E A D

Early Age Development

CONNECTING EDUCATION WITH LIFE

NO-TECH ROUTE

Twelve real problems. Find one. Fix it. Prove it.

Twelve complete projects that need paper, a pen and conversations. No device and no connection at any step. They reach the same findings as the High-Tech route and are marked against the same twenty points.

12	120	/20	6
projects, one per industry	steps, written out in full	how the work is marked	weeks, start to defence

THE TWELVE PROJECTS IN THIS BOOKLET

01 **The Sixty-Litre Dinner**
Agriculture & Climate

02 **The Sugar You Did Not Order**
Health & Preventive Medicine

03 **The Prayer-Time Error**
Space & Cosmos

04 **The Thing That Keeps Breaking**
Engineering & Robotics

05 **The Four-Hundred-Unit Leak**
Energy & Smart Systems

06 **The Ten Minutes That Teach**
Education & Future Learning

07 **Where The Money Actually Went**
FinTech & Ethical Economy

08 **The Rule Nobody Follows**
Law & Governance

09 **The Lie This Street Believes**
Media & Deepfake

10 **The Trigger**
Psychology & Behaviour

11 **The Cheapest Clean**
Matter & Chemistry

12 **The Question Nobody Asked**
Sociology & Future Society

We print this with your school's name on the cover. Your brand on the front, ours beneath it, printed and delivered to your campus.

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Start here - what you are actually going to do

This page has no special words in it. Everything after it explains how the work is checked, and you do not need any of that today.

Pick one thing that annoys your household. The electricity bill. The food that gets thrown away. A rule nobody follows. Something you already complain about.

Measure it for about two weeks. Properly, the same way each time, and write the number down with the date beside it. Do not change anything yet - this number is the whole foundation, and you cannot get it back later.

Then change one thing. One. Not five. Something that costs nothing.

Measure the same number again, the same way, for two or three more weeks.

At the end you can say a sentence like this one, and back every word of it:

> ***"Our fridge was costing us four hundred and thirty rupees a month. I moved it away from the cooker and it dropped to three hundred and ten. Here is how I know, and here is what else might explain it."***

That is the entire method. Six weeks, a few hours a week, alongside school.

> **Read the calendar line before you choose**
>
> Every project's first page carries a line saying how many **measurement days** it needs. That is calendar, not effort. A fortnight of daily readings is fourteen days and about two hours of work - but it cannot be caught up in week five. Pick a project whose calendar fits your term.

Seven things people ask first

How old do I need to be? There is no age. If you can read these steps and write down a number, you can start. Nobody is asked for a birthday or a grade.

Do I need to buy anything? No. Every project lists what it needs on its own page, and every project has a school version that uses the school's equipment. If your household does not have a scale, a meter or a spare hour, that is planned for, not a problem.

Do I need a teacher? For the steps, no - they are written out in full. For the project, yes: a teacher sends the expert request, holds the code key, and witnesses the defence. Nothing in here asks you to contact an adult on your own.

What if my change does not work? That is a real result and it scores higher than a win you cannot prove. Nobody loses marks for an honest failure.

What does it cost? The projects, the assessment and the mark are free, and always will be. Certification costs a fee per learner, and no learner is ever blocked from it by cost - a school, a sponsor or the community fund covers anybody who passes and cannot pay.

How long does it really take? About six weeks, and one and a half to three hours a week. Read the calendar line on your project's first page before you start: several projects need measurements running from week one, and those cannot be caught up later.

Where do I start? Turn to the contents, pick the project whose title annoys you most, and read its first three steps tonight.

How this booklet works

Every project in here runs the same way. You measure something ordinary in your own life until you can say what it costs. Then you change one thing and measure it again. That is the whole method, and it is why the result is worth something to somebody other than your teacher.

ACT 1 - STEPS 1 TO 5

Find the problem

Measure it. Your teacher puts one question to somebody who deals with it for a living. Work out what it costs, per week or per year. You end with a costed problem statement: whose problem, what it costs, and the evidence behind the number.

ACT 2 - STEPS 6 TO 10

Fix it and measure

Change one thing. Not five. Measure the same quantity the same way and report what happened, including when nothing happened. You end with a before figure, an after figure, and an honest answer about what caused the difference.

Nine things you hand in - progress reads 0/9

#	Deliverable	Strand	Due	What it feeds
1	**Question card**	Research	Week 2	The artefact - whether the change is traceable to a costed problem
2	**Expert interview pack**	Outreach	Week 3	Gate one - the expert row
3	**Evidence log**	Research	Week 4	Gate two - the baseline; and the artefact
4	**Failure log**	Process	Week 4	The process and its failures
5	**The build**	Design	Week 5	The artefact
6	**One-page explainer**	Design	Week 5	The artefact
7	**Identity card**	Branding	Week 5	The artefact
8	**Relations ledger**	Outreach	Week 6	Gate one - all ten coded relationships
9	**The defence**	Defence	Week 6	The defence

Two gates. Neither can be waived.

The ten relationships. Ten logged relationships are required per project, written as codes and never as names: one professional (E1), three people the problem affects (A1-A3), three peers who reviewed the work before it was finished (P1-P3), and three people who saw the finished work and replied (R1-R3). Until all ten are logged with dates and roles, the work is not marked and no score out of twenty is issued. If the professional never replies, the gate is met by the questions as sent, the dated attempts, and one named published source in their place - you are never asked to compel a reply.

The baseline. An effect claimed without the same quantity measured before the change is returned unmarked, because there is nothing to measure against. A baseline counts only when it carries a number with its unit, the dates it was taken on, the instrument or source behind it, and a written method that the after-measurement then repeats.

Four tiers - capability, never age

Declare your tier in week two. It can be revised down once, without penalty, before your evidence log goes in. Nobody is asked for a birthday or a grade.

Tier	What "secure" evidence means here
Starter	The written method was followed with no gap: same instrument, same times, every zero entered rather than left blank, and one professional's answer recorded through your school.
Practitioner	You chose what to measure and can defend that choice, every borrowed figure is cited to its page or table, and one chart is read correctly by somebody with nobody standing there explaining the axes.
Researcher	The protocol was written and dated before the first reading, the length of the after-period is justified rather than assumed, and the error from the instrument, the divisor and any borrowed coefficient is quantified rather than mentioned.
Contributor	The figure is set against published work you name - a printed report, a leaflet, a standard or a table, on paper or on screen - the method survives a specialist who disagrees with it, and every raw reading is kept so a school can share it on request and a stranger can recompute the result.

How the work is marked

Twenty marks, three strands, and the bands are printed here rather than kept somewhere else. A marker gives the band that the evidence reaches, not the band the learner intended.

The artefact - 6 marks

Is the one change traceable to the costed problem, and was the same quantity measured the same way before and after, so a stranger could repeat both halves?

6	A stranger could repeat both halves from the page alone. Every figure carries its unit, its date and its source. The chart is read correctly by somebody with nobody standing there explaining the axes. Units never share an axis that they cannot share.
4	The before and after are the same quantity measured the same way, and most figures are sourced. One chart or one column needs the learner present to be understood.
2	A change was made and something was measured, but the before and after are not the same quantity, or the sources are missing, or the divisor moved between the two halves.

The process and its failures - 6 marks

Does the record show a change that was actually run, slipped somewhere, and was measured honestly anyway, rather than a plan written up after the result was known?

6	The failure log is dated and specific, and each entry says what that slip did to the comparison. The protocol predates the first reading and any rewrite is logged with its date. Confounders are named, including the ones that weaken the result.
4	A real failure log exists with dates, and the protocol predates the data, but the effect of the slips on the comparison is asserted rather than worked out.
2	The log records only that things went well, or was written in one sitting at the end. The protocol cannot be shown to predate the readings.

The defence - 8 marks

Asked whether this would have happened anyway without the change, does the learner reason from their own before-and-after data, or repeat the result more slowly?

8	Answers unseen questions from their own numbers. Names the limit of their own method before being pushed to it, says what a fourth week or a larger sample would most likely have shown, and can say plainly what the figure cannot tell anybody.
6	Answers from their own data and concedes limits when they are put to them, but does not raise them first.
4	Repeats the finding accurately and can point to where each number came from, but treats challenges as attacks on the result rather than questions about the method.
2	Restates the conclusion. Cannot say where a figure came from, or defends a number the log does not support.

A well-measured failure scores higher than an unmeasured success.

If your change did not work and you measured it properly, say so plainly. It costs you nothing and it is worth more than a tidy number nobody can check. That rule is in the bands above, not only in this box: an honest null result reaches 6 on the artefact and 6 on process, and a defence that explains why the change did nothing reaches 8.

The six weeks, week by week

The ten steps do not spread evenly across six weeks, and the deliverables are not evenly spaced either. This is the shape every project follows. Your project's own first page tells you how many measurement days it needs on top of this.

When	What happens	What is due
Week 1	Read the project. Declare your tier. Write the protocol and get it dated before you measure anything. Start the baseline - most projects need it running from day one.	**Nothing is due. If your project needs fourteen measurement days, this is the week that decides whether it finishes.**
Week 2	Finish the baseline. Steps 1 to 3. Your teacher sends the expert request this week, not next.	**Due: the question card.**
Week 3	Steps 4 and 5. The costed problem statement takes shape. The expert reply, or the logged attempts and the substitute source, lands here.	**Due: the expert interview pack.**
Week 4	Steps 6 and 7. Name the one change, write the prediction and date it, agree the rules, and put the change in place.	**Due: the evidence log and the failure log.**
Week 5	Steps 8 and 9. The after-period runs. Build the chart, write the explainer, name the measurement.	**Due: the build, the one-page explainer and the identity card.**
Week 6	Step 10. Show it to real people, complete the coded ledger, and stand the defence.	**Due: the relations ledger and the defence.**

> **The week that decides the project is week one**
>
> Most projects need the baseline running from day one. A learner who starts measuring in week three has no baseline, and no baseline means no mark - not a lower mark. If week one is gone, change project rather than shorten the baseline.

If you finish the after-period early

Do not stop measuring. A longer after-period is worth more than an extra artefact, because it is the only thing that tells you whether your first week was a fluke.

If you run out of time

Shorten the after-period and say so on the chart itself. Never shorten the baseline, and never fill a missing day from memory. A missing reading is data; an invented one destroys the whole table.

Before you knock on any door

This programme asks you to measure real households and to hear from real professionals. That is what makes the result worth something, and it is the part with rules. These are not suggestions.

Consent, every time

- Ask before you measure anybody's home, spending or behaviour, in words, and write down that they agreed.
- Anybody may stop at any point without giving a reason. When they do, stop the same day, mark the row withdrawn with the date, and do not use anything already recorded.
- Never call twice at a door that said no, and never go back to anyone who asked not to be called on again.
- Your teacher makes every approach to an adult outside the school. You write the questions; the school sends them.

Where you go, and with whom

- Never do fieldwork alone. A named adult goes with you and stays within sight - not an adult who merely knows where you are.
- Never enter anybody's home. Measure at a counter, a gate, a reception, your school, or on a call.
- Daylight only. Finish before dark, or take the reading with the named adult beside you.
- Never open, unscrew, reach into or climb to reach anything. Read meters and machines from a normal standing distance or not at all.

What never goes into a submission

Phone numbers, addresses, email addresses, house numbers, bank or card numbers, anybody's income or debt, anybody's medical treatment or diagnosis, a photograph of a face nobody agreed to, or a photograph of another person's child. People appear as codes with a role and a date. Never record a complaint about a named person - write the problem, not the accusation.

If something worries you

If a conversation turns to something that worries you about a person's safety, stop the project conversation, promise no secrecy, and write down what was said in their own words the same day. If anybody becomes angry, leave at once, say nothing back, and write it down as soon as you are away. **Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.** That is not optional and it never affects your mark.

What your school puts in place before week one

Parental consent	A signed form for every learner, held by the school, covering measurement at home, any work outside the home, the coded ledger, and how long the work is kept. The form is at the back of this booklet and may be copied freely.
Risk assessment	One generic assessment plus the named hazards for the project each learner has chosen. The hazard table for all twelve projects is at the back of this booklet.
The contact protocol	No learner contacts an adult outside the school on their own account. The teacher makes every approach, from a school address, and keeps the log. The protocol is at the back of this booklet.
The data statement	What is collected, who can see it, where it is held and when it is destroyed. The statement is at the back of this booklet and should be given to parents with the consent form.
A named adult per learner	Somebody who knows where the learner is, when they will be back, and who accompanies them for any measurement outside the home. This is a person, not a policy.
Your own safeguarding policy	EAD does not supply your child protection policy or your local off-site rules. Ask your safeguarding lead which ones apply before week one.

The words this booklet uses

Twenty-seven words do all the work in here. Learn these and every project reads easily. Each one is written in bold the first time a project uses it.

Baseline	The number as things are now, before you change anything, with the date and the instrument written beside it. Everything is compared against this, and you cannot get it back once you have changed something.
After-figure	The same number, measured the same way, once the change has been running.
Costed problem statement	One page saying whose problem it is and what it costs them per week or per year - in money, litres, minutes or waste - with the evidence behind that number.
The one change	The single thing you change. One, not five. If two things move at once, nobody can say which one caused the result.
Confounder	Something else that changed during the same weeks and might explain your result instead of your change - a wedding, a price rise, a guest, a season. You list them rather than hide them.
Instrument	The thing you measure with: a scale, a meter, a stopwatch, a tally sheet. Use the same one before and after.
Least count	The smallest step your instrument can show. A meter that moves in tenths cannot tell you about hundredths. Find it before you set any tolerance.
Divisor	What you divide by to make figures comparable: per person, per plate, per week. Keep it the same both times.
Protocol	The written rule for how you will measure, agreed and dated before you start, so the after-measurement repeats the before exactly.
Sample	The people, days or items you actually measured, out of all the ones you could have.
Granularity	The smallest change your sample can show. With twenty people your figure moves in steps of five points, so a three-point change is not a finding.
Median	The middle value when you line every figure up in order. It is not the average, and it is harder for one very large figure to distort.
Percentage points	The difference between two percentages. From 40 per cent to 45 per cent is five percentage points, not five per cent.
Blind	The person scoring does not know which sample is which, so their expectation cannot move the score. Somebody else holds the key.
Verbatim	The exact words somebody said, written down as they said them. Your summary of what they meant is not verbatim.
Measured or reported	Measured means you took the reading yourself. Reported means somebody told you. Mark every figure M or R and never add the two into one total without saying which is which.
Modelled	A figure worked out from a smaller measured figure, such as a street total scaled from five households. Always print how many it rests on.
Null result	The change made no difference. This is a real result and it scores well when it is measured properly.
Artefact	The thing you hand in that shows the work: the chart, the log, the build, the explainer.
Evidence log	Every reading with its date, time and source. The spine of the whole project.
Failure log	Everything that went wrong, dated, and what each slip did to the comparison.
Relations ledger	Ten coded entries - E1, A1 to A3, P1 to P3, R1 to R3 - each with a role, a date and what that person said. Names never appear; the key stays with your teacher.
Defence	Ten to twelve minutes of questions you have not seen, about your own numbers, answered in front of two witnesses who sign the page. Eight of the twenty marks.
Gate	A rule that must be met before anything is marked at all. There are two, and neither is a score.
Tier	How deep your work goes - Starter, Practitioner, Researcher or Contributor. You declare it. It is never your age.
Elapsed days	The calendar the project needs, as opposed to the hours it takes. A fortnight of daily readings is fourteen elapsed days and about two hours of work.
School variant	The same method run on school property with a member of staff, for anyone whose home, street or budget makes the household version impossible. It scores exactly the same.

The twelve projects in this booklet

Pick the title that annoys you most. The line under each one tells you what you will be measuring and how many days of calendar it needs.

1. The Sixty-Litre Dinner
Agriculture & Climate - litres of water behind one plate of one dinner, and what that plate cost in your local currency

28 measurement days

2. The Sugar You Did Not Order
Health & Preventive Medicine - level teaspoons of total sugars drunk by the household in one week, with the part added by a manufacturer or a shop reported on its own line

Fourteen logging days

3. The Prayer-Time Error
Space & Cosmos - minutes between the published time and the event observed from one fixed spot

Twenty-one evening slots inside six weeks

4. The Thing That Keeps Breaking
Engineering & Robotics - failures of one object per hundred identical uses, and failures per fortnight in ordinary use

Twenty-eight logging days

5. The Four-Hundred-Unit Leak
Energy & Smart Systems - kilowatt-hours per month for one appliance or one habit, and what those units cost at that supply's own rate

Thirty-five measurement days

6. The Ten Minutes That Teach
Education & Future Learning - the percentage of an immediate twenty-question test score still present about seventy-two hours later, averaged across the people taught

Ten measurement days across two groups

7. Where The Money Actually Went
FinTech & Ethical Economy - the share of one purse's outflow taken by each category, in per cent, and the change in that share between two fortnights, in percentage points

Twenty-eight consecutive logging days at ten minutes a day

8. The Rule Nobody Follows
Law & Governance - compliance rate for one rule, as a percentage of observed instances, with the instance count written beside it

Twenty counting days across four counting weeks

9. The Lie This Street Believes
Media & Deepfake - percentage of twenty people who say the claim is true, which can only move in steps of five points

Thirty-two calendar days at least

10. The Trigger
Psychology & Behaviour - occurrences per day of one defined habit of your own, and the share of those occurrences carrying the top cue, written as a percentage

Twenty-eight logging days plus one change day between the two fort…

11. The Cheapest Clean
Matter & Chemistry - rupees per use to shift one standard stain, and the mean removal score out of five those rupees buy

28 measurement days inside six weeks

12. The Question Nobody Asked
Sociology & Future Society - minutes lost per household per week on the problem residents raise most, and the modelled hours the street loses each month

Six weeks

Every project has a school version

If your household has no scale, no meter, no clear horizon, no spare hour or no wish to be measured, every project in here can be run on school property with a member of staff instead. It is marked exactly the same and it is written on each project's own page. Nobody is left without a project.

PROJECT 01 - AGRICULTURE & CLIMATE

The Sixty-Litre Dinner

Weigh tonight's dinner, then count the litres of water standing behind it that nobody at the table sees.

THE QUESTION

How many litres of water, and how much money in your local currency, stand behind one plate of a dinner you actually eat, and which single item carries most of both?

Every litre on your plate was rained on, pumped or piped somewhere upstream, and the food industry is now asked to report those litres to buyers, lenders and regulators. Water-footprint accounting is paid work in farming, food processing and export, because a shipment with no defensible water number is getting harder to sell. The method you use on one dinner is the method used on a whole supply chain: mass, a published coefficient, a cited source, and an honest statement of what the number leaves out.

ACT 1 - FIND

You take one dinner your household cooks anyway and account for it item by item: raw mass on one plate, the money actually paid, and litres of water per kilogram taken from a published source you name beside the number. You also weigh what gets thrown away across seven days, because food thrown out carries its whole footprint with it.

A one-page costed problem statement carrying four lines: whose dinner, litres of water per plate, cost per plate, and litres and money per year at the rate this household actually eats it, with the caveat that the yearly figure is extrapolated from four cooked meals. Beside it sits a bar chart of litres per item, largest bar first, and a source line against every coefficient used.

ACT 2 - FIX

You change exactly one thing - an ingredient swapped, a portion cut, a shop changed, or one form of waste stopped - and cook the same dish on three dates across three weeks. Every weighing, price and source is repeated identically, so the only moving part is the change you named.

A four-bar chart of litres per plate, baseline against weeks one, two and three, with the mean after-figure, the difference in litres and money per year, the spread of your own three weeks, a named list of confounders, and the household's recorded answer on whether the change stays.

YOU MEASURE

litres of water behind one plate of one dinner, and what that plate cost in your local currency

BEFORE

Raw mass in grams of every ingredient on one plate, multiplied by a published litres-per-kilogram figure with its source recorded beside it, plus the litres attached to food weighed into the bin over the same seven days. Taken once, before anything is changed.

AFTER

The identical dish measured the identical way on three dates across three weeks, using the same scale, the same divisor and the same published sources, reported as a mean with all three weeks shown separately beside the single baseline week.

The calendar this needs

28 measurement days: one baseline week of waste weighing and three cooking dates a week apart. Start the baseline in week 1 or this will not finish.

Safety and ethics - not optional

- Measure a meal the household was cooking anyway. Do not cook anything extra for this project and do not use the stove, hot oil or a sharp knife for it - every weighing is of raw, cold ingredients before they go in the pot.
- Nobody's plate gets smaller for the sake of the number. Weigh what is served, and if a portion or an ingredient changes in Act 2, agree it first with the person who has to eat it.
- Weigh raw meat, fish and eggs in a bowl or on a plate, never directly on the scale surface. Wash your hands and the bowl afterwards, before touching the notebook or the phone.
- Handle only your own household's food waste, in a bowl kept for the purpose, and wash your hands after every weighing. Never open a neighbour's bin, a shop's bin or a street container.
- This project touches money. Record what a plate of food cost and nothing else - never what the household earns, never what it owes, never what it cannot afford, and never anybody's name beside a price.
- Go to the shop with the adult who normally shops, not on your own and never after dark. That adult stays with you while you copy prices, and you copy prices from the shelf or the board rather than questioning shopkeepers.
- If anyone reacts badly to your questions, stop, leave and write down what happened. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

What you use - no-tech route

- A kitchen scale, or a marked measuring cup and a one-litre bottle for anything liquid
- A notebook ruled into six columns with a pen and a ruler: item, grams, money, litres per kilogram, source, litres on plate
- The household's shop receipts, or a card carrying prices copied at the shop counter
- A printed litres-per-kilogram table with its source written across the top, supplied free by your teacher or read in a library
- Squared paper for the bar charts, drawn to a stated scale, and a ruler
- One bowl kept by the sink for the week's food waste

A scale, a notebook and a pen produce the same litres figure; the only thing borrowed from outside is the published coefficient table, and your teacher or a library supplies that at no cost, so never pay anyone to copy it.

The school version of this project

Run the same method on one school serving with a member of staff. Weigh the raw ingredients for a single portion on the school scale before cooking, price them from the school's own purchase records rather than any household's, and take the litres-per-kilogram figures from the printed table the teacher supplies. The waste week becomes seven school days of one class's plate scrapings, weighed with staff present. No household is named, and nothing about anybody's home enters the submission. This is a full-mark route, not a reduced one.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Choose the meal

40 MINUTES · The two plate records are made at the meal itself, which the household was cooking anyway.

Pick one dinner your household cooks anyway and lock it as the meal you will measure four times.

- Ask whoever cooks which dinner repeats most often, and write the dish and its usual night at the top of a fresh page.
- List every item that goes into it on one line each, including oil, salt, tea and anything drunk alongside it.
- Rule six columns across the page: item, grams, money, litres per kilogram, source, litres on plate.
- Draw the plate as served to a stated scale, name every item on it, and write the scale you drew to across the corner.
- Draw the same plate again after eating, from the same position, so the two drawings can be set side by side.
- Write the dish, the date and the number of people served across the top of the page.

WRITE THIS DOWN

The dish name, the date, the number of people served, and one row per ingredient.

DONE WHEN

There is one row per item, and a dated record of the same plate before and after eating.

Watch out. Watch out. Choosing a meal you never normally eat because it sounds interesting. Pick the repeated, boring one - you have to cook it three more times.

2 Weigh the plate

70 MINUTES · The No-Tech route writes every division out longhand, which is why it takes longer. The weighing itself sits inside cooking that was happening anyway.

Measure the raw mass of every ingredient that ends up on one person's plate.

- Zero the scale with the empty bowl on it, then weigh each raw ingredient in grams before it goes in the pot.
- Where there is no scale, measure by level cupfuls, weigh one cupful once on a shop's scale with the adult who took you there, and write that conversion at the top of the page.
- Where the pot serves five, divide every figure by five and write the division out longhand in the margin so it can be checked.
- Measure oil, milk and water in a marked cup or a one-litre bottle and write the millilitres, with the conversion you used for oil written beside it.
- Weigh the served plate too, and record raw and cooked mass on separate lines, because the published figures attach to raw mass.

WRITE THIS DOWN

Raw grams per person for every item, the divisor used, and a mark against anything estimated rather than weighed.

DONE WHEN

Every row carries a raw mass in grams per person, and nothing on the page says 'about'.

Watch out. Watch out. Weighing cooked rice and treating it as raw. Cooked grain has absorbed water and weighs far more than the dry grain it came from - weigh it dry, or state the conversion you used and where it came from.

3 Price the plate

60 MINUTES · plus the walk to the shop with the adult who normally shops, on a day they are going anyway.

Work out what one plate cost, in your local currency, from prices actually paid rather than from memory.

- Collect the receipts and, where there are none, go with the adult who normally shops and copy the current price per kilogram onto your card at the counter. Do not go alone.
- Ask whoever shops where each item was bought and write the shop name beside the price.
- Do the arithmetic longhand in the margin: price per kilogram divided by one thousand, multiplied by grams on the plate.
- Worked example only, in rupees, to show the shape of the sum: rice at 180 rupees a kilogram, 90 g on the plate, 180 / 1000 x 90 = 16.20 rupees. Use your own currency and your own prices.
- Add cooking fuel as one line, marked as an estimate, with the reason written beside it.
- Write the currency once at the head of the column, and use that one currency everywhere in the project.

WRITE THIS DOWN

The cost of each item on one plate, in your local currency, the shop each price came from, and the total for one plate.

DONE WHEN

The plate total is one figure in one named currency, and every price behind it traces to a receipt or a shop visit recorded in the log.

Watch out. Watch out. Using a price you remember from last year, or a shop price nobody in this household actually paid. Use what was actually paid, and where you cannot recover it, say so beside the number.

4 Find the litres

75 MINUTES · On the No-Tech route, ask your teacher for the printed table in week 1: it can take several days to arrive, and that wait is not work time.

Look up the published water footprint per kilogram for each item and convert it to litres on your plate.

- Ask your teacher for a printed litres-per-kilogram table - the Water Footprint Network product figures, or the Our World in Data table of freshwater use per kilogram. A library copy does the same job. It should cost you nothing.
- Write the source across the top of the page: the organisation, the table name and the date you obtained it.
- Copy only the ingredients you need, one per row, with units, and write the source again in the source column of each row.
- Multiply litres per kilogram by kilograms on the plate longhand, leaving the working visible on the page.
- Write this line on the same page as the numbers you have just produced: These litres-per-kilogram figures are national or global averages. They are not a measurement of the field that grew your food, and the true figure for your district could be higher or lower.
- Underline the largest single figure and write one line on what that coefficient includes and excludes, in the source's own words.

WRITE THIS DOWN

Litres per item, the total litres for one plate, the exact source line beside every coefficient, and the sentence saying those coefficients are averages measured somewhere else.

DONE WHEN

You can name the single item carrying the biggest share of the litres, point to the exact published line the figure came from, and show the averages caveat written beside your own total.

Watch out. Watch out. Treating a published coefficient as the truth for your district. These are national or global averages - write that limit down now, because the defence will ask for it.

5 Weigh the waste

35 MINUTES · plus 10 minutes a day for 7 days, at the sink, after meals. The seven days run whether you are working or not, so start them in week 1.

Measure the food this household throws away over one week and attach its full footprint to it.

- Keep one bowl by the sink for seven days; after every meal scrape uneaten food into it and weigh it before it goes in the bin.
- Weigh anything thrown out uncooked from the fridge as well, item by item, and write the reason it was thrown.
- Apply the same borrowed coefficient to the wasted mass, because the water was already spent before the food was binned.
- Rule two more lines at the foot of the page: grams wasted this week, litres thrown away this week.
- Write a zero on any day nothing was wasted, on the day itself, not from memory at the end of the week.

WRITE THIS DOWN

Grams wasted each day for seven days, the reason for each, and the week's litres-wasted total.

DONE WHEN

Seven daily waste figures exist, including the days that were zero, and the weekly litres figure sits with the rest of the table.

Watch out. Watch out. Leaving the cell empty on a day nothing was wasted. A zero is a measurement; an empty cell is a hole in the week.

Worked fragment - one plate converted from grams to litres

Item	Raw grams per person	Litres per kilogram (published)	Litres on this plate	Source line
Rice, dry	90	2500	225	Water Footprint Network, Product Gallery, rice, obtained 4 March
Chicken	70	4325	303	Water Footprint Network, Product Gallery, chicken meat, obtained 4 March
Cooking oil	12	5000	60	Our World in Data, Environmental Impacts of Food Production, palm oil, obtained 4 March
Onion	40	345	14	Water Footprint Network, Product Gallery, onion, obtained 4 March
Tomato	60	214	13	Water Footprint Network, Product Gallery, tomato, obtained 4 March
Total for one plate	272	-	615	All five coefficients are national or global averages, not this district

The arithmetic, written out: Chicken: 70 g / 1000 = 0.070 kg; 0.070 kg x 4325 litres per kilogram = 302.75 litres, written as 303 litres on this plate. Plate total: 225 + 303 + 60 + 14 + 13 = 615 litres.

What a marker looks for: A marker multiplies two columns and checks the third: grams divided by a thousand, times the published coefficient, must give the litres shown, and every coefficient must carry a named source with a date beside it.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost

75 MINUTES · The No-Tech route draws the bar chart by hand on squared paper and works the yearly arithmetic longhand.

Finish the costed problem statement on one page and choose the single change you will make.

- Write four lines: whose problem this is, litres per plate, cost per plate in your local currency, and litres and money per year at this household's real frequency.
- Work the yearly figure from how often this dish is actually cooked: meals per week x 52, longhand. If the household counts in months rather than weeks, use 4.33 weeks in a month and write 4.33 on the page where you used it.
- Write this beside the yearly figure: it is extrapolated from one baseline meal and three cooked meals. This assumes those meals are typical. Write one reason they might not be.
- Draw the litres-per-item bar chart on squared paper, largest bar first, with the scale stated and the finding as the title. Litres only on that axis; money belongs on a second chart, never the same one.
- List three possible changes - swap an ingredient, cut a portion, change where an item is bought, stop one form of waste - with the litres each would save, then choose one and write: 'I will change X to Y for three weeks and expect litres per plate to fall from A to B.'
- Read the page aloud to whoever cooks and have them sign and date it if they agree to the change.

WRITE THIS DOWN

The one-page costed problem statement with its extrapolation caveat, the three candidate changes with predicted savings, and the chosen change as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once and repeats your litres number back correctly.

Watch out. Watch out. Choosing the change that saves most on paper but nobody at home will accept. A change abandoned in week one measures nothing - choose the one that survives.

7 Agree the rules

50 MINUTES

Write the protocol that keeps the after-measurement identical to the before-measurement, and give the measurement its name.

- Write what stays fixed: same dish, same scale, same number of people, same shops, same weighing point in the cooking.
- Write what is allowed to move: only the one thing you named in step six.
- Rule three blank labelled rows for weeks one, two and three before any data exists, and write the three dates beside them.
- Write the three dates on the household's wall calendar as well, and tell everyone who eats the meal.
- Write the identity card now: a name for the measurement, a one-line promise, and the single sentence you want repeated at somebody else's dinner table.
- Write your prediction on the page, date it, and have one person witness it with their signature.

WRITE THIS DOWN

The protocol as a numbered list, the three dates, the identity card, and the witnessed, dated prediction.

DONE WHEN

Three empty labelled rows wait for three weeks, the measurement has a name and a one-line promise, and the prediction exists before the data does.

Watch out. Watch out. Deciding the measurement rules after seeing week one. Anything rewritten once data exists goes in the failure log with the date it was rewritten.

8 Measure week one

60 MINUTES · This falls on a cooking night, not a free evening. Book it with the household a week ahead.

Cook the meal with the change in place and measure exactly the quantities you measured before.

- Weigh every raw item again in grams per person, using the same scale and the same divisor.
- Write down the prices paid this week rather than copying the Act 1 prices down the page.
- Use the same printed coefficient table you wrote the source on - do not change source in the middle of an experiment.
- Weigh this meal's waste into the same bowl and add it to the running count.
- Write what went wrong: a substitute ingredient, an extra guest, a forgotten weighing.

WRITE THIS DOWN

The week one row complete - grams, money, litres, waste - plus a dated failure entry.

DONE WHEN

Week one carries every column the baseline had, and the failure log holds at least one honest entry.

Watch out. Watch out. Removing the row for the ingredient you swapped away instead of entering zero. Enter the zero; the comparison depends on the same rows existing in both periods.

9 Weeks two and three

80 MINUTES · plus 45 minutes on each of the two booked cooking nights, 60 on the No-Tech route, one week apart. The minutes here are the arithmetic and the chart afterwards.

Repeat the identical measurement twice more, compare all three weeks against the baseline, and say plainly what three measurements cannot show.

- Cook and measure on the two booked dates, changing nothing except what the protocol allows.
- Add the three after-weeks and divide by three, longhand, to get the mean litres per plate, then set it against the single baseline plate.
- Draw four bars on squared paper to one stated scale: baseline, week one, week two, week three, in litres per plate. Litres only on that axis; the money comparison is a second chart.
- Work out the spread of your own three after-weeks - highest minus lowest - and write it as a percentage of the baseline. That spread is the smallest change you can honestly claim. Do not claim a change smaller than it.
- Write this sentence in full: three after-weeks show how much this dish varies after the change, but one baseline week shows nothing about how much it varied before. You can say the after-mean is higher or lower than that single baseline. You cannot say the difference is larger than ordinary week-to-week variation, because you never measured ordinary variation before the change.
- List every confounder you can name - guests, a price rise, an ingredient out of stock, a different cook, a different appetite - and write the change as a number and as a percentage.

WRITE THIS DOWN

The four-bar chart, the mean after-figure, the difference in litres and in money per year, the spread of the three after-weeks, and the confounder list.

DONE WHEN

You can state the before number, the after number, the spread of your three after-weeks, and at least two reasons the difference might not be your doing.

Watch out. Watch out. Reporting the best of the three weeks. Report all three, including the week that went backwards - a well-measured failure outscores an unmeasured success.

10 Defend it and record what stays

90 MINUTES · The defence itself is 10 to 12 minutes of that, answered live in front of two witnesses. The rest is the explainer, the ledger and the household's answer.

Defend the finding to people who can question it, and record what the household will keep.

- Sit the defence: ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page. There is no recording on this route; the two signatures and the date are the record.
- Read the one-page explainer to three people who eat this meal and write down what each of them said.
- Hand the chart to your teacher to pass to the professional you interviewed, with one question written on it: what would you have measured that I did not.
- Ask the household whether the change stays and why, in front of a witness, and write the answer down word for word without prompting them.
- Complete the relations ledger in codes only - E1 the expert, A1 to A3 the people affected, P1 to P3 peers, R1 to R3 those who replied - each with role, date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Give the pack to your school. Where your school agrees it may be shared, it is shared through the school and nowhere else.

WRITE THIS DOWN

The defence page signed and dated by two witnesses, the one-page explainer, and the coded relations ledger holding ten entries.

DONE WHEN

Ten coded relationships are logged with roles, dates and replies, no name appears in the ledger, and the household has said on the record whether the change stays.

Watch out. Watch out. Calling it a success because the household said they liked it. The metric is litres and money - report those first and opinions second.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-ruled card naming the dish, the household and the number of eaters, and the question: how many litres of water and how much money stand behind one plate of this, and which item carries most of both.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for an agronomist or irrigation engineer, your plate figures copied out as one page, the date and how you asked, the fact that your teacher sent it, and the reply recorded word for word. If no reply comes, the dated attempts and one named printed substitute source complete this pack.

3 - RESEARCH - WEEK 4

Evidence log

Every weighing in grams with its date, every price with the shop it came from, and every litres-per-kilogram coefficient hand-copied with its printed source written across the top of the page. Nothing unsourced survives here.

4 - PROCESS - WEEK 4

Failure log

The weighings you missed, the ingredient substituted mid-experiment, the week the swap was abandoned, the guest who doubled the pot, and what each of them did to the comparison, all dated.

5 - DESIGN - WEEK 5

The build

The measuring set-up itself - scale, waste bowl, ruled notebook page - together with the four-bar comparison chart of litres per plate drawn on squared paper to a stated scale, baseline against the three after-weeks, litres on the one axis.

6 - DESIGN - WEEK 5

One-page explainer

One hand-written page a neighbour reads in ninety seconds: the dish, the litres per plate, the money per year, the one change, the three-week result, the line stating that the litres-per-kilogram figures are national or global averages rather than a measurement of the field that grew your food, the line stating that the yearly figure is extrapolated from four cooked meals, and what this figure cannot tell anybody.

7 - BRANDING - WEEK 5

Identity card

Written in step seven: a name and a one-line promise for the measurement, so the household can refer to it by name, plus the single sentence you want repeated at somebody else's dinner table.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries with role, date and reply, and no names: E1 the agronomist, A1 to A3 the people who eat this meal, P1 to P3 the peers who checked your arithmetic, R1 to R3 those you passed the chart to who answered. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page: the plate, the litres figure, the source of every coefficient, the one change, the three-week result, and the limits you accept without argument. There is no recording on this route. The two signatures and the date are the record.

The four tiers, in this project

Starter

You weigh one plate, price it from real receipts, look up every litres-per-kilogram figure with its source written beside it, and put your five questions to one professional through your school.

Practitioner

Everything in Starter, and you choose which meal to measure and defend that choice, cite every borrowed figure to its exact page and date, and produce one chart a reader who was not there reads correctly without you explaining the axes.

Researcher

Contributor

Everything in Practitioner, and you write the protocol before the first weighing, justify three after-weeks rather than one, state the spread of your own three weeks as the smallest change you are willing to claim, and quantify the error your scale, your per-person divisor and globally averaged coefficients introduce.

Everything in Researcher, and you set your plate figure against a named published water-footprint study you can show in print, put your method to a professional who disagrees with part of it and record what they said word for word, and make your raw weighings and every source available through your school on request, where your school agrees they may be published.

The one professional you must hear from

Who. An agronomist, irrigation engineer or agricultural extension officer - somebody who decides how much water a crop actually gets. A rice mill manager, a dairy farm manager or a food company's sustainability officer works equally well.

Where your school finds one. Hand your teacher a written list of institutions and roles: the district agriculture extension office, the agriculture or water-resources department of a nearby university, the provincial irrigation department, an agricultural research institute, or a rice mill, dairy or vegetable market office. Your teacher writes to the institution and asks for whoever holds that role. The reply comes back through the school, and you wait for it.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has weighed the raw ingredients of one plate of a cooked dinner, then worked out [number] litres of water behind it from published per-kilogram figures. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. For the crop you know best, how many litres of water reach one kilogram at the farm gate, and how do you know that figure?
2. Published water footprints are national or global averages. How far off would that average be for a field in this district, and in which direction?
3. Which ingredient on a plate like this one would you expect to be the most water-expensive, before I show you my numbers?
4. When a farmer changes one practice, how long before the change shows up in water use, and how is it measured?
5. If a buyer asked you to prove a shipment's water footprint tomorrow, what evidence would you actually send them?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would this drop in litres have happened anyway without your change, and how do you know?
2. Your litres-per-kilogram figures are averages taken somewhere else. What would the figure be for the field that actually grew your rice, and how would you find that out?
3. You measured one week before and three weeks after. Convince me three is enough, and tell me what you cannot say at all because the baseline was measured only once.
4. Your yearly figure comes from four cooked meals. What would make a whole year look nothing like those four meals?
5. If the household goes back to the old ingredient next month, what was this project worth, in litres and in money?
6. Show me one number in your table you would not defend, and tell me why it is still there.

If you get stuck

- If nobody replies to your interview request - then give your teacher the five questions exactly as they were sent, with the date of every attempt, and take your answers instead from one named published source you can show in print. That path scores: the questions as sent, the dated attempts and the named substitute source are the evidence.
- If the household or the site says no - then run the school variant: one school serving, weighed with a member of staff, priced from the school's own purchase records, with no household named anywhere in the submission.
- If your before and after look the same - then report that as the finding, check first whether the change was actually kept on every one of the twenty-one days, and write what you find in the failure log.
- If you cannot weigh an item - then measure it by level cupfuls, weigh one cupful once on a shop's scale with the adult who took you there, write that conversion at the top of the page, and mark the row as estimated.
- If you cannot get hold of a printed coefficient table - then ask your teacher for one printed page. A teacher-supplied page or a library copy is free, and you should never pay anybody to copy it.
- If you run out of time - then shorten the after-period to two weeks rather than dropping the baseline, and state the shortened period on the chart itself.

Finished early?

Measure the same dish cooked in a second household that agrees to it in advance, and set the two plates side by side, item by item, on one chart in litres.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 02 - HEALTH & PREVENTIVE MEDICINE

The Sugar You Did Not Order

Log seven days of drinks, convert them to level teaspoons, and separate the sugar nobody in the house chose.

THE QUESTION

How many level teaspoons of sugar does your household drink in one week, how much of it was added by somebody else, and which single drink carries most of them?

Sugar in drinks is a product decision made by manufacturers and tea stalls, and it is measured in grams per hundred millilitres on a label almost nobody reads. Governments tax or regulate sugar in beverages and manufacturers reformulate in response, so converting labels into an honest household total is paid work for dietitians, public-health analysts and product teams. The method here is theirs: a defined population, a fixed window, a published composition figure per unit, a stated conversion, and a plain account of what the total leaves out.

ACT 1 - FIND

You count what your household drinks, not what it eats. Every drink taken by every logged person over seven days is recorded by volume, the grams of sugar per hundred millilitres are read off the panel where there is one, the sugar spooned in at home is counted in level teaspoons, and the whole week becomes one number: level teaspoons of sugar drunk, with the part somebody else added shown on its own line.

A one-page costed problem statement carrying four lines: which household and how many people, level teaspoons drunk in the week with the added part stated separately, the same figure across a year with its caveat beside it, and the rupees those drinks cost. Beside it sits a bar chart of teaspoons by drink type, largest bar first, with the source of every sugar figure named and your own measured grams per level teaspoon stated on the page.

ACT 2 - FIX

You swap exactly one drink - one item, not all of them - agreed in advance with whoever drinks it, and you leave everything else in the household untouched. Seven days later you count the identical seven days in the identical way, using the same log, the same codes, the same measured teaspoon and the same conversion, so the only moving part is the one swap you named.

A two-panel chart: level teaspoons per household per week, baseline against swap week, on one panel, and the rupee difference on a second panel because it is a different unit. Beside them, the swapped drink's own before-and-after line, a named list of confounders, and the household's recorded answer on whether the swap stays.

YOU MEASURE

level teaspoons of total sugars drunk by the household in one week, with the part added by a manufacturer or a shop reported on its own line

BEFORE

Seven consecutive days of logging every drink by volume. For each row: millilitres times grams of sugar per hundred millilitres, divided by one hundred, gives grams; grams divided by your measured grams per level teaspoon gives teaspoons. Sugar spooned in at home is already in teaspoons and is counted once. Taken before anything is swapped.

AFTER

The same seven weekdays logged the same way one week later, by the same people, with the same log sheet, the same label figures, the same conversion and the same measured grams per teaspoon. Reported as a whole-household total in level teaspoons, with the added-sugar part and the swapped drink each shown on their own line.

The calendar this needs

Fourteen logging days: seven baseline days and seven swap days a week apart, plus the day the labels are read. Start the baseline in week 1 or the swap week will not finish before moderation.

Safety and ethics - not optional

- Nobody is weighed, nobody is measured, no calories are counted, and no remark about anyone's size, shape or appearance goes in the log, the chart, the explainer or the defence. There are no diets, no targets and no use of the word should. Say plainly on the front page that this is a study of a product and a habit, never of a person's body.
- Nobody is named anywhere, including members of your own family. Use adult 1, adult 2, person 3 in the log and the same codes in the write-up, the chart and the defence. Anybody may refuse to be logged at the start and anybody may withdraw at any point without giving a reason; when they do, their rows stop, the row is marked withdrawn with the date, and nothing already recorded is used against them.
- If anyone being logged looks uncomfortable, goes quiet about it, or says they would rather not, stop logging that person immediately and write it in the failure log as a recorded event with the date. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session. A household total taken from fewer people is a real finding reported with its limits; a total taken from someone who did not want to be counted is not.
- This project touches health and money, so neither enters the submission attached to a person. No condition, no medication, no pregnancy, no fast kept for a health reason, no dietary restriction, and no remark about what a household can or cannot afford goes in the log, the chart, the explainer or the defence. Log the drink and say nothing about the reason for it.
- Nobody is denied a drink at any point, in either week. The swap in Act 2 is one drink, agreed in advance with the person who drinks it, and either of you can end it. Weigh dry sugar cold, in a bowl on the scale, and do not prepare extra drinks for the project.
- Any trip out of the house for this project - to a shop, a pharmacy or a library - is made with a named adult who goes with you, not merely one who knows you have gone. In a shop you ask a member of staff for permission before you copy anything off a bottle, and you accept a no.
- If anyone reacts badly to being asked about drinks, stop, leave and write it down. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

What you use - no-tech route

A large sheet of paper taped by the kettle, ruled into seven dated day blocks, with columns for time, person code, drink, millilitres, spoons added and sugar code

A marked measuring jug, or a one-litre bottle and a pen, to mark the household's cups and glasses once

A kitchen scale - the grams in one level teaspoon, measured by you rather than borrowed

A box kept under the sink - every bottle, carton, tin and sachet from the week, so the panels can be read at the end

A notebook and a pen - the evidence log, the failure log, the daily completeness note and all the longhand working

Squared paper and a ruler - the teaspoons-by-drink chart and the two-panel comparison, each drawn to a stated scale

A sheet on the wall, a scale and a level teaspoon produce the identical total, and where there is no scale at home ask your teacher for the school balance rather than printing a figure you did not measure.

The school version of this project

Where there is no co-operative household, no scale and no kept packets, run the same method on the school's own drinks. With a member of staff, log every drink sold or brought into one room for seven school days, by volume and by seat code rather than by person. Read the panels off the packets the school already holds, weigh ten level teaspoons on the science-room balance, and swap one item on the counter for the second week with the staff member's agreement. Everything else in the method is unchanged.

Act 1 - find the problem

steps 1 to 5, ending with a costed problem statement

1 Set the rules

55 MINUTES · No-Tech takes longer because the wall sheet is ruled by hand before anything is written on it.

Agree who is being logged, on what terms, and build the empty log before a single drink is counted.

- Sit the household down together and read out one sentence: this counts drinks, not people, nobody is weighed and nobody is named.
- Give each person a code - adult 1, adult 2, person 3 - write the codes at the head of the wall sheet, and tell everyone they may stop being logged at any point without giving a reason.
- Tape a large sheet by the kettle, rule seven dated day blocks down it, and rule six columns across: time, person code, drink, millilitres, spoons added, sugar code.
- Write the seven dates in now, including the days you expect to be quiet.
- Write across the top of the sheet: this project is about a product and a habit, never about a person's body.
- Agree with your teacher which week is the baseline week, so the swap week still finishes before moderation.

WRITE THIS DOWN

The person codes with no names beside them, the seven dates, the empty column headings including the sugar code column, and one line recording that everyone agreed and how they were told they could withdraw.

DONE WHEN

The log exists with seven dated day blocks and no data in them, and every person being logged can say in their own words how they would stop.

Watch out. Watch out. Starting the log first and asking permission afterwards. Permission collected after the fact is not permission, and a household that feels watched changes what it drinks before you have measured anything.

2 Log seven days

30 MINUTES · Plus 20 minutes a day for 7 days at the kettle. Those seven days are the baseline week and they cannot be shortened or run in parallel with anything else.

Record every drink taken by every logged person for seven consecutive days, by volume.

- Measure the household's usual cup, glass and bottle once with a jug, write the millilitres of each at the top of the sheet, and log by vessel afterwards.
- Hang the pen on a string beside the sheet and mark each drink as it is poured, not at the end of the day from memory.
- Log everything with sugar in it or on it: tea, coffee, soft drinks, packaged and fresh juice, flavoured milk, lassi, squash, cordial, energy drinks, sweetened yoghurt drinks and sweetened lemonade.
- Log drinks taken outside the house too, marked with the letter O, and log plain water and unsweetened tea as zero rows so the week is complete.
- Write one line in the notebook each evening saying whether anything was missed and roughly how much.
- Keep every bottle, carton and sachet in a box under the sink for the whole week instead of throwing it away.

WRITE THIS DOWN

One row per drink with date, time, person code, drink, millilitres and where it was drunk, plus a nightly completeness note.

DONE WHEN

Seven consecutive days each carry at least one row, no day is blank, the daily completeness notes exist including the ones admitting misses, and the box holds the week's empty packets.

Watch out. Watch out. Reconstructing three days on Sunday evening. Memory undercounts drinks badly, especially tea. Log at the kettle, and where you did reconstruct, mark those rows as reconstructed rather than pretending.

3 Read the labels

70 MINUTES · No-Tech adds about 30 minutes for one accompanied trip out, and only where a drink left no packet in the box.

Get grams of sugar per hundred millilitres for every packaged drink, and mark on every row who put the sugar there.

- Empty the box onto the table and sort the packets into one pile per drink.
- Copy the sugars figure per hundred millilitres from each nutrition panel into a table in the notebook, one row per drink, with the brand and the pack size beside it.
- Where a panel gives sugar per serving, write the serving size in millilitres and do the conversion longhand in the margin so the working stays visible.
- For any drink that left no packet, go to a shop with a named adult who goes with you, ask a member of staff first whether you may copy a nutrition panel, copy it only if they agree, and write the shop, the date and the adult's initials beside the figure.
- For fresh juice, plain milk or a home-made yoghurt drink, ask your teacher for a printed composition table, or read one from a printed reference in a public library with the adult who came with you, and write its title and page across the top of your table.
- Give every row a sugar code: A where a manufacturer or a shop added it, H where somebody added it at home, N where nobody added it and it is the milk's or the fruit's own sugar, M where the panel gives one total sugars figure and does not say which part was added.

WRITE THIS DOWN

Sugar grams per hundred millilitres for every packaged drink, the exact source beside each one, and the sugar code on every row of the log.

DONE WHEN

Every packaged drink in the log has a sugar figure with a source somebody who was not there could go and check, and every row carries one of the four sugar codes.

Watch out. Watch out. Copying the per-serving figure into the per-hundred-millilitres column. A serving is often more than a hundred millilitres and sometimes far less; do the conversion where it can be seen rather than in your head.

4 Weigh the spoons

60 MINUTES · The three days of watching tea being made sit inside the ordinary day and need no extra block; the longhand division adds about 15 minutes on the No-Tech route.

Measure the sugar added at home, which no label will ever tell you, and measure your own teaspoon rather than borrowing one.

- Put a small bowl on a kitchen scale, zero it, add ten level teaspoons counted out loud, weigh the total, divide by ten longhand, and write the grams in one level teaspoon at the top of the sheet.
- Report the figure you measured and cite the standard beside it, in this shape: one level teaspoon equals 4.2 g measured here, and 4 g is the figure usually quoted. Never print the standard in place of your own.
- Where there is no scale at home, ask your teacher to weigh the ten spoons on the school balance with you present, and write down whose balance it was and the date.
- Watch the tea being made for three days and count the level teaspoons that go in, asking whoever makes it to spoon as normally as they can while you count.
- Where sugar goes into a shared pot, count the spoons into the pot, count the cups poured out of it, and write the division out longhand.
- Level every spoon against the rim with a knife before counting it, and say so on the page.

WRITE THIS DOWN

Grams in one level teaspoon as measured by you, with the four-gram standard cited beside it and not instead of it, the spoons added per cup for each home-made drink, the pot divisor where one applies, and a mark against anything estimated rather than counted.

DONE WHEN

Every home-made drink row carries a spoons-added figure, and the grams-per-teaspoon figure on the page is your own measurement with the borrowed standard printed beside it.

Watch out. Watch out. Counting heaped spoons as level ones. A heaped spoon can hold close to twice a level one. Level them against the rim, or weigh a heaped spoon once and use that weight instead.

5 Convert to teaspoons

120 MINUTES · No-Tech takes about twice as long because every row is worked longhand and the chart is ruled by hand; split it into two sittings of about an hour on different days.

Turn the whole week into one number anybody understands: level teaspoons of sugar drunk, with the part somebody else added on its own line.

- For every row that has a panel figure, work the grams longhand in the margin: millilitres multiplied by grams of sugar per hundred millilitres, divided by one hundred. The division by one hundred is not optional, and leaving it out is the first error a marker looks for.
- Turn those grams into teaspoons by dividing by your measured grams in one level teaspoon, and leave the division on the page.
- Sugar spooned in at home is already counted in level teaspoons. Write the spoon count straight into the teaspoons column. Do not turn it into grams and then back into teaspoons, and never do both.
- Where one drink carries a panel figure and spooned sugar, add the two teaspoon figures together in that row and say so beside it.
- Add the teaspoons column up twice, once from the top and once from the bottom, then rule four summary tables at the foot of the sheet: teaspoons for the week, teaspoons by drink type, teaspoons by person code, and teaspoons by sugar code.
- Draw the teaspoons-by-drink bar chart on squared paper, largest bar first, with the scale stated and the finding as the title.

WRITE THIS DOWN

Teaspoons per row, the week's household total, the four sugar-code subtotals, the breakdown by drink type and by person code, and the chart.

DONE WHEN

You can say the household's weekly teaspoon total out loud without looking, say how many of those teaspoons carry the code A, and name the single drink carrying the biggest share of the total.

Watch out. Watch out. Reporting one enormous grams figure, or counting the home spoons twice. Grams mean nothing at the dinner table and teaspoons mean everything, and a spoon turned into grams and then back into a spoon has been counted twice. Convert once, and put the conversion you used on the same page as the number.

Worked fragment - five rows of the evidence log, with the conversion done once

Drink	Millilitres	Sugar g per 100 ml	Sugar code	Level teaspoons
Cola, 330 ml tin	330	10.6	A	8.3
Tea, made at home, 2 level spoons	150	no panel	H	2.0
Flavoured milk carton	200	9.0	M	4.3
Plain milk	250	4.7	N	2.8
Orange squash, made up	250	4.0	A	2.4

The arithmetic, written out: 330 ml x 10.6 g per 100 ml / 100 = 34.98 g of sugar; 34.98 g / 4.2 g per level teaspoon = 8.3 level teaspoons. The tea is not converted at all: 2 level spoons counted in is 2.0 level teaspoons. These five rows total 19.8 teaspoons, of which code A, the part added by a manufacturer or a shop, is 8.3 + 2.4 = 10.7.

What a marker looks for: A marker checks that the division by one hundred is on the page, that the home spoons were counted once rather than turned into grams and back, that the grams-per-teaspoon figure is the learner's own measurement with 4 g cited beside it, and that every row carries a sugar code so the added part can be separated from the total.

Act 2 - fix it and measure

steps 6 to 10, ending with a proven effect

6 Name the cost

70 MINUTES · No-Tech copies the chart by hand onto the statement page, which is the whole of the difference.

Finish the costed problem statement on one page, name the measurement, and choose the single drink you will swap.

- Write four lines: which household and how many people, level teaspoons drunk this week with the code A part stated separately, the same figure multiplied across fifty-two weeks, and the rupees the week's drinks cost from receipts or shop prices.
- Beside the yearly figure write this: this assumes the fortnight is typical. Then write one reason it might not be. If you also give a monthly figure, the weeks in a month is 4.33, not 4, and you state that on the page.
- Copy the teaspoons-by-drink chart onto the same page with your measured grams per level teaspoon printed under it and the four-gram standard in brackets beside it.
- Write the identity card on the same page: a name for the measurement, a one-line promise, and the single sentence you want repeated at somebody else's table, carrying the number and no judgement.
- List three possible swaps with the teaspoons each would save: replace one packaged drink with water or unsweetened tea, halve the spoons in one home-made drink, or change one bottle size.
- Choose one, and only one, and write: for one week we will swap X for Y and expect the household total to fall from A teaspoons to B. Read the page aloud to the person who actually drinks that drink and have them sign and date it if they agree, or record their refusal and choose another swap.

WRITE THIS DOWN

The one-page costed problem statement with the yearly caveat written out, the identity card, the three candidate swaps with predicted savings, the chosen swap as one testable sentence, and the dated agreement of the person affected.

DONE WHEN

Somebody who was not there reads the page once and repeats the teaspoon number back correctly, the measurement has a name and a one-line promise, and the person whose drink changes has agreed on the record.

Watch out. Watch out. Swapping everything at once because the total looks bad. Swap one drink. Change five and you will never know which one moved the number, and the household will abandon all five by Wednesday.

7 Agree the protocol

50 MINUTES · No-Tech rules and dates a fresh wall sheet by hand before any data exists.

Write down what must stay identical in the second week so the two weeks can be compared at all.

- Write what is fixed: same seven weekdays, same people and codes, same cups and vessels, same ruled sheet, same panel figures, same measured grams per teaspoon.
- Write what is allowed to move: only the one drink named in step six.
- Rule and date a fresh wall sheet for the swap week before any data exists, and tell everyone which day it starts.
- Remind everyone, out loud, that anybody may withdraw at any point without giving a reason, and that the swap week changes nothing about that.
- Buy or prepare the replacement drink before day one, so nobody is stuck without a choice at the moment of habit.
- Write your prediction at the foot of the page, date it, and have one person witness it with a signature.

WRITE THIS DOWN

The protocol as a numbered list, the seven swap-week dates, and the dated prediction with its timestamp or its witness signature.

DONE WHEN

Seven empty labelled day blocks exist for the swap week, and a prediction exists that plainly predates the data.

Watch out. Watch out. Running the swap week in a week that is not normal - a holiday, a wedding, guests, exams. Pick an ordinary week, and if the week turns out not to be ordinary, write that down rather than hiding it.

8 Run the swap

20 MINUTES · Plus 20 minutes a day for 7 days at the kettle, one week after the baseline week ends.

Log the swap week exactly as you logged the baseline week, changing nothing else.

- Mark every drink at the kettle again, in the same columns, with the same person codes and the same sugar codes.
- Give the replacement drink its own row with its own panel figure or spoon count, rather than writing a zero and moving on.
- Write the swapped drink as zero on the days it did not happen, and write it honestly on any day it came back.
- Write one line each evening on how the swap held: kept, partly kept, or abandoned, and why.
- If anyone asks to stop being logged, stop that person's rows the same minute, mark them withdrawn with the date, and carry on with the rest.

WRITE THIS DOWN

Seven complete swap-week days, the daily kept-or-broken line, and any withdrawal recorded with its date.

DONE WHEN

The swap week carries every column the baseline week had, and the failure log holds at least one honest entry about a day the swap slipped or a drink went unrecorded.

Watch out. Watch out. Quietly not logging the day the old drink came back. That day is the most informative day in the fortnight. Log it, and say what happened just before it.

9 Compare the weeks

90 MINUTES · No-Tech adds about 35 minutes for the second longhand total, added twice, and for two hand-ruled panels.

Set the two weeks side by side and report the difference honestly, including if there is none.

- Total the swap week in teaspoons in exactly the same way, adding the column twice, and write the two totals side by side.
- Draw the two bars on squared paper to one stated scale starting at zero, baseline against swap week, in level teaspoons per household per week.
- Rule the rupee difference as a second panel of its own. Teaspoons and rupees are different units and they never share an axis.
- Draw the swapped drink on a third small panel, so a reader can see whether the swap worked and the household total still did not move.
- Write the change as teaspoons and as a percentage, then write the granularity line: one level teaspoon in a weekly total of 120 teaspoons is 0.8 of a percentage point, so work out what one teaspoon is worth in your own total and do not claim a change smaller than that.
- List every confounder by name: a guest, a hot week, a fast, an illness, a person withdrawing, a price change, somebody drinking more of something else instead.

WRITE THIS DOWN

The teaspoons panel, the rupees panel, the swapped-drink panel, the difference in teaspoons and in rupees, the granularity line, and the named confounder list.

DONE WHEN

You can state the before number, the after number, the smallest change your total is able to show, and at least two reasons the difference might not be your doing.

Watch out. Watch out. Explaining away a week that went the wrong way. Report it. A well-measured failure outscores an unmeasured success, and substitution - more of something else - is the finding a dietitian will most want to hear.

10 Share and reflect

100 MINUTES · The defence itself is ten to twelve minutes; the rest is the three showings, the expert's question and the coded ledger. No-Tech writes the ledger out by hand.

Defend the finding to real people, record what the household will keep, and close the ledger without naming anybody.

- Deliver the defence out loud: ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page. There is no recording on this route; the signed page is the evidence.
- Read the one-page explainer to three people who drink these drinks and write down what each of them said.
- Hand or post the two-panel chart to the expert through your teacher with one question: what would you have counted that I did not.
- Ask the household, without prompting them, whether the swap stays, and write the answer down word for word using codes rather than names.
- Close the relations ledger with ten coded entries: E1 the expert, A1 to A3 the people affected by the drinks bill, P1 to P3 the peers who checked your arithmetic, R1 to R3 those you sent the chart to who answered. Each carries a role, a date and what they said. No name appears in the ledger.
- Write the name-to-code key once, on the teacher's sheet. The school holds it and destroys it after moderation, and it never travels with your submission.

WRITE THIS DOWN

The defence page with two witness signatures and dates, the one-page explainer, the coded relations ledger with ten entries, and the household's recorded answer on whether the swap stays.

DONE WHEN

Ten coded relationships are logged with roles, dates and replies, no person is named anywhere in the submission because the key sits on the teacher's sheet alone, and the household has said on record whether the swap stays.

Watch out. Watch out. Ending with advice about what people should drink. You measured a product and a habit for two weeks. Report the number, report the limits, and let the household decide.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-ruled card naming the household size, the seven baseline dates and the person codes, and the question: how many level teaspoons of sugar does this household drink in a week, how much of it was added by somebody else, and which drink carries most.

2 - OUTREACH - WEEK 3

Expert interview pack

Five questions for a dietitian, school nurse, community pharmacist or public-health nutrition analyst; your weekly teaspoon total attached as one page with no names on it; the letter exactly as your teacher sent it on school paper; the date and how you asked; and the reply word for word, either the printed reply kept in the pack or copied out by hand.

3 - RESEARCH - WEEK 4

Evidence log

Every drink row with date, time, person code, millilitres and sugar code; every sugar figure with the kept packet itself, or the panel hand-copied with the shop, the date and the accompanying adult's initials written across the top; your measured grams per level teaspoon with the four-gram standard cited beside it; and every spoon count with its date.

4 - PROCESS - WEEK 5

Failure log

The drinks logged from memory, the days the swap broke and why, anyone who withdrew and when, the panel you could not read, the row you had to estimate, and what each of them did to the comparison, all dated in the notebook.

5 - DESIGN - WEEK 3

The build

The logging system itself - the ruled wall sheet, the marked cups, the kitchen scale and the weighed teaspoon - together with the comparison chart of teaspoons per household per week, baseline against swap week, drawn on squared paper to a stated scale, with rupees kept on a separate panel.

6 - DESIGN - WEEK 5

One-page explainer

One handwritten page a neighbour reads in ninety seconds: the teaspoon total, how much of it was added by somebody else, the drink that carried most, the one swap, the second week's total, and what this figure cannot tell anybody about anybody's health.

7 - BRANDING - WEEK 4

Identity card

Written in step six on the problem-statement page: a name and a one-line promise for the measurement so the household can refer to it by name, plus the single sentence you want repeated at somebody else's table, carrying the number and no judgement.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries with role, date and what each one said: E1 the expert, A1 to A3 the people affected by the drinks bill, P1 to P3 the peers who checked your arithmetic, R1 to R3 those you sent the chart to who answered. No name appears in the ledger. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the teaspoon total, how much of it was added by somebody else, the source of every sugar figure, the one swap, the result, and the limits you accept without argument. There is no recording on this route; the signed and dated page is the evidence.

The four tiers, in this project

Starter

You log seven consecutive days without missing a drink, read the sugar figure off at least five panels yourself, weigh ten level teaspoons and report the grams in one, produce a weekly household total in level teaspoons, and put five questions to one professional who works with food or health.

Practitioner

Everything above, and you decide which drinks count and defend the boundary in writing, code every row A, H, N or M so the added part can be separated from the total, cite every sugar figure to the panel or published entry it came from, and produce one chart a reader takes the right number from without you explaining the axes.

Researcher

Everything above, and you write the protocol and the prediction before day one and have them dated and witnessed, justify seven days rather than three, state the smallest change your total is able to show, and put a number on the error introduced by unlabelled drinks, shared pots and drinks taken outside the house.

Contributor

Everything above, and you set your household figure beside one named printed published survey of beverage sugar intake and say where the two differ and why, put your method to a dietitian or pharmacist who disagrees with part of it and record the disagreement unchanged rather than answering it, and hold the coded daily log so your school can share it, where your school agrees it may be shared, with anybody who asks to recompute your total.

The one professional you must hear from

Who. A dietitian or nutritionist, a school nurse, a community pharmacist, or a public-health nutrition analyst. Converting composition figures into intakes is their daily work, they know which drinks a household forgets to mention, and they know what usually happens to the rest of the diet when one item changes.

Where your school finds one. Ask your teacher for the school's brokered contact list, then send a letter on school paper to the dietetics department of the nearest hospital, to the school nursing service, or to a community pharmacy your teacher telephones first. Address the department and the role, never a named individual. A printed professional directory in a public library gives you the postal address.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has logged seven days of drinks for one household, converting the panel figures into level teaspoons of sugar and reaching [number] teaspoons for the week. Could you spare fifteen minutes, on a call with me present or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you count sugar from drinks, what do you count and what do you deliberately leave out?
2. How far off is a household's own seven-day log likely to be, and does it usually undercount or overcount?
3. Which drink in a normal week do people most often forget to mention to you, and why that one?
4. When somebody changes one drink, what usually happens to the rest of what they drink, and how would I detect that in my log?
5. If you had my seven days of data, what one extra column would you have asked me to record?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Show me the division by one hundred in your working. Where is it, and what would your weekly total have been if you had left it out?
2. Your title says the sugar you did not order. Which rows in your log did somebody in this house order, and how many teaspoons of the total is that?
3. Would the second week's total have fallen anyway without your swap, and how do you know?
4. Your figures come from panels and from spoons you counted. Which of the two do you trust less, and what would it take to check it?
5. Somebody in the household drank more of something else during the swap week. Show me where in your data you would see that, or explain why you could not.
6. You logged seven days. Convince me seven is enough, and tell me what a different week of the year would most likely have looked like.

If you get stuck

- If nobody replies to the requests your teacher sent - then take the expert-unreachable path, which still scores: keep the five questions exactly as they were sent, list every dated attempt and how you asked, and answer the questions against one named printed published source instead, saying plainly on the page that this is a substitute for a reply.
- If the household or the site says no - then run the school variant with a member of staff on school property, log the school's own drinks for seven days by seat code, and record the refusal as a dated line in the failure log without naming anybody.
- If your baseline and swap weeks look the same - then report that as the finding, check the daily kept-or-broken lines to see whether the swap was actually held on all seven days, and look for a drink that grew while the swapped one shrank.
- If a drink has no panel and no published entry - then measure it directly: count the spoons that went into the pot, count the cups poured out of it, divide, and mark the row as measured rather than sourced.
- If somebody reacts badly to being asked about their drinks - then stop logging that person the same minute, write it in the failure log with the date, tell the adult who knows where you are the same day, and tell your teacher before the next session.
- If you run out of time - then keep both weeks at seven days and cut the number of drinks you cover rather than the number of days, and state on the chart exactly which drinks were excluded and why.

Finished early?

Log a second household of a different size for the same seven days and set the two weekly totals side by side per person, still using codes and no names.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 03 - SPACE & COSMOS

The Prayer-Time Error

Time the sunset from one fixed spot for eight clear evenings and find how far the table is out.

THE QUESTION

How many minutes does the printed timetable differ from the event you actually see from one fixed spot, and where does that difference come from?

A published time is the output of a model, and the moment you see is an observation; the gap between the two is exactly what positional astronomy exists to account for. Surveyors, satellite operators, flight planners and anybody who publishes an almanac are paid to know the size of that gap, its causes and its limits. The method here is theirs: fix a station, prove the clock, observe repeatedly, and report the residual with its spread instead of one confident number.

ACT 1 - FIND

You stand on one marked ground-level spot, with a named adult beside you, on the evenings of a twelve-evening window until eight of them are usable, and record to the minute, against a clock you have proved, the moment the last light leaves your skyline edge. You set that against what each published source states for the same dates.

A one-page costed problem statement carrying four lines: whose problem this is, the mean signed difference in minutes at this spot with its combined error and the number of usable evenings behind it, the worst evening of the window, and the minutes one person was out across the days you actually observed. Beside it sits a chart of the signed difference against date with a line at zero, the source and stated location of every published time, and one line stating that this is an observation and not a verdict, and that questions of religious practice belong to a qualified scholar.

ACT 2 - FIX

You build a corrected sheet for this one spot, covering only the dates you observed near and a short window you state, with its evidence, its error and its expiry date printed on the same page. Your teacher reads it before anybody else does. Five people take a copy, and you observe a nine-evening window against it until six evenings are usable.

The residual difference in minutes between the corrected sheet and the fresh observations, reported with the same combined error and the same count of usable evenings, the adoption count in user-days backed by tick sheets the users keep themselves rather than by memory, and every user's answer to the same two questions recorded against A1 to A5 and never against a name, including the answers of those who stopped.

YOU MEASURE

minutes between the published time and the event observed from one fixed spot

BEFORE

Eight usable evenings inside a twelve-evening window, observed from one chalk-marked spot at a marked eye height, each read to the minute from a clock set against a stated public reference and subtracted from every published time for that date. Reported as a mean with its range and its combined error, cloudy evenings marked unusable and never filled in.

AFTER

Six usable evenings inside a nine-evening window, observed from the identical spot at the identical eye height with the identical clock, subtracted from the corrected sheet you published. Reported the same way, with the same error beside it, alongside the count of user-days recorded by the five people using the sheet.

The calendar this needs

Twenty-one evening slots inside six weeks: twelve slots in weeks one and two to collect eight usable baseline evenings, and nine slots in week five to collect six usable evenings against your corrected sheet; if cloud takes the sky, print the number of usable evenings beside every mean, never fill a gap, and below six usable before or four after say plainly that the mean is provisional and the comparison is not settled.

Safety and ethics - not optional

- Never look at the sun. Not with the naked eye, not through a phone or camera screen, not through glasses, sunglasses, binoculars, a telescope or any lens. Keep your eyes on the wall top, the ridge or the horizon edge and note the moment the light leaves that edge.
- A named adult is at the spot with you for the whole of every observation slot taken outdoors, not merely aware that you are out. Write that adult's name and the agreed slot into the protocol before the first evening. No adult, no observation.
- Use a ground-level spot: a doorway, a courtyard, or a ground-floor window looking west. Do not observe from a roof, a parapet, a balcony edge, an unlit street or an open plot. If the view needs a climb, choose a different spot.
- Take nothing to the observation spot that you would not want to drop, hold nothing over an edge, and drag nothing to the edge to see further.
- This project measures visibility from one spot. It is not a religious ruling. Write on every page you publish that this is an observation and not a verdict, and that questions of religious practice belong to a qualified scholar.
- Nobody's name, age, address, health, money or religious practice enters your submission. Users are recorded as A1 to A5 with their role only, and anyone may stop at any time, without giving a reason, with their line taken out that day.
- If anybody reacts angrily to the sheet or to being asked, stop, leave, and write down what happened. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

What you use - no-tech route

One fixed ground-level spot marked with chalk, with a card taped at eye height on the frame beside it

A watch with a second hand, set once against a named public reference clock and re-checked against it once at the end

The printed wall calendar or timetable, kept undamaged, and a newspaper carrying the same daily times as the second printed source

A notebook ruled into six columns: date, calendar time, newspaper time, observed time, signed difference, sky

Squared paper, a ruler and a pencil for the difference chart drawn to a stated scale, one source per panel

A pinned paper sheet carrying the corrected table copied out by hand, plus five hand-copied copies

Two printed sources, one watch set once against a named public clock and a ruled notebook give the same minutes figure without a single computation; nothing enters the notebook that you did not read off a printed page or a watch face, and if you cannot reach a public reference clock on foot with your adult, take the school-site variant and use the office clock the school names.

The school version of this project

Run it on school property, and run it properly. The school marks one spot in the yard with paint and a card at eye height, and a member of staff stands with you for every slot. One office clock, set once against a stated public reference, serves everybody. Observe on the evenings the school can staff, print that number beside every mean, and take both printed sources from the library. The corrected sheet goes on the school notice board, where the school agrees it may go.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Fix the spot

50 MINUTES · Do this with the named adult who will stand with you every evening, so the slot is agreed before the first observation.

One spot, one eye height, one named adult, fixed before the first evening so nothing moves for six weeks.

- Choose a ground-level spot with a view of the western skyline: a doorway, a courtyard, or a ground-floor window looking west. No roof, no parapet, no balcony edge.
- Agree the evening slot with the named adult who will stand with you, and write their name, their role and the agreed times into the protocol.
- Mark the standing position with chalk and tape a card at your eye height on the frame beside you, so height as well as position is fixed.
- Draw the western skyline across the first page of the notebook to a stated scale, and mark on it the wall top, ridge or roof line the sun goes behind.
- Pace out and write down where the spot sits: which room or which side of the building, how many paces from a named door, and the length of your pace in centimetres.
- Write one line on what blocks the true horizon and roughly how high it stands above your eye height.

WRITE THIS DOWN

The description of the spot, the eye-height mark, the named adult with their role and the agreed slot, and the skyline drawing or photograph with the blocking edge marked on it.

DONE WHEN

Another person can stand on your mark, put their eyes at the taped height and see the skyline you recorded, and the named adult has agreed the slot in writing.

Watch out. Stepping half a metre aside because the view is better. A different standing point puts a different edge in the way and moves the moment of disappearance; mark the spot and keep it.

2 Prove the clock

45 MINUTES · The No-Tech route adds one walk to the public reference clock with the named adult, and one more walk at the end of the project to record the drift.

Get one clock you can defend, and write down exactly how far it could be moving your answer.

- Name one public reference clock you can reach on foot with the named adult: a railway station clock, the school office clock, a radio time signal, or the speaking clock on a landline telephone.
- Set your watch against it to the second, once, and write down which clock it was, where it stands, the date and the time you set it.
- Write the tolerance you are accepting: this project accepts a watch within one minute, so the watch alone can move your answer by up to one minute.
- Go back to the same reference clock once at the end of the project and write the drift in seconds, including a zero if it has not drifted.
- Agree the rules aloud with the named adult: which spot, which slot, that they stand with you throughout, and that you never look at the sun or through any lens.

WRITE THIS DOWN

The clock or device named, where it was set from and when, the tolerance you accept in minutes, and the agreed slot with the named adult.

DONE WHEN

You can name the reference, state the date it was set, and state in one sentence how much of your final answer the clock alone could account for.

Watch out. Reading the time off a wall clock nobody has set this year. An argument decided by minutes cannot be settled by a clock that is four minutes out.

3 Read the tables

60 MINUTES · The No-Tech route copies both printed sources by hand and writes each source's provenance across the top of the page, which takes about a third again as long.

Record what each published source states for the twelve dates of your window, before you observe a single one of them.

- Fix the window first: twelve consecutive dates starting on the first day of week one. Eight usable evenings out of those twelve is the target.
- Copy the wall calendar or printed timetable times for those twelve dates into the first column, exactly as printed.
- Copy a newspaper's daily times for the same twelve dates into the second column, and write the newspaper's name and issue date across the top of the page.
- Write down which city, zone or point each source says it was computed for; where it does not say, write 'not stated'.
- Write where each printed page came from and on what date you copied it, so the copy can be traced back to the page.
- Rule the remaining columns: observed time, signed difference in minutes, sky condition, notes.

WRITE THIS DOWN

Twelve dated rows carrying every published time you will test against, with the name, the stated location and the copying date beside each source.

DONE WHEN

Every date in the window carries every published time, and another person can find each printed source from what you wrote down.

Watch out. Assuming two published tables agree and copying only one. Copy both; the gap between two published tables is a finding on its own.

4 Watch the baseline window

20 MINUTES · Plus 20 minutes on each evening of the twelve-evening window, with the named adult, until eight evenings are usable. Waiting for a clear sky is not work, but it is calendar time: book all twelve slots in weeks one and two and stop at eight usable.

Observe the moment itself from the fixed spot and record it to the minute, or record honestly that you could not.

- Stand on the chalk mark ten minutes before the printed time, with the named adult at the spot with you for the whole slot.
- Keep your eyes on the wall top, ridge or horizon edge and never on the disc itself, and use no glasses, binoculars, telescope or lens of any kind.
- Note the minute the last light leaves that edge, reading the watch you set in step two.
- Write the reading in the notebook while still standing on the mark, before you move.
- Record the sky in three words - clear, hazy, cloud on the horizon, dust - and mark any evening you could not see the edge as unusable rather than guessing.
- Stop when eight evenings are usable or when the twelve slots are gone, whichever comes first, and write down which of the two it was.

WRITE THIS DOWN

A dated observed time to the minute for every usable evening, the sky condition for each, and a clear mark against every evening lost to weather or to a missing adult.

DONE WHEN

Eight usable evenings carry an observed time, or the window is spent and the shortfall is written down as a shortfall; every unusable evening is written down as unusable rather than left blank.

Watch out. Filling in a cloudy evening from the printed table so the row looks complete. A missing observation is data; an invented one destroys the whole table.

5 Work out the error

85 MINUTES · The No-Tech route does every subtraction, the mean, the error budget and the drift check longhand, which takes about half as long again.

Turn the readings into one signed mean with an error you can defend, and say whether the offset holds steady or drifts.

- Subtract each published time from the observed time for every usable date, longhand in the margin, keeping the sign so early and late stay apart.
- Add the differences and divide by the count of usable evenings, longhand, then underline the largest and the smallest and write the count beside the mean.
- Add up the error budget and write the rule: the watch accepted within one minute, the reading taken to the whole minute at half a minute, your judgement of the moment at half a minute, and the published time printed to the whole minute at half a minute, so 1 + 0.5 + 0.5 + 0.5 = 2.5 minutes on any single evening; the mean of eight or more usable evenings is good to no better than plus or minus 1.5 minutes, because the watch offset does not average away and the reading wobble does. Never claim a difference smaller than that.
- Split the usable evenings into the first half and the second half, take a mean of each longhand, and write down whether the offset holds steady across the window or drifts, and by how many minutes per week.
- Draw the window on squared paper: difference in minutes up the side, date along the bottom, a ruled line at zero, the scale stated, and one panel per source so no two sources share an axis.
- Write one plain paragraph on why an error exists at all: the table is computed for a city centre or a broad zone, while you stand at your own longitude, your own altitude and behind your own wall, and a wall or a hill changes the moment the sun disappears from where you are standing.

WRITE THIS DOWN

The signed difference for every usable date, the mean and the range for each source with the count of usable evenings beside it, the error budget in full, the drift answer in minutes per week, and the paragraph explaining where the difference comes from.

DONE WHEN

You can state the mean difference in minutes for your spot with its error and its count of usable evenings, and say whether it holds steady across the window or drifts.

Watch out. Dropping the signs and averaging the sizes. Three minutes early and three minutes late average to zero, not to three, and the direction is the whole finding.

Worked fragment - five rows of a baseline observation log

Date	Calendar time	Observed time	Signed difference (min)	Sky
04 May	18:42	18:46	+4	clear
05 May	18:43	18:48	+5	clear
06 May	18:43	not seen	unusable	cloud on the horizon
07 May	18:44	18:47	+3	hazy
08 May	18:45	18:49	+4	clear

The arithmetic, written out: Mean of the usable evenings so far = (+4 + 5 + 3 + 4) minutes divided by 4 usable evenings = +16 / 4 = +4.0 minutes, carried with the error budget of 1 + 0.5 + 0.5 + 0.5 = plus or minus 2.5 minutes; with only 4 usable evenings of the 12 slots the mean is still provisional at plus or minus 2.5 minutes, and it tightens to plus or minus 1.5 minutes only once eight evenings are usable.

What a marker looks for: A marker looks for the unusable evening left unusable rather than filled in, the signs kept so early and late do not cancel, and the count of usable evenings printed beside the mean.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost

60 MINUTES · The No-Tech route does the per-person arithmetic longhand and copies the estimate box out by hand, which adds about ten minutes.

Put one defensible number on the problem, and keep every number you did not measure in a box of its own.

- Write four lines: whose problem this is, the mean difference in minutes at this spot with its error and its count of usable evenings, the worst evening of the window, and the minutes one person following the printed table was out across the days you actually observed.
- Do that last line as longhand arithmetic - the mean difference in minutes multiplied by the number of usable evenings, for one person. That is the only cost figure you measured, and it covers only the days you stood on the mark.
- Put any wider figure in a separate box headed 'Estimate - not measured'. Write the headcount you are assuming, where the headcount came from, and this line: this assumes the window is typical, and here is one reason it might not be.
- Never sum minutes across people who never agreed to be counted. A person-minute belonging to somebody who was never asked is not a cost; it is a number you made up about a stranger's day.
- Write one line without hedging: this measures visibility from one spot, it is an observation and not a verdict, and questions of religious practice belong to a qualified scholar.
- Choose the fix and write it as one sentence: 'I will publish a corrected sheet for this spot, for the dates I observed and a short stated window, and get five people to use it across the after window.'

WRITE THIS DOWN

The one-page costed problem statement, the measured per-person figure with its arithmetic shown, the separate estimate box with its assumption and its one reason it might not be typical, the sentence about the scholar, and the fix as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once and repeats back your minutes figure, its error and the sentence about the scholar, and can say which number on the page was measured and which was only estimated.

Watch out. Writing the page as a claim about what is correct to do. The page reports what was seen from one spot on the evenings you observed; that is the only claim it can carry.

7 Build the corrected sheet

80 MINUTES · The No-Tech route writes every line and both times by hand, which takes about half as long again; the sheet is short precisely so that this is possible.

Turn the measured offset into a corrected sheet that covers only the dates it can honestly cover, and give it a name.

- Look back at what step five told you. The setting point migrates along your skyline through the year, so one mean offset cannot be added to a year, or a month, of dates you never observed. If your offset drifted, write the drift in minutes per week on the sheet and shorten the sheet until the drift across it is smaller than your error.
- Build the sheet for the nine dates of your after window only, plus at most seven further dates marked 'provisional'. Sixteen lines is the ceiling, and this is why you are not copying thirty.
- Copy the printed source's time for each of those dates onto a fresh ruled page, add your mean offset longhand, and write both the original and the corrected time on every line so the arithmetic stays visible.
- Write a header block: the spot, how to find it by paces from a named door, the dates observed, the count of usable evenings, the mean offset with its error, and the range.
- Write a footer block: the horizon this sheet assumes, the expiry date after which it must not be used, the plain statement that it does not hold for anyone standing elsewhere, and the sentence that this is an observation and not a verdict, and that questions of religious practice belong to a qualified scholar.
- Name the sheet and write its one-line promise under the name, so people can refer to it by name; then give it to one person who was not involved, ask what it means, and correct anything they misread.

WRITE THIS DOWN

The corrected sheet with both times on every line, its header block, its footer block with the expiry date on it, the sheet's name and its one-line promise, and a note of what the first reader misunderstood.

DONE WHEN

The sheet fits on one page, states its offset, its error, its evidence and the date it expires, runs no further than the dates your evidence reaches, and one adult who was not involved can say what it is for and what it is not for.

Watch out. Publishing a rounded offset with no range beside it, or a table that runs further than the evidence behind it. Print the mean and the spread together, and print the expiry date, so a reader knows how tightly and for how long to trust it.

8 Put it in five pairs of hands

50 MINUTES · The No-Tech route hand-copies five copies of the sheet, which adds about ten minutes on top of the conversations.

Get the sheet to five people properly: teacher first, roles only, and a way out for anybody who wants one.

- Show the corrected sheet to your teacher before anybody else sees it. Your teacher checks the error line, the expiry date and the sentence about the scholar. Nothing goes out until they have.
- Copy the sheet out five times by hand, and give one to each of five adults who stand at or near your spot: your own household, your own building, or people your school approaches on your behalf. Never approach a stranger in the street.
- Explain the one number, its error and its limits in under a minute, and then say plainly: you may stop using this at any time, you do not have to give me a reason, and I will take your line out of my record the same day.
- Ask each of them directly whether they will use it across the after window, and write the answer down, including every refusal.
- Agree with each how use gets recorded - a tick sheet pinned beside the sheet, or one question you ask at a fixed time - and leave the tick sheet with them. Write your expected user-days on a page, date it, and have one person sign as witness before the window starts.
- Write the user ledger in codes only: A1 to A5, the role of each (household member, neighbour, member of staff), the date given and the recording method agreed. No names, no ages, no addresses, and nothing about anybody's health, money or religious practice. The one sheet linking a code to a name is written by your teacher, held by the school, and destroyed after moderation.

WRITE THIS DOWN

The user ledger as A1 to A5 with roles, dates and agreed recording methods, your teacher's sign-off on the sheet, and the dated prediction of the user-days you expect.

DONE WHEN

Five people hold a copy, your teacher saw the sheet first, each user has been told in your own words that they may stop at any time without giving a reason, and no name appears anywhere in your submission.

Watch out. Handing out ten copies and calling it ten users. A copy given is not a use; the count rises only when somebody records using it.

9 Measure the after window

60 MINUTES · Plus 20 minutes on each evening of the nine-evening window, with the named adult, until six evenings are usable. Book all nine slots in week five; the desk work here is the arithmetic afterwards.

Test the sheet against fresh evenings, and count only the use that somebody else wrote down.

- Observe from the same mark at the same eye height with the same named adult under the same rules, recording the observed minute exactly as before.
- Subtract the corrected sheet time from the observed time each evening, longhand, to get the residual error in minutes, keeping the sign.
- Report the residual with the same error budget beside it: no better than plus or minus 2.5 minutes on a single evening, no better than plus or minus 1.5 minutes on the mean of six usable evenings. If the residual is smaller than that, the honest finding is that the sheet and the table cannot be told apart at this resolution, and you write that down.
- Collect every user's tick sheet on the agreed day and count days ticked, not copies handed out, entering them against A1 to A5.
- Ask every user the same two questions and write the answers word for word against their code: did it change what you did, and will you keep using it.
- Write down every reason a user stopped - forgot, did not trust it, moved away, disagreed with the idea - and take out of your record anybody who asked to be taken out.

WRITE THIS DOWN

The residual difference for every usable evening with its error and its count, the adoption count in user-days against A1 to A5, and every recorded answer including those of the users who stopped.

DONE WHEN

You can state the residual error in minutes with its error and its count of usable evenings, and the number of user-days, and both rest on records other people made.

Watch out. Counting a user who says they used it with nothing written down. Ask for the tick sheet; memory inflates adoption every time.

10 Defend it

60 MINUTES · Book the two witnesses a week ahead; the defence is live and cannot be rescheduled into week seven.

Answer unseen questions live in front of witnesses, and record what happens to the sheet now.

- Deliver the defence out loud: ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page. There is no recording on this route; the signatures are the evidence.
- Have ready without notes: the spot, the watch and its tolerance, the mean offset with its error and its count of usable evenings, the drift answer, the corrected sheet and its expiry, the residual, the user-days, and the limits you accept without argument.
- Read the one-page explainer to three people who use the sheet and write down what each of them said against their code.
- Hand the drawn chart to your teacher to send to the expert, with one question: what would you have measured that I did not.
- Complete the relations ledger in codes: E1 the expert, A1 to A5 the users, P1 to P3 the peers who checked your arithmetic, R1 whoever replied from the institutions your teacher wrote to. Roles, dates and replies only; the name-to-code key is written once on your teacher's sheet, held by the school, and destroyed after moderation.
- Pin the sheet where your school agrees it may be pinned, and write down what the school decided and why.

WRITE THIS DOWN

The defence page signed and dated by both witnesses, the one-page explainer, and the relations ledger holding ten coded relationships with roles, dates and replies.

DONE WHEN

Two witnesses have signed and dated the defence page, ten coded relationships are logged, no name appears in the ledger, and the users have said on record whether they keep the sheet.

Watch out. Ending on how useful people said it was. The metric is minutes and user-days - report those first and opinions second.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One card naming the exact spot in paces from a named door, the named adult and the agreed slot, the two printed sources being tested, the twelve dates of the window, and the question: how many minutes out is this table at this doorstep, and why.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for an astronomer, surveyor or almanac compiler, your drawn chart attached, the institution and role written to, the date and how you asked, who sent it from the school, and the reply recorded word for word against code E1.

3 - RESEARCH - WEEK 4

Evidence log

Every observed time with its date, sky condition and the adult present; the reference clock named with the date it was set and the drift at the end; and every published time with its printed source and the location it was computed for.

4 - PROCESS - WEEK 4

Failure log

The evenings lost to cloud, the evenings lost because no adult was free, the evening you arrived late, the watch that drifted, the user who stopped ticking, and what each of those did to the comparison, all dated.

5 - DESIGN - WEEK 5

The build

The corrected sheet itself on one page, written by hand with both times on every line, its header of evidence and its footer of limits and expiry, together with two squared-paper panels of signed difference in minutes at a stated scale: the baseline window and the after window.

6 - DESIGN - WEEK 5

One-page explainer

One hand-written page a neighbour reads in ninety seconds: the spot, the mean minutes with its error and its count of usable evenings, why a table computed for a zone misses a doorstep, the corrected sheet with its expiry, and the line that this is an observation and not a verdict, and that questions of religious practice belong to a qualified scholar.

7 - BRANDING - WEEK 5

Identity card

The name you gave the sheet in step seven and its one-line promise, hand-lettered at the head of the pinned sheet, plus the single sentence you want repeated at somebody else's table - which must include the expiry and the limit.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded relationships with roles, dates and replies and no names at all: E1 the astronomer or surveyor, A1 to A5 the five users, P1 to P3 the peers who checked your arithmetic, R1 the institution that answered. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the spot, the watch evidence and its tolerance, the mean error with its count of usable evenings, the drift answer, the corrected sheet and its expiry, the residual, the user-days, and the limits you accept without argument. There is no recording on this route; the two signatures are the evidence.

The four tiers, in this project

Starter

You observe from one marked spot with the named adult on at least six usable evenings, read each time to the minute against the clock you set, write the sky condition beside every row, and print the combined error and the count of usable evenings on the page.

Practitioner

Everything above, and you defend the choice of spot, cite the source and the stated location of every published time you compare against, say whether the offset holds steady across the window or drifts, and make one chart another person reads correctly without your help.

Researcher

Everything above, and you write the protocol before the first evening including how many evenings you need and why,

Contributor

Everything above, and you set your measured offset against one named published source you can hold - a printed

separate in seconds what your eye, your clock and your blocked edge each contribute to the error, and run the after window against the corrected sheet.

almanac or ephemeris page, or an observatory's published figure - get one specialist who disagrees with your method to say in writing why, and offer every raw reading to any school that asks, through your school, where your school agrees it may be shared.

The one professional you must hear from

Who. An observational astronomer, a physics or astronomy lecturer, a land surveyor who works in coordinates, or whoever computes the times a local calendar prints. A member of an amateur astronomy society who does timing work is just as good, because all of them are paid or trained to know how far a computed time sits from an observed one.

Where your school finds one. Institutions and roles only, and your teacher makes the approach. A letter on school paper, posted by the school office to the physics or astronomy department of a nearby university, to the survey or land-records office of the municipality, or to the secretary of an amateur astronomy society. The meteorological department has a public enquiries telephone line, which the teacher rings with you present. Ask for a role, never for a named individual.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has timed sunset from one fixed spot on [number] usable evenings, finding a mean difference of [number] minutes from the printed table. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When a sunset time is published for a city, which point in that city is it computed for, and what horizon does the computation assume?
2. How many minutes can a wall, a ridge or a block of flats on the western skyline move the observed moment away from the computed one?
3. How far apart do two spots have to be, east to west, before their sunset times differ by a full minute at this latitude?
4. When you time an event by eye, what exactly do you take as the moment, and how closely do two observers standing together usually agree?
5. If a measured offset holds for one fortnight, how many days either side of that fortnight can it honestly be carried before the setting point has moved along the skyline too far?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Your combined error on the mean is plus or minus 1.5 minutes and your offset is [number] minutes. Show me the arithmetic that says you found anything at all.
2. The setting point moves along your skyline through the year. Why is it honest to hand somebody a corrected sheet at all, and what did you print on it to stop them using it three months from now?
3. Your horizon is blocked by a wall. How much of your offset is longitude and altitude, how much is that wall, and how would you separate the two?
4. You lost evenings to cloud. Convince me the mean you published is stable, and tell me what a second window would most likely have shown.
5. Somebody carries your sheet two streets away and uses it. What error have you handed them, and what did you print on the page to prevent it?
6. You wrote a headcount in your estimate box. Which of those people agreed to be counted, and what does your figure mean for the ones who did not?

If you get stuck

- If nobody replies to the requests your teacher sent - then take the expert-unreachable path, which still scores: file your five questions exactly as they were sent, the dated list of attempts with institution and role, and one named published substitute source such as a printed almanac page, an observatory's published note or a textbook chapter, then answer your own five questions from it and say which answers it could not give.
- If the household or the site says no - then move to the school-site variant: one marked spot on school property, a member of staff with you for every slot, the school's office clock as the reference, and the number of evenings the school could staff printed beside every mean.
- If cloud takes more than four of your twelve baseline evenings - then stop at whatever usable evenings you have, print that count beside every mean, invent nothing and widen nothing, and record in the failure log that the mean is provisional; below six usable evenings, say plainly that the comparison is not settled.
- If the named adult cannot make a slot - then the slot does not happen. Mark that evening unusable with the reason 'no adult available', use one of your spare slots, and put the lost evening in the failure log.
- If you cannot see the horizon on most evenings - then choose a fixed edge you can always see, a roof line or a wall top, define it in writing and mark it on your drawing, and report every time against that edge instead, saying so on every page.
- If your before and after look the same - then report that as the finding, check first whether the five users actually recorded use on each evening of the window, and write what you find in the failure log.

Finished early?

Repeat the after window from a second marked ground-level spot on the same street with a different skyline, with the same named adult, and chart the two offsets on one axis in the same units.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 04 - ENGINEERING & ROBOTICS

The Thing That Keeps Breaking

Count what one latch, strap or bracket costs your household a year in rupees and lost hours.

THE QUESTION

Which small object in your house, shop or classroom fails most often, what does each failure cost in rupees and minutes, and does one reinforcement stop it failing?

Every factory, fleet, hospital and building runs on somebody counting how often a part fails and what each failure costs, and that counting has a name in industry: reliability and maintenance engineering. Manufacturers pay for failure data because a warranty claim, a stopped line or a callout costs many times what the part cost. The method here is the industry method at household scale: define one use, count the failures, find where the load concentrates, change one thing, and count again under identical conditions.

ACT 1 - FIND

You find the object that actually fails most - a gate latch, a bag strap, a shelf bracket, a tap washer, a door handle, a drawer runner, a broom head, a chair joint - and you build the case from evidence rather than memory: three people asked how often it fails, the physical repair scars drawn to a stated scale and counted, and the failure produced on purpose in a controlled test you can repeat. Then you cost it: what a repair costs, what a replacement costs, how many minutes each failure eats, and how often it happens, which together give rupees and hours per year.

A one-page costed problem statement carrying five lines: whose problem this is, failures per hundred uses in the controlled test, failures per fortnight in ordinary use, rupees per year and hours per year. Beside it sit a drawing of the failure point to a stated scale, an annotated drawing showing where the load concentrates, and the arithmetic behind every rupee figure with its source.

ACT 2 - FIX

You change one thing about the object using only what is already in the house or the shop - a second fixing, a packing plate under a bracket, a stop that limits travel, a doubled strap, a washer at the wear point - and you fit it. Then you run the identical hundred-use test and log the identical fortnight of ordinary use, with the same tester, the same load and the same definition of one use.

Two chart panels, never one: panel one carries failures per hundred uses before and after, panel two carries failures per fortnight before and after, because a rate per use and a rate per time share no scale - a hundred uses may pass in a day or in a month - so one axis cannot honestly carry both. With them go the new rupees and hours per year, a named list of confounders, and a before-and-after pair of the fitted change drawn to the same stated scale and signed by a witness.

YOU MEASURE

failures of one object per hundred identical uses, and failures per fortnight in ordinary use

BEFORE

Two counts taken before anything is changed: failures in a controlled test of one hundred identical uses, tallied by hand with the load and the definition of one use written down first and the sheet signed by your counter; and failures logged on a tally card across fourteen days of ordinary use, each with date, user code and minutes lost.

AFTER

The identical hundred-use test on the changed object, run by the same person in the same place with the same load and the same speed, plus fourteen more days of ordinary-use logging on a fresh tally card in the same place, using the same definition of a failure and the same coded users.

The calendar this needs

Twenty-eight logging days, fourteen before the change and fourteen after, plus two test days and a fitting day, so the baseline tally must start in week 1 or this will not finish.

Safety and ethics - not optional

- Nothing electrical and nothing gas. A plug top, a switch plate or an extension lead is examined only with it unplugged from the wall and the cover left screwed shut; nothing is opened, stripped, rewired or plugged in to test, and nothing attached to a gas pipe, cylinder, regulator or burner is part of this project.
- Feet on the floor. No ladders, no stools, no climbing, no roof and no work above your own standing reach; if the object sits out of reach, an adult brings it down or you choose a different object.
- Test loads fall onto empty floor and nothing else. Load with weight you can hold in one hand - filled bottles, a bag of rice, a bucket half full - hung or placed so that if it drops it lands on bare floor, never over a foot, a hand, a lap or a pet; stand to one side, and for anything under tension, spring, elastic or wire, wear eye protection or keep your face turned away.
- Out of scope: anything structural or anything holding a person off the ground - a stair tread, a balcony rail, a ladder rung, a swing, a bed frame, a roof or wall fixing. A loose chair joint may be measured and reinforced only with the chair empty on the floor and loaded by hand with weight; no person is ever the test load. No power tools unless an adult is holding the work, and no cutting, drilling or heating on your own.
- Every trip out of the home for this project - a hardware shop, a workshop, a market stall - is made with a named adult who goes with you and stays with you, not an adult who merely knows you have gone. You do not approach a workshop, a shop or a repairer on your own account; the school makes that approach for you.
- If anybody is hostile, refuses to be recorded in writing, or asks you to come somewhere else with them, stop, leave and write it down. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.
- This project counts rupees, so it touches money. Write prices against shops and dates, never against people. No information about what a named person earns, owes or cannot afford, and no health or reading information about a named person, enters the submission.

What you use - no-tech route

A notebook ruled into columns with a pen and a ruler: object, times per month, minutes lost, rupees, tally

A tape measure or a ruler for the dimensions at the failure point, and a card taped beside the object for the fourteen-day tally

A known test load already in the house - a one-litre bottle of water weighs one kilogram, a sealed bag of rice is marked with its weight

Squared paper for the load-path drawing, the reinforcement drawn to a stated scale, and the two chart panels

Repair material already in the house: string, wire, a spare screw, a washer, an offcut of wood, glue, tape, a strip of old rubber

The household's receipts, or a card carrying prices copied at a shop counter with the shop name and date written across the top

Nothing in this project needs power, a screen or a meter: the counting is done by hand, every drawing carries its stated scale, and the witnesses sign what they saw.

The school version of this project

Run the whole method on school property with a member of staff. The caretaker names an object that fails often, such as a classroom latch, a cupboard hinge or a gate bolt, and agrees the load and the definition of one use in writing. The hundred-use test runs at a quiet hour with that staff member present, and the tally card lives on the staff-room wall, signed each week. This is the version for a learner with no safe object, no co-operative household or no safe street.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Find the thing

65 MINUTES · The three daily users may not all be in at once; allow two sittings across two days to get their answers.

Walk your house, shop or classroom, list every object that has failed more than once, and choose one on the numbers.

- Walk one lap of each room with the notebook open and write down every object that has been repaired, tied, taped, glued, wired or propped.
- Ask three people who use these things daily how often each one fails, and write their answers as times per month, never as the word 'often'.
- Record each of those three by code, not by name - A1, A2, A3 - and keep the key off this sheet.
- Sketch each candidate on its own line, marking the joint or the point that gives.
- Rule three columns beside the list: times per month, minutes lost per failure, and safe to test yes or no, against electrical, gas, structural or above your reach.
- Choose the highest-scoring object that passes the safety column and write one sentence saying why you chose it over the runner-up.

WRITE THIS DOWN

The candidate table with three coded users' frequency answers, the safety column, the chosen object and the written reason.

DONE WHEN

One object is named, drawn or photographed, and defended in writing against at least four rejected candidates.

Watch out. Watch out. Choosing the object that annoys you most rather than the one that fails most. Let the table decide; if the annoying one wins on numbers, keep it, but it has to win.

2 Read the scars

65 MINUTES · No-Tech is longer because every scar is drawn to a stated scale by hand rather than photographed.

Collect physical evidence that this object has failed before, instead of trusting anybody's memory.

- Draw the object large on one page to a stated scale - write the scale on the drawing, for example one square to five millimetres - and mark every repair on it: old glue, a second screw hole, wire, tape, a replaced part, a worn groove.
- Count the separate repair marks and write the count down, because each mark is a past failure somebody already paid for.
- Ask the three coded users when each repair happened and write the nearest month against each mark on the drawing.
- Ask whoever fixed it last what they used and what it cost, and note whether the receipt or leftover material still exists.
- Measure the object with a tape and write the dimensions on the drawing in millimetres: thickness at the failure point, length of the arm, diameter of the fixing.

WRITE THIS DOWN

A dated repair history with one line per mark, the measured dimensions in millimetres, and the scale drawing with every scar marked on it.

DONE WHEN

Your count of past failures comes from marks you drew and people you asked, not from one person's recollection.

Watch out. Watch out. Accepting 'it breaks all the time' as data. Convert every statement into a count and a month, and write down which coded user said it.

3 Count it failing

105 MINUTES · Plus about 5 minutes a day for 14 days keeping the ordinary-use tally card - roughly 70 minutes that sits outside this work block and cannot be caught up at the end. No-Tech is longer because a second person marks the tally by hand and the failure point is drawn to scale rather than filmed.

Produce the failure on purpose in a controlled test, and start a fourteen-day log of failures in ordinary use.

- Write down the definition of one use - one full open and close, one lift with the bag loaded to its usual weight, one turn of the handle - and keep that definition for the rest of the project.
- Run one hundred of those identical uses at the speed and load of real use, and have a second person mark a tally every time it slips, jams, loosens, tears or comes apart; at ordinary speed a hundred cycles with the load reset each time takes half an hour or more, so book the time rather than hurrying it.
- Use a known load you can hold in one hand, such as filled one-litre bottles counted as one kilogram each, placed so it can only fall onto bare floor, with feet and hands clear and your face turned away.
- Write the two honesty lines beside your figure: with one hundred uses your rate moves in steps of one failure per hundred uses, that is one percentage point, so do not claim a change smaller than that; and fewer than five failures in the hundred cannot be told apart from chance, so if you record four or fewer, say so and run a second hundred on another day before quoting a rate at all.
- Draw the exact point that gives, large and to a stated scale, immediately after the test, and have your counter sign and date the tally sheet.
- Tape a tally card beside the object and begin a fourteen-day count of failures in ordinary use, one line per failure with date, time and the code of whoever was using it.

WRITE THIS DOWN

The written definition of one use, the load in kilograms, the failures-per-hundred-uses figure with the number of failures it rests on, and the signed tally sheet.

DONE WHEN

A failures-per-hundred-uses number exists with its failure count beside it, the fourteen-day log has begun, and somebody who was not there could repeat your test from your written definition alone.

Watch out. Watch out. Cycling it faster and harder than real use to force a failure. A test that does not look like ordinary use tells you nothing about ordinary use, so match the speed and the load, write both down, and let the hundred cycles take the time they take.

4 Cost one failure

80 MINUTES · Add the walking time to whichever shop you visit, and the named adult goes with you and stays with you. No-Tech is longer because the cost arithmetic is done twice longhand instead of in formula cells.

Work out what a single failure costs and turn it into rupees and hours per year, labelled as the projection it is.

- Price the repair from the household's own receipts first: the material, the part, and what a tradesman charges to come, each with the shop and the date beside it.
- For any price you cannot find on a receipt, walk to the hardware shop with a named adult who goes with you and stays with you, and copy the prices onto a card with the shop name and date across the top; ask at two shops on that same trip what a full replacement costs and write both prices down.
- Sit with the coded people involved and time the last failure end to end: minutes to notice, to find tools, to fix, to walk to the shop, and the minutes the thing was unusable.
- Do the arithmetic longhand in the margin: failures per year times rupees per failure, and failures per year times minutes per failure divided by sixty. Repeat it twice, once with the users' failure rate and once with the rate your own tally implies, and leave both workings on the page.
- Write the conversion you used and the caveat beneath it: a year holds 26.1 fortnights (365 divided by 14) and the weeks in a month are 4.33. Multiplying a fortnight by 26.1 is a projection, not a measurement. This assumes the fortnight is typical. Write one reason it might not be.

WRITE THIS DOWN

Rupees per failure, minutes per failure, failures per year from two sources, the conversion you used, and rupees and hours per year with the working visible and the word projection written against it.

DONE WHEN

Two independent rupees-per-year figures sit on the page, each labelled a projection from a fortnight, and you can say which is the more conservative and why.

Watch out. Watch out. Counting only the part you bought. The trip to the shop, the waiting and the thing being unusable are usually larger than the part, so count the minutes.

5 Find the weak point

65 MINUTES · The expert's answer may come back days later; write the question now and leave the line blank until the reply arrives.

Work out where the load concentrates and why the same point gives every time.

- Draw the object large on squared paper to a stated scale and draw arrows along the path the force takes, from where the hand or the weight pushes to where the object is held.
- Mark three places on the drawing: the narrowest section, the sharpest corner, and the single fixing carrying most of the load, because failures start at those three.
- Write plainly whether the material gave or the joint gave, since a fixing working loose is a different problem from a bar bending.
- Compare with the repair marks from step two and write yes or no against the question: did it fail at the same place every time.
- Write the one question you cannot answer yourself into the expert pack your teacher sends, and record the reply word for word against the code E1 when it comes back.

WRITE THIS DOWN

The arrowed load-path drawing to its stated scale, one paragraph naming the weak point in plain language, and the expert's answer as spoken.

DONE WHEN

You can point at one place on the object and explain, in a sentence somebody who was not there follows, why the load ends up there.

Watch out. Watch out. Blaming the material because that is easier to say. Most household failures are a fixing loosening, a sharp corner concentrating load, or a part hammering against a stop, so look at the joint before the metal.

Worked fragment - fourteen days of ordinary-use failures on one gate latch

Date	User code	What failed	Minutes lost	Rupees spent
02-03	A1	Latch dropped, gate swung open	4	0
04-03	A2	Latch dropped	3	0
07-03	A1	Screw pulled out, latch re-fixed	25	60
11-03	A3	Latch dropped	4	0
13-03	A1	Latch dropped, gate swung open	4	0

The arithmetic, written out: 5 failures in 14 days = 5 / 14 x 365 = 130.4 failures a year (projection); 40 minutes lost / 5 failures = 8.0 minutes per failure; 130.4 failures x 8.0 minutes = 1043 minutes = 17.4 hours a year; 60 rupees / 5 failures = 12 rupees per failure x 130.4 = 1565 rupees a year.

What a marker looks for: A marker checks that every row carries a date, a coded user and a timed number rather than a remembered one, that the five failures are enough to quote a rate at all, and that the per-year figures are labelled projections from a fortnight with one reason the fortnight might not be typical.

Act 2 - fix it and measure

steps 6 to 10, ending with a proven effect

6 Name the cost

75 MINUTES · The owner of the object has to be in the room to agree the change; do not start this step on a day they are out.

Finish the costed problem statement on one page and choose the single change you will make.

- Write five lines: whose problem this is, failures per hundred uses with the failure count beside it, failures per fortnight, rupees per year, hours per year, with the word projection written against the two per-year lines.
- Draw a bar chart on squared paper to a stated scale, rupees per year for your object beside the two runners-up from step one, with the finding as the title.
- List three possible fixes using only what is already in the house or the shop: a second fixing, a packing plate, a stop that limits travel, a doubled strap, a washer at the wear point.
- Choose one and write: 'I will change X to Y and expect failures per hundred uses to fall from A to B and failures per fortnight from C to D.'
- Read the page aloud to whoever owns the object and have them sign and date it if they agree to the change.

WRITE THIS DOWN

The one-page costed problem statement, the three candidate fixes with the failure each would prevent, and the chosen fix as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once and repeats your rupees-per-year figure back correctly, including the word projection.

Watch out. Watch out. Choosing a fix that needs something bought. Nothing bought is the rule, so cost the shop fix honestly on paper and reinforce with what is already there, or you will have nothing to measure.

7 Draw, fit and name it

95 MINUTES · An adult must be free to hold the work while you fit the change; book that hour with them rather than assuming it.

Draw the change to real dimensions, fit it, name it, and write the protocol that keeps the after-test identical to the before-test.

- Draw the reinforcement on squared paper to a stated scale, using the dimensions measured in step two, with the new fixing or plate shown in position.
- Write what stays fixed: same definition of one use, same load, same tester, same counter, same place, same speed, same hundred-count, same definition of a failure.
- Fit the change with what is already in the house; if a hand tool is needed, an adult holds the work, and nothing is cut, drilled or heated by you alone.
- Make the matched pair: one drawing to the stated scale before fitting and one after, from the same viewpoint and at the same scale, each signed and dated by a witness who saw the object.
- Write your prediction on the page, date it, and have one person witness it with their signature before any after-data exists.
- Name the reinforcement in three words or fewer, write its one-line promise so the household can ask for it by name, and write the single sentence you want repeated when somebody else's latch gives way. That card is deliverable 7.

WRITE THIS DOWN

The dimensioned drawing with its stated scale, the fixed protocol as a numbered list, the witnessed matched pair, the witnessed dated prediction, and the named identity card.

DONE WHEN

The change is fitted, the protocol is written down, the reinforcement has a name and a one-line promise, and a signed prediction predates the first after-test.

Watch out. Watch out. Improving three things at once because you already have the tools out. One change only, or you can never say which one worked.

8 Test it again

100 MINUTES · The same tester and the same counter both have to be free on the same day; if you have to split the hundred across two sittings, write the split into the failure log.

Run the identical hundred-use test on the changed object and count failures exactly as before.

- Read the protocol aloud before starting and check the load, the speed, the tester and the definition of one use line by line.
- Run the hundred at the same ordinary speed as the baseline, have the same counter mark the tally, and have them sign and date the sheet at the end.
- Record separately anything new that started going wrong because of the change, in its own column.
- Inspect the change afterwards and draw it to the same stated scale as the before drawing: has it loosened, bent, worn or shifted position.
- Write down what went wrong on the day: a distracted count, a load that slipped, a helper who joined in halfway.
- Write the failure count beside the rate again, and if either hundred holds fewer than five failures, say so here rather than letting the chart imply a difference you cannot support.

WRITE THIS DOWN

Failures per hundred uses after the change on a signed tally sheet, the failure count it rests on, the inspection drawing, and a dated failure-log entry naming every deviation.

DONE WHEN

The after-test used the same load, speed and use-definition as the before-test, and the failure log holds at least one honest entry.

Watch out. Watch out. Testing gently because you want the fix to work. Count out loud and let the witness watch the last twenty uses.

9 Fourteen days again

75 MINUTES · Plus about 5 minutes a day for 14 days on the fresh tally card and 10 minutes once a week inspecting the change - roughly 90 minutes spread across the fortnight, outside this work block. No-Tech is longer because both chart panels are ruled and scaled by hand and the cost arithmetic is redone longhand.

Log failures in ordinary use for fourteen more days, compare like with like, and chart the two rates apart.

- Tape a fresh tally card in the same place and log every failure with date, time, user code and minutes lost, exactly as in the baseline fortnight.
- Check the object once a week for the change working loose, and write down and draw what you find each time.
- Rule two chart panels on squared paper, not one: panel one shows failures per hundred uses before and after, panel two shows failures per fortnight before and after, each to its own stated scale. A rate per use and a rate per time share no scale, because a hundred uses may pass in a day or in a month, so one axis cannot honestly carry both. Write that reason under the pair.
- Write the failure counts on the bars themselves, and if either fortnight holds fewer than five failures, report the counts and say plainly that the rates are too thin to compare.
- List every confounder you can name: colder or wetter weather, a lighter user, the object being used less because everybody knows it is being watched, a second repair somebody made without telling you.
- Redo the rupees and hours arithmetic longhand with the new failure rate, mark the per-year figures projection again - this assumes the fortnight is typical, so write one reason it might not be - and state whether the fix saved more than the time it took to make.

WRITE THIS DOWN

The two labelled chart panels with their failure counts on the bars, the new rupees and hours per year marked as projections, the confounder list, and the weekly inspection notes.

DONE WHEN

You can state the before figures, the after figures, and at least two reasons the difference might not be your doing.

Watch out. Watch out. Reporting the hundred-use test and quietly dropping the fortnight log because it disagreed. Report both, and where they disagree, say so, because that disagreement is itself the finding.

10 Defend it and close the ledger

80 MINUTES · Two witnesses and the owner of the object all have to be in the room; fix the date a week ahead.

Defend the finding live to unseen questions, and record whether the change stays on the object.

- Sit the defence: ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page - the object, the failure point, the definition of one use, both before-counts, the change fitted, both after-counts, and the limits you accept without argument. Witnesses only on this route; there is no recording.
- Read the one-page explainer to three people who use the object and write down what each of them said against their code.
- Hand both chart panels and the load-path drawing back to the expert through your teacher, with one question: what would you have reinforced that I did not.
- Ask the owner of the object, in front of a witness, whether the change stays and why, and write the answer word for word.
- Complete the relations ledger in codes only - E1 the expert, A1 to A3 the people affected, P1 to P3 the peers who checked your tally, R1 to R3 those who replied - each with role, date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Where anything is shown beyond your class, it goes out through your school, where your school agrees it may be shown.

WRITE THIS DOWN

The defence page signed and dated by its two witnesses, the one-page explainer, and the coded relations ledger holding ten entries.

DONE WHEN

Ten coded relationships are logged with roles, dates and replies, no name appears anywhere in the submission, and the owner has said on record whether the reinforcement stays.

Watch out. Watch out. Calling it a success because the object feels sturdier. The metric is failures counted, rupees and hours, so report those first and opinions second.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One ruled card naming the object, where it sits, who uses it by code, and the question: how often does this fail, what does each failure cost in rupees and minutes, and will one reinforcement stop it, with the candidate table copied on the back.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a carpenter, welder, mechanic, tailor or maintenance technician, with your load-path drawing and failure count attached, carried or read out from the school office by your teacher, the date and how you asked, and the reply written down word for word against the code E1.

3 - RESEARCH - WEEK 4

Evidence log

Every tally sheet with its date and signed counter, the dimensions in millimetres, a drawing of each repair scar to a stated scale, every price with the shop and date written across the top of the price card, and the timed minutes lost per failure.

4 - PROCESS - WEEK 5

Failure log

The counts you lost track of, the load that slipped, the fortnight interrupted by a holiday, the reinforcement that worked loose in week one, and what each of them did to the comparison, all dated in the notebook.

5 - DESIGN - WEEK 4

The build

The fitted reinforcement itself with its squared-paper drawing to a stated scale, the load and rig used for the hundred uses, and the two chart panels ruled by hand: failures per hundred uses before and after, failures per fortnight before and after, each panel carrying its own unit and its own scale.

6 - DESIGN - WEEK 5

One-page explainer

One handwritten page a neighbour reads in ninety seconds: the object, the failures per hundred uses with its failure count, the rupees and hours per year marked as projections, the one change, the after-counts, and what this test cannot tell anybody.

7 - BRANDING - WEEK 5

Identity card

Made in step 7: a name of three words or fewer and a one-line promise for the reinforcement written on one card, so the household can ask for it by name, plus the single sentence you want repeated when somebody else's latch gives way.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries, each with role, date and what they said: E1 the repairer who does this for a living, A1 to A3 the three people who use the object daily, P1 to P3 the peers who checked your tally, R1 to R3 the three who replied when you handed the chart over. No names. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page: the object, the failure point, the definition of one use, both before-counts, the change fitted, both after-counts, and the limits you accept without argument. Witnesses only on this route; there is no recording.

The four tiers, in this project

Starter

You choose one object against a scored table rather than by annoyance, ask three users how often it fails, count and draw the repair scars, run one hundred identical uses counting failures by hand, and put five written questions to one professional through your teacher.

Practitioner

Everything in Starter, and you define one use yourself and defend that definition, cite every price to the shop and the date it came from, state how many failures your baseline hundred actually held, and produce two labelled chart panels that somebody who was not there reads correctly without you explaining the axes.

Researcher

Contributor

Everything in Practitioner, and you write the test protocol before the first count, justify one hundred uses and fourteen days rather than fewer, label every per-year figure as a projection from a fortnight with one written reason the fortnight might not be typical, and quantify the error your tally, your load and your single tester introduce.

Everything in Researcher, and you set your failure rate beside one named printed source a marker can hold - a manufacturer's fitting or warranty leaflet, a maintenance or servicing schedule from a school, hospital, hotel or factory maintenance office, or a printed page a library or your teacher supplies - defend your method to one maintenance professional who disagrees with you and record what they said word for word, and make your raw tally sheets, dimensions and drawings available through your school on request, where your school agrees they may be shared, so others can repeat it.

The one professional you must hear from

Who. A carpenter, welder, motorcycle mechanic, tailor, plumber or building maintenance technician - somebody paid to repair this class of object, who therefore knows which part goes first and how soon it comes back.

Where your school finds one. Institutions and roles only, offline, and your teacher makes the approach, not you. Your teacher asks the school office to send a letter by hand, or to telephone: the school's own caretaker or maintenance staff; the owner of the furniture workshop, welding shop, tailor's or hardware market nearest the school, at a quiet hour; the maintenance office of a hospital, hotel or factory, asking for whoever fixes the doors; the workshop instructor at a nearby technical training institute. You never go to a workshop or market on your own account.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has counted how one small object fails across [number] identical uses and [number] days, and what each failure costs in rupees and minutes. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. Of the ones people bring you, which part fails first, and what is it about that part that makes it first?
2. When you repair this, do you put it back exactly as it was, or do you change something, and what do you change?
3. How long does your repair last compared with the original, and how do you know that?
4. What would you have to see to say a thing is genuinely worn out rather than badly fitted?
5. If somebody wanted this to stop failing and could spend nothing at all, what would you tell them to do?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the failures have dropped anyway without your change, and how do you know?
2. Your hundred-use test and your fortnight log point in different directions. Which do you believe, and what would settle it?
3. You counted for fourteen days before and fourteen days after. Convince me those two fortnights were comparable, and name what was not.
4. How many failures did your baseline hundred actually contain? Tell me why that number is enough to compare against, or admit that it is not.
5. Your chart has two panels. Say why those two rates cannot sit on one axis, and what a reader would have wrongly concluded if they had.
6. If your reinforcement works loose in three months, what was this project worth, in rupees and in hours?

If you get stuck

- If the expert cannot be reached - then submit the five questions exactly as your teacher sent them, the dated record of each attempt and how you asked, and one named printed substitute source such as a manufacturer's fitting leaflet or a maintenance schedule from the school office; this path scores in full and is not a lesser submission.
- If nobody will reply - then ask your teacher for the brokered contact list and request a written answer, or a call with your teacher present; you do not approach a workshop, a market, a shop or a repairer on your own account, and you do not go looking for one.
- If the household or the site says no - then run the whole method on school property with the member of staff named in the school variant, on a classroom latch, a cupboard hinge, a chair joint or a gate bolt, and write in your submission that this is where it ran and why.
- If your before and after look the same - then check first whether the change is still fitted and still tight, count how many times the object was actually used in each fortnight, and report the null result with both use-counts beside it.
- If you cannot produce the failure in a controlled test - then drop the hundred-use test, say so plainly, extend the ordinary-use log to a fixed longer period before and after, and make that log your only metric.
- If you run out of time - then shorten both logging periods to the same seven days rather than dropping the baseline, write the shortened period on both chart panels, and say that seven days holds fewer failures and therefore supports a thinner claim.

Finished early?

Fit the same reinforcement to a second identical object - in your own home, or on school property with the member of staff - and run the identical hundred-use test on both.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 05 - ENERGY & SMART SYSTEMS

The Four-Hundred-Unit Leak

Read one meter for a fortnight and find the single load quietly taking hundreds of units a month.

THE QUESTION

Which single appliance or habit on this supply costs the most units per month, measured from the meter rather than guessed, and what is one of those units worth at this supply's own rate?

A household that cannot say where its units go cannot argue with its bill, and neither can a school, a hospital or a factory. Energy auditing is a trade built on exactly this method - baseline, isolate, convert to money, change one thing, measure again - and it is paid for because the savings pay for it. Grid operators, solar installers and building managers all hire people who can defend a before-and-after number in front of somebody who does not want to believe it.

ACT 1 - FIND

You read one meter at the same two clock times every day for a fortnight, so the baseline can be measured against itself. A named adult then isolates one appliance by running it alone for long enough to move the display honestly, and you read the meter before and after and work out units per hour.

A one-page costed problem statement carrying five lines: whose supply this is by code rather than by name, units per month for the one appliance, cost per month at that supply's own rate, cost per year, and that appliance's share of the whole. Behind every line sits a dated reading or a circled line on a published tariff table.

ACT 2 - FIX

You change exactly one thing that costs nothing - a setting, a timing, a habit, a door seal, or a lamp already in the building - and keep reading at the same two times for three weeks. The isolation test is repeated under the new condition, and every hour of power that did not come through the meter is logged for both periods.

Two chart panels rather than one axis: the baseline fortnight against weeks one, two and three in units, and the same weeks in money beside it. With them go the mean after-figure, the gap between the two baseline weeks written down as the smallest change you could believe, a named confounder list, and the bill-payer's recorded answer on whether the change stays.

YOU MEASURE

kilowatt-hours per month for one appliance or one habit, and what those units cost at that supply's own rate

BEFORE

Fourteen days of readings at two fixed clock times, giving two whole weeks that can be compared with each other as well as with what follows. Inside that fortnight sit two timed isolation runs, each long enough to move the display by at least ten of its smallest steps, and a tally of the hours the appliance actually runs.

AFTER

The same two readings at the same two clock times for twenty-one days after one no-cost change, the isolation run repeated under the new setting at the same run length, and the three after-weeks set against the two baseline weeks and against the wobble measured between them.

The calendar this needs

Thirty-five measurement days: fourteen baseline days, then twenty-one after the change. Start the baseline on the first day of week 1 or this will not finish.

Safety and ethics - not optional

- Never open, unscrew or remove the cover of anything: an appliance, a socket, a switch plate, a distribution board, a fuse box or the meter itself. If a test needs a cover to come off, the test is out of scope - choose a different appliance.
- Never touch wiring, terminals, exposed metal or the face of the meter. Every reading is taken by looking only, from normal standing distance, with dry hands and dry feet, and never in the rain or with wet floors underfoot.
- A named adult performs every switching operation in this project and you read and record only. You do not touch a consumer unit, a main switch, a fuse box, a main board, or anything wired into the wall - a water heater, a pump, a fixed heater - and you do not switch a fixed appliance on or off at any point.
- Take both daily readings in daylight if the meter's position allows it, and write down that you did. Where a reading falls after dark, the named adult comes to the meter with you every time and holds the light; you never go to the meter after dark on your own. Never climb or stand on anything to reach a meter mounted high - ask the adult to read it out to you instead.
- This project touches a household's money. Submit units and a rate and nothing else: never the household's name, address, account number, meter number, total payable, arrears, or anything about money owed, late payment or disconnection.
- If anybody becomes angry, or tells you to stop asking about the bill or the meter, stop, leave it, and write down what happened. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.
- Record every hour the building ran on power that did not come through the meter - a scheduled outage, a generator, an inverter or battery, a solar panel - on every day of both periods. Power that did not come through the meter breaks the comparison, and a before-and-after made without that note is worth nothing.

What you use - no-tech route

The printed bill, this month's and last month's, with the name, address and account number covered before it goes anywhere

A notebook ruled into six columns with a pen and a ruler: date, time, reading, difference, off-meter power hours, notes

A clock or watch showing seconds, for the timed isolation run and the pulse or disc count

Squared paper and a ruler - the block chart and the two-panel before-and-after chart, drawn to a stated scale

A tally card kept beside the appliance for start and stop times

A torch or lamp, carried and held by the named adult, for any reading that cannot be moved into daylight

This is the one project that cannot run on paper alone: it needs a meter you are allowed to look at, a printed tariff table, and a light for any reading that falls after dark - so if there is no meter, no bill in the household's name, or a shared or landlord-billed supply, run the school-meter variant with the site electrician, which is the normal form of this project on this route.

The school version of this project

Run the whole method on the school's own meter with the site electrician, caretaker or facilities manager. That adult finds the meter, states its least count, and does every switching operation. One well-defined load is isolated in a quiet window - the staffroom water boiler, one corridor of lights, the computer room - while you time the run and read the display. The school's own bill, with the account details covered, supplies the rate. Both readings sit inside the school day, so both fall in daylight.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Find the meter and its smallest step 55 MINUTES

Find the meter, learn what one unit on it means, and find the smallest change its display can show.

- Go to the meter in daylight with the adult who knows where you are, keep both hands at your sides, and copy every figure on the face into the notebook exactly as it appears.
- Write this into the log in your own words: one unit is one kilowatt-hour, and one kilowatt-hour is what a one-kilowatt load uses in one hour - an iron marked 1,000 W left on for sixty minutes.
- Sketch the meter face and label what each figure means, marking the decimal digit if there is one.
- Find the least count - the smallest step the display can show. If the last digit is a tenth, the least count is 0.1 kWh. If there is no decimal, it is 1 kWh. Write it down; every run length in this project comes from it.
- Copy any pulse or disc constant printed on the face, such as '1000 imp/kWh' or '1200 rev/kWh'. It gives a far finer reading than the digits do, and you may need it in step four.
- Rule the log columns in ink: date, time, reading, difference, off-meter power hours, notes.

WRITE THIS DOWN

The meter type, your own sentence defining a unit, the least count, the pulse or disc constant if there is one, whether the meter number matches the bill written only as 'matches' or 'does not match', and the first reading with its date and time to the minute.

DONE WHEN

The first reading is logged with its clock time, and you can say in one sentence what a unit is and what the smallest step your meter can show.

Watch out. Watch out. Pressing buttons on a digital meter to reach the screen you want. Press nothing and wait for the cycle. If the units screen never appears, record every screen and ask the expert which one it is.

2 Fourteen days of readings 60 MINUTES · plus 5 minutes a reading, twice a day, for 14 days

Build a baseline long enough to show how much this supply wobbles with nothing changed at all.

- Choose two fixed clock times that both fall in daylight if the meter's position allows it, for example 07:00 and 18:00, and agree with the household that somebody reminds you at each.
- Where the second reading cannot be moved into daylight, the named adult comes with you every time and holds the torch. Write down which of the two arrangements you used.
- At each time copy the reading into the log in ink with the actual clock time, and never correct an earlier entry - strike it through and write again.
- Write down every hour the building ran on power that did not come through the meter: a scheduled outage, a generator, an inverter or battery, a solar panel. Write the zeros too.
- Subtract longhand in the difference column to get block A units and block B units, showing the subtraction on the page.
- Total each week separately, so you finish the fortnight with two weekly totals that can be set side by side.

WRITE THIS DOWN

Twenty-eight readings, fourteen block A totals, fourteen block B totals, the two weekly totals, and an off-meter power line for every day including the zeros.

DONE WHEN

Fourteen complete days with no missing reading, every day carrying an off-meter power note even when it is zero, and two weekly totals written side by side with the difference between them.

Watch out. Watch out. Reading at 'about six'. A reading an hour late wrecks the block comparison - write the real clock time and let the arithmetic work from it.

3 Read the bill properly 70 MINUTES

Turn a printed bill into two rates you can defend: what the bill averages, and what one saved unit is actually worth.

- Cover the name, address and account number before the bill goes anywhere. Do the average-rate division on your own working sheet and submit the rate only - never the total payable, never anything about money owed.
- Name the currency once at the top of the page and then write plain numbers underneath it, so a reader anywhere can follow the arithmetic.
- Average rate: total payable divided by units billed, worked longhand. Worked example with made-up numbers: 4,860 divided by 320 units = 15.19 a unit. That is what the bill feels like.
- Marginal rate: find the band your next unit falls into on the tariff table printed on the bill and add the taxes that ride on it. Second line of the same example: the next unit sits in the 301-400 band priced at 22.14, and 17 per cent tax makes it 25.90. That is what one saved unit is worth, because it is the last unit that comes off the bill.
- Hand-copy the tariff table and twelve months of billed units into the notebook with the printed source and its date written across the top of the page.
- Example only, from one country: the bands are printed on the back of the bill and in the supplier's counter leaflet. Every country has its own equivalent, and some supplies have one flat rate with no bands at all. The method needs a bill and a printed rate, not a particular company.

WRITE THIS DOWN

Both rates with the division written out in full, the currency named once, twelve months of billed units, and one sentence naming which rate you will use for the appliance costing and why.

DONE WHEN

You can say what one more unit costs tonight, put your finger on the printed line that proves it, and say in one sentence how that number differs from the average rate.

Watch out. Watch out. Using the headline band rate and ignoring taxes and fixed charges. Show both rates: the marginal rate is what a saved unit is worth, the average rate is what the bill feels like.

4 Size the run, then isolate one appliance

105 MINUTES · plus a second run of the same length on a different day

Measure what one appliance draws, with a run long enough for the meter to give an honest answer.

- The named adult performs every switching operation in this test, at the plug or the wall switch the household already uses. You watch, time, read and write. Nothing wired into the wall is switched by you at any point.
- Propose two or three appliances and let the adult choose and operate one. Copy the wattage printed on its own label without moving it, opening it or removing any cover.
- Work out how long the run must be, because the display must move by at least ten least counts. Ten steps of 0.1 kWh is 1.0 kWh; at a labelled 1,500 W, 1.0 divided by 1.5 is 0.67 hours, so 40 minutes. Round up to the next five minutes and show the working.
- If that sum comes out above ninety minutes, or your least count is a whole unit, use the pulse or disc constant instead: with the adult beside you, count pulses or disc turns for ten timed minutes and divide by the constant to get kWh.
- Agree a quiet window. The adult switches off the other loads that can safely be switched off, and you list everything that stays on: the fridge, the standby lamps, anything that cannot be reached.
- Copy the reading and the clock time, time the run to the minute, copy the reading and time again, then divide units used by hours run longhand. Repeat the whole test on a different day.

WRITE THIS DOWN

The least count, the run length you calculated and the sum behind it, start reading, end reading, minutes run, units per hour, the label wattage, the list of loads that stayed on, and the name of the adult who did the switching.

DONE WHEN

The display moved by at least ten least counts in each run - with a 0.1 kWh least count that means at least 1.0 kWh - and the two runs agree within ten per cent of the smaller figure, which is the closest a meter read this way can be trusted, or you have written down exactly why they do not.

Watch out. Watch out. Forgetting the fridge, the router and the standby lights. Anything left on lands inside your appliance's figure - list what could not be switched off and subtract its measured share.

5 Count the hours

180 MINUTES · plus 2 minutes a day for 14 days keeping the tally card

Find how many hours the appliance really runs, then turn units per hour into units per month.

- Keep a tally card beside the appliance and mark every start and stop time across the baseline fortnight.
- For a fridge or a pump that cycles on its own, sit with it for a full hour with the watch and count the minutes it actually runs. Do this twice at different times of day: that is two hours of sitting, and it is why this step is long.
- Multiply units per hour by hours per week, then by 4.33 - the weeks in a month, because 52 weeks divided by 12 months is 4.33 - then by your chosen rate, showing every multiplication on the page.
- Set the figure against the whole-building units from step two and give the appliance's share to the nearest five per cent. Both numbers in that share were measured, so a share written as 37.4 per cent claims a precision your meter cannot support.
- Write the annual figure only with its caveat beside it on the same page: this assumes the fortnight is typical. Write one reason it might not be.

WRITE THIS DOWN

Hours per week, units per month, cost per month for this one appliance with every multiplication shown, its share of the whole to the nearest five per cent, and the annual figure with its caveat.

DONE WHEN

The appliance figure exists in units and in money per month, it is smaller than the whole-building figure, and somebody who was not there can follow every multiplication without asking you a question.

Watch out. Watch out. An appliance that appears to cost more than the entire bill. That means the isolation test or the hours are wrong - redo the test before writing another line.

Worked fragment - two isolation runs sized to the meter's least count

Run	Start reading (kWh)	End reading (kWh)	Minutes run	Units per hour
1 - Tue, before change	48 231.4	48 232.6	45	1.60
2 - Fri, before change	48 297.1	48 298.2	45	1.47
3 - Tue, after change	48 610.3	48 611.3	45	1.33
4 - Fri, after change	48 664.0	48 665.0	47	1.28

The arithmetic, written out: Run 1: 48 232.6 kWh - 48 231.4 kWh = 1.2 kWh, which is 12 steps of this meter's 0.1 kWh least count; 45 minutes = 0.75 hours; 1.2 kWh divided by 0.75 hours = 1.60 kWh per hour.

What a marker looks for: A marker looks for a run long enough to move the display by at least ten least counts, two before-runs that agree within ten per cent of the smaller figure - 1.60 and 1.47 differ by 0.13, which is nine per cent of 1.47 - and the switching credited by name to the adult who did it.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the leak 90 MINUTES

Finish the costed problem statement, give the measurement a name, and choose the single change you will make.

- Write five lines: whose problem this is by code rather than by name, units per month, cost per month, cost per year at today's rate, and share of the whole.
- Draw the fourteen block A totals against the fourteen block B totals as paired bars on squared paper, scale stated, titled with the finding rather than with the word 'chart'.
- Write the identity card: a name for the measurement, a one-line promise it makes, and the single sentence you want repeated to a neighbour who asks about their own bill.
- List three candidate changes that cost nothing: a thermostat or fan setting, a timing shift, a door seal pressed back, a lamp already owned, or one habit.
- Choose one and write it as one testable sentence: 'I will change X for three weeks and expect this appliance to fall from A units per week to B.'
- Read the page aloud to whoever pays the bill and have them sign and date it if they agree to the change.

WRITE THIS DOWN

The one-page costed problem statement carrying no name, address or account number, the identity card, the three candidate changes, and the chosen change as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once, repeats your unit figure and your money figure back correctly, and can say the name of the measurement without looking at it.

Watch out. Watch out. Choosing a change that needs something bought. Use what is already in the building, or the result measures money spent rather than a habit changed.

7 Set the after rules 70 MINUTES

Write the protocol that makes the after-measurement comparable with the before, and say in advance how big a change you could believe.

- Write what stays fixed: the same two clock times, the same meter, the same rate, the same appliance, the same tally card, the same isolation run length.
- Write what is allowed to move: only the one thing you named in step six.
- Take the difference between your two baseline weeks and write it down as the smallest change you could believe: 'my two baseline weeks differed by N units with nothing changed, so an after-week within N units of the baseline mean proves nothing.'
- Rule twenty-one blank dated rows in the notebook before any data exists.
- Write the confounders you already expect: weather, guests, hours of power that did not come through the meter, a different person using the appliance.
- Write your prediction of the after figure in units and in money, date it, and have one person witness it with a signature.

WRITE THIS DOWN

The numbered protocol, the smallest believable change with the arithmetic that produced it, the twenty-one blank dated rows, the confounder list, and the dated prediction.

DONE WHEN

The rows sit ready and empty for three weeks, the prediction carries a date that precedes the data, and the smallest believable change is written down before you know the answer.

Watch out. Watch out. Changing two things at once because both looked easy. Two changes give one number you cannot attribute to either - change one and keep the second for the stretch.

8 Measure week one

140 MINUTES · plus 5 minutes a reading, twice a day, for 7 days

Run the change for seven days and read the meter exactly as you read it before.

- Take both daily readings at the same two clock times and write them in ink with the real time, with the named adult beside you for any reading that falls after dark.
- Keep the tally card running exactly as it ran in Act 1.
- Repeat the isolation test once under the new setting, with the adult doing the switching again and the run held to the same length as before.
- Write the hours of power that did not come through the meter every day, and mark the week disturbed if those hours moved sharply against the baseline fortnight.
- Write down every slip: a missed reading, a night the change was forgotten, a guest who reversed it.

WRITE THIS DOWN

Seven days of readings, one repeated isolation test with its run length and both readings, the hours tally, and a dated failure entry.

DONE WHEN

Week one is complete with no blank rows, the repeated isolation run moved the display by at least ten least counts, and the failure log holds at least one honest entry.

Watch out. Watch out. Being unusually careful with electricity all week because you are watching yourself. Name that effect in the log - it is the reason you measure for three weeks and not one.

9 Weeks two and three

140 MINUTES · plus 5 minutes a reading, twice a day, for 14 days

Finish the after-period, compare it with a baseline that can be checked against itself, and say plainly what this design cannot rule out.

- Take the same two readings daily for a further fourteen days without altering anything else.
- Add the three after-weeks and divide by three longhand, then set the mean against the mean of the two baseline weeks.
- Set the change beside the smallest believable change from step seven and write one sentence saying whether your result clears it or sits inside it.
- Write the limit the design forces on you: two baseline weeks show how much this supply wobbles with nothing changed, but two weeks cannot show a season turning, so record the weather for both periods and state what five weeks of measurement cannot rule out.
- When the next bill arrives, set its billed units beside your own arithmetic in units, and write out any gap and the reason for it.
- Draw two panels on squared paper to a stated scale rather than one axis carrying two units: units per week in the first, money per week in the second, each showing the two baseline weeks and the three after-weeks.

WRITE THIS DOWN

The two-panel chart, the mean after-figure, the baseline mean and the gap between the two baseline weeks, the bill comparison in units with its explanation, and the confounder paragraph.

DONE WHEN

You can state the before figure, the after figure, the size of the wobble your baseline showed with nothing changed, and at least two reasons the difference might not be your doing.

Watch out. Watch out. Blaming the bill when it disagrees with your own readings. Check the billing dates first - a bill rarely covers the same days you measured.

10 Share and defend 90 MINUTES

Defend the number live, and record what the household or the site will keep.

- Give the defence out loud: ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page. There is no recording option on this route - the two signatures are the evidence.
- Read the one-page explainer to three neighbouring households or three members of staff on the same tariff and write down what each of them said.
- Hand or post the drawn chart to the expert through your teacher with one question: what would you have measured that I did not.
- Ask whoever pays the bill, in front of a witness, whether the change stays and why, and write the answer word for word.
- Complete the relations ledger in codes and never in names: E1 expert, A1 to A3 affected, P1 to P3 peers, R1 to R3 replied, each with a role, a date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Nothing is posted up beyond the room. Where a figure is shared, it is shared through your school, where your school agrees it may be published.

WRITE THIS DOWN

The signed and dated defence page, the one-page explainer, and the coded relations ledger holding ten entries.

DONE WHEN

Ten relationships are logged by code with dates and replies, two witnesses have signed and dated the defence page, and the bill-payer's answer on whether the change stays is written down word for word.

Watch out. Watch out. Presenting the money saving without the off-meter power note. Everyone you show it to will ask about it - answer it before they do.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-ruled card in ink naming the supply by code rather than by household name, the meter type and its least count, the appliance under test, and the question: what does this one appliance cost per month, measured from the meter rather than guessed.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for an energy auditor or maintenance engineer, your two isolation runs and the run-length calculation attached as one hand-written page, the date and how you asked, and the reply copied out word for word. Carried or posted by your teacher.

3 - RESEARCH - WEEK 5

Evidence log

Every reading in ink with its clock time, both baseline weekly totals with the difference between them, every isolation run with start reading, end reading and run length, the hand-copied tariff table with its printed source written across the top, and an off-meter power note for every single day.

4 - PROCESS - WEEK 4

Failure log

The readings missed, the night the change was forgotten, the isolation run spoiled by a load that could not be switched off, the run that moved the display by fewer than ten least counts, and what each of them did to the comparison, all dated in ink.

5 - DESIGN - WEEK 4

The build

The measurement rig itself - the ruled log, the tally card, the two fixed clock times, the least-count calculation and the isolation procedure written as steps anybody could repeat - plus the before-and-after chart drawn on squared paper to a stated scale in two panels, units in one and money in the other, never both on one axis.

6 - DESIGN - WEEK 5

One-page explainer

One hand-written page a neighbour reads in ninety seconds: the appliance, the units per month, the cost at a named rate, the change made, the three-week result against a two-week baseline, the off-meter power caveat, and what the figure cannot prove.

7 - BRANDING - WEEK 3

Identity card

A name and a one-line promise for the measurement, written by hand in step six, so the household or the site refers to it by name, plus the single sentence you want repeated to the neighbour who asks about their own bill.

8 - OUTREACH - WEEK 6

Relations ledger

Ten entries in code and never in names: E1 the energy professional, A1 to A3 the people who pay or share this supply, P1 to P3 peers who checked your arithmetic, R1 to R3 people who received the drawn chart and answered - each with a role, a date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the meter and its least count, the isolation method, the units, the money at a named rate, the one change, the three-week result against the two-week baseline, and the limits you accept without argument. There is no recording option on this route - the two signatures are the evidence.

The four tiers, in this project

Starter

You take twenty-eight readings at two fixed clock times, write down your meter's least count, watch one adult-run isolation test and work units per hour from it, convert units to money at your own rate, and put your five questions to one professional through your teacher.

Practitioner

Everything in Starter, and you run the isolation test twice on different days, justify the run length from the least count rather than guessing it, defend the choice of appliance, and produce one chart a reader gets right without you standing there explaining the axes.

Researcher

Contributor

Everything in Practitioner, and you write the protocol before measuring, use the gap between your two baseline weeks as the smallest change you could believe, and quantify how off-meter hours, weather and the loads that stayed on limit your figure.

Everything in Researcher, and you set your measured units per hour against the appliance's rated wattage and against one named published source you can hold - a printed tariff table or a conservation leaflet, quoted with its title and date - take a written disagreement from one energy professional on your isolation method, and offer every raw reading to the school so it can be shared on request with anybody who asks to recompute it.

The one professional you must hear from

Who. An energy auditor, or the maintenance engineer or technician who signs off the electricity bill for a school, hospital, hotel, mill or small factory. A solar installer who sizes loads for a living uses the same arithmetic every day.

Where your school finds one. Institutions and roles only, offline, and your teacher makes the approach. The school's own site manager, caretaker or electrician. The maintenance office of a nearby hospital, hotel or mill, reached by a letter your teacher signs or a call your teacher places. The supplier's counter or customer-service office. The engineering department of a technical college, approached through its front office.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has read one meter twice a day for a fortnight, then timed one appliance running alone to work out units per hour. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you audit a building, what do you measure first, and why that before anything else?
2. Our isolation run was timed so the meter moved by at least ten of its smallest steps. Is that long enough for you to believe the figure, and what would you have done differently?
3. Would you cost a saved unit at the marginal rate or at the average rate, and why?
4. How do you separate a real saving from a change in the weather or in the hours of supply?
5. What is the commonest appliance you find people are wrong about, and how wrong are they?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the figure have fallen anyway without your change? Use the gap between your two baseline weeks to answer, and give the number.
2. What is the smallest step your meter can show, and how did that decide the length of your isolation run?
3. Your baseline is a fortnight. Name one thing a fortnight cannot rule out, and say how that limits what you are claiming.
4. Somebody says your saving is only cooler weather and longer hours of supply. Answer them using nothing but your own data.
5. If the tariff has bands and this supply crossed one during the three weeks, what happens to your cost-per-month figure?
6. Which loads stayed on during the isolation run, how many units did they add, and how do you know?

If you get stuck

- If the household or the site says no - then run the school-meter variant: the school's own meter, read with the site electrician or caretaker, one load switched by that adult, and the school's own rate with the account details covered. This is a full version of the project and is marked as one, not a reduced one.
- If nobody replies to the school's approach - then take the expert-unreachable path, which still scores: submit the five questions exactly as sent, the dated record of every attempt and how you asked, and one named published substitute source - a printed conservation leaflet or an engineering handbook page - quoted with its title and date.
- If your meter's least count is one whole unit - then use the pulse or disc constant printed on the face, count pulses or disc turns for ten timed minutes with the adult beside you, divide by the constant, and write the method out so a marker can follow every line of it.
- If nothing else in the building can be switched off - then have the adult agree a window when only that appliance is being used, measure the whole building across it, and write down the residual load you could not remove and the share you subtracted for it.
- If your before and after look the same - then compare the off-meter hours across both periods first, then report the null result with the numbers, because an honest zero is a finding.
- If you run out of time - then shorten the after-period to two weeks, keep the two daily readings and the full baseline fortnight intact, and state the shortened period on the chart rather than filling the gaps in.

Finished early?

Size a second load the same way and rank every measured load by units per month, so the household or the site can see which one to attack next.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 06 - EDUCATION & FUTURE LEARNING

The Ten Minutes That Teach

Teach five people the same ten minutes, test them twice, and count what three days quietly deletes.

THE QUESTION

How much of one ten-minute lesson is still there in the people you taught three days later, and does changing one thing about how it is revised keep more of it?

Organisations spend enormous sums on training that nobody checks three days afterwards, and the field that does check - instructional design and learning measurement - is paid precisely because forgetting is expensive and invisible. A trainer who can show a measured retention figure instead of a satisfaction form is worth more than one who cannot, in schools, in hospitals, in factories and in software companies. The method here is the standard method: identical content, identical questions, an identical gap, one variable changed, and the limits reported rather than buried.

ACT 1 - FIND

You take one small, self-contained thing you can teach fully in ten minutes, teach it identically to at least five people, and test them immediately with twenty short questions marked against a key you wrote first. You tell everybody at that first session that the same questions come back once more on a day inside a stated window, without saying which day, and you ask for consent again when it happens. The distance between the two scores is your finding.

A one-page costed problem statement carrying five lines: who was taught, the mean immediate score out of twenty, the mean retest score, the mean individual retention percentage, and what that loss is worth in minutes of teaching per week and hours per year at the rate teaching is actually paid for here. Beside it sits a two-point retention line for the group, marked with the number of people and the real gap in hours.

ACT 2 - FIX

You change exactly one thing about how the lesson is revised - a two-minute recap at day one, one practice question at day one, the learner explaining it back at the end, or a written summary in their own words - and you teach a second, comparable group the identical ten minutes from the same script. The same twenty questions are asked at the same two moments and marked to the same key by the same person.

Two two-point lines on one chart, one per group, each running from the immediate mean score to the retest mean score, one axis in one unit, with the number of people on each, the mean individual retention percentage for each, the difference between them, and a written list of every way the two groups were not alike. Five against five, chosen rather than randomised, cannot settle which method is better, and you say so on the same page.

YOU MEASURE

the percentage of an immediate twenty-question test score still present about seventy-two hours later, averaged across the people taught

BEFORE

Five or more people taught the same ten minutes from a written script, tested at once on twenty short questions, one mark each, against a key written before anybody answered. Each person's retention is their second score divided by their first score; the baseline is the mean of those individual percentages, not the ratio of the two group means.

AFTER

A second group of at least five, taught the same ten minutes from the same script by the same teacher, with one named change to how the material is revised, tested at the same two moments with the same twenty questions, marked to the same key by the same person, and reported as the same mean individual retention percentage.

The calendar this needs

Ten measurement days across two groups, each lesson followed by a retest sixty-eight to seventy-six hours later; start recruiting in week 1 or the second retest will not land inside week 6.

Safety and ethics - not optional

- Consent every time, in words, before every session and before every test. Each person is told that this is a study about forgetting rather than about them, what will happen to their answers, and that they may stop at any moment, refuse the second test, or ask for their answers to be destroyed, with no reason given and nothing said about it afterwards.
- Tell everybody at the first session that the same questions come back once more, on a day inside a stated window of three to four days. Say the window, never the day. Nobody is ever tested without knowing a retest is coming, and you ask for consent again before the retest begins.
- Everybody becomes a code before anything is written down; no name goes on an answer sheet, into a form or onto a chart; nobody sees anybody else's score; nobody is ranked, compared aloud, told they did badly or told who scored highest. The page linking codes to names stays out of sight and is torn up at the end in front of a witness who signs and dates a line saying it was destroyed.
- Never test anybody on work they are being formally graded on. Choose a small neutral topic that touches no real mark anywhere, because a poor result here must never reach a report, a file or a mark book. The topic is never personal, religious or political, and no question asks about anybody's beliefs, family, income or ability.
- This project touches reading, memory and test performance. Never write down a judgement of how well anybody reads, remembers or learns; nothing about anybody's health, money or reading enters the submission; and no result is ever shown to anybody except the person it belongs to.
- No pressure and no rewards that make refusal awkward. At the second test, ask again rather than assuming, and record anybody who declines as a withdrawal, removing their first score from the analysis and saying so in the report.
- If anybody becomes upset, or objects to being tested, or reacts badly to being asked - stop the session, destroy their sheets if they ask, and say nothing about it to anybody else. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

What you use - no-tech route

A notebook and a pen, and one master question page holding the twenty questions in a fixed order, written out once

Coded answer sheets ruled and numbered one to twenty, with the consent sentence across the top, a code box, and no name line

A clock or a watch with a second hand for the ten minutes, and a calendar for fixing the retest between sixty-eight and seventy-six hours later

An envelope for the marked sheets, and a separate folded page holding the code-to-name key, kept out of sight of everybody

Squared paper for the two-point retention lines, drawn to a stated scale

A written marking key on its own page, finished before the first sheet is handed out

You read the twenty questions aloud from the one master page at both moments and to both groups, so the wording cannot drift and nobody has to copy twenty questions out five times over; nothing in this project needs mains electricity, a meter or a screen.

The school version of this project

Run the whole study on school property with a member of staff present. Participants are volunteers from a lunchtime club or a tutor group, never a class being graded on anything. The school books one room for the lesson and the same room for the retest three or four days later, and the member of staff keeps the code-to-name page in a locked drawer until you tear it up at the end. Nobody is recruited at home, and no session happens after school hours.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Choose the ten minutes

70 MINUTES · The two timed read-throughs are twenty minutes of that on their own. No-Tech is longer because the script is written out longhand.

One small neutral topic is chosen and the ten-minute script exists word for word, so both groups can hear the identical lesson.

- List five candidate topics you could teach fully in ten minutes: a knot, the rules of a card game, how a lock works, the parts of a bicycle brake, five words of a language nobody in the room speaks.
- Strike out any topic that appears on somebody's syllabus this term, and any topic touching belief, politics, family or money.
- Write the ten-minute script word for word in the notebook, including the examples and the exact order, so the second group hears the identical lesson.
- Read the script aloud twice against a clock with a second hand, and cut or pad until it lands between nine and eleven minutes both times.
- Write one sentence on why this topic is safe to test: it touches no mark, no belief and nobody's private life.
- Show the topic and the safety sentence to your teacher and get their agreement before you ask anybody to sit through it.

WRITE THIS DOWN

The chosen topic, the safety sentence, your teacher's agreement, and the full script with both timed lengths recorded.

DONE WHEN

The script runs to time twice in a row and contains nothing about anybody's beliefs, family, ability or graded work.

Watch out. Watch out. Choosing something you know well and improvising around the script. Improvisation means the two groups get different lessons, and then nothing you measure afterwards means anything.

2 Write the twenty questions

110 MINUTES · Twenty items is roughly twice the writing of five. No-Tech is longer because the master page, the marking key and every answer sheet are ruled and written by hand.

The test exists once, with its marking key, and carries twenty items so that one mark moves a figure by a small step rather than a large one.

- Write twenty short questions that can only be answered by somebody who received this lesson, one mark each, with no half marks anywhere.
- Write the marking key on its own page, stating exactly what earns a mark and what does not, before a single answer exists.
- Write the twenty questions once on one master page in a fixed order; you read them aloud from that page at both moments and to both groups, so no question can be reworded.
- Rule the coded answer sheets, numbered one to twenty, with the consent sentence across the top, a code box and no name line.
- Read the questions aloud to one person who has not had the lesson; their score tells you how much of your test can simply be guessed, and it also tells you the reason for twenty items rather than five - one mark is now five points of one person's figure instead of twenty.
- Write the two test moments on the calendar now: immediately after teaching, and a chosen hour between sixty-eight and seventy-six hours later, the same target hour for every participant and for both groups, never late at night and never inside somebody's lesson.

WRITE THIS DOWN

The twenty questions, the marking key, the untaught person's score, the reason for twenty items, and the two test moments with the window you will hold to.

DONE WHEN

Somebody who never had the lesson scores near zero, and the key decides every mark without you having to think.

Watch out. Watch out. Writing questions answerable by common sense. If the untaught person scores twelve out of twenty, your test measures general knowledge rather than your lesson, so rewrite the questions before anybody is taught.

3 Ask and consent

45 MINUTES · Add ten minutes for every person you have to ask twice, and ten more if the adult who runs the room needs the study explained.

At least five people have consented in words, know a second test is coming inside a stated window, and hold a code instead of a name.

- Find at least five people who can give you ten minutes now and twenty more minutes in three or four days, ask each one face to face, and tell the adult who runs the room exactly what you are doing.
- Read the consent sentence at the top of the sheet aloud to each person: this is a study about forgetting, not about you; your score is never shown to anyone; you can stop at any moment and I will destroy your answers.
- Tell each person plainly that the same questions come back once more, on a day between three and four days from now, that you will not say which day, and that you will ask them again before that second test; ask them not to revise, and tell them you will ask afterwards whether they did.
- Give each person a code, tell them what it is, and write the code-to-name key on a folded page kept apart from the sheets.
- Record consent as a tick, a code and a date, and note that consent will be asked for again at the second test.
- Write one neutral line per person against their code, using only what they tell you themselves: how much of the topic they already knew, and whether the lesson is in their first language. Write nothing about how well anybody reads, remembers or performs.

WRITE THIS DOWN

The consent record by code and date, the code page kept apart, the exact sentence you read out about the second test and its window, and the one-line self-reported note against each code.

DONE WHEN

Five or more people have consented aloud, hold a code, know a second test is coming inside a stated window and know they can stop; no name sits anywhere near a score.

Watch out. Watch out. Recruiting only the people who are good at tests because they are easy to ask. Write down who you asked and who declined, because a group of five willing friends is a limit you must report, not hide.

4 Teach and test now

70 MINUTES · The lesson is ten minutes and the test about fifteen; the rest is marking twenty items for five people. If you cannot bring everybody together, add twenty-five minutes for each extra session.

The first group hears the scripted ten minutes and answers the twenty questions immediately, with codes and no names anywhere near a score.

- Teach from the script without adding examples, without answering extra questions, and time every session against the clock.
- Hand out the coded answer sheets the moment the lesson ends, seat the participants apart, and read the twenty questions aloud from the master page at a steady pace, explaining nothing.
- Check each sheet carries a code and not a name before you collect it, and put the collected sheets straight into the envelope.
- Mark every sheet against the key page and write the score out of twenty against the code in the notebook, never against a name.
- Remind everybody that the same questions come back once inside the window they agreed to, that there is nothing to revise, and that you would rather they carried on as normal.
- Write down anything that was not identical: a question you answered, a session that ran long, a room that was noisy.

WRITE THIS DOWN

The immediate score out of twenty for each code, the timed length of each session, and every deviation from the script.

DONE WHEN

Every code has a first score, the sessions ran within one minute of each other, and no name appears anywhere near a score.

Watch out. Watch out. Answering one good question during the lesson and giving that person extra content. Write the deviation down and report it rather than pretending the lesson was identical when it was not.

5 Retest inside the window

90 MINUTES · The gap between the two tests is waiting, not work, and none of it counts here. No-Tech is longer because five retention ratios and both means are worked out longhand.

The same twenty questions come back inside the agreed window, consent is taken again, and the group's retention figure is calculated the honest way.

- Hold to the window: retest at your chosen hour, between sixty-eight and seventy-six hours after the lesson, at a time that is not late at night and not inside somebody's lesson.
- Ask each person again whether they are willing to be tested, and record anybody who declines as a withdrawal, removing their first score from the analysis, destroying their sheets and saying so in the report.
- Hand out fresh coded answer sheets and read the twenty questions aloud from the same master page, identical wording in the identical order, and mark to the same key page.
- Write the real gap in hours beside every second score, taken from the clock rather than from the plan.
- Ask each person two questions afterwards and write the answers against their code: have you thought about this or talked about it since, and did you revise once you knew a second test was coming.
- Work out each person's retention longhand - second score divided by first score, times one hundred - show each division on the page, then take the mean of those percentages. That mean is the figure you report, not the second group mean divided by the first group mean.

WRITE THIS DOWN

The second score per code, the real gap in hours for every person, each person's retention percentage with the division shown, the mean of those percentages, and who withdrew.

DONE WHEN

You can state one number aloud with its granularity beside it: the mean percentage of the immediate score still there at about seventy-two hours.

Watch out. Watch out. With twenty questions and five people, one mark on one second sheet moves the group figure by roughly one to two points, and by more when that person's first score was low. Do not claim a change smaller than five points, and never report the second mean divided by the first mean as though it were the same number, because it is not.

Worked fragment - five coded participants, twenty items, retention worked the honest way

Code	First score /20	Second score /20	Real gap (hours)	Retention %
A1	16	9	71	56.3
A2	14	8	71	57.1
A3	18	11	73	61.1
A4	11	5	71	45.5
A5	15	9	75	60.0

The arithmetic, written out: A1: 9 marks out of 20 divided by 16 marks out of 20 = 0.563, so 56.3 per cent. Group figure: (56.3 + 57.1 + 61.1 + 45.5 + 60.0) per cent divided by 5 people = 280.0 divided by 5 = 56.0 per cent mean retention. The ratio of the two means, 8.4 out of 20 divided by 14.8 out of 20 = 56.8 per cent, is a different number and is not the one you report.

What a marker looks for: A marker looks for the mean of the five individual ratios rather than the ratio of the two group means, a real gap in hours inside the sixty-eight to seventy-six hour window beside every score, and no name anywhere on the page.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the loss

75 MINUTES · No-Tech is longer because the costed lines and the scale of the squared-paper chart are worked out longhand.

The one-page costed problem statement is finished and the single change you will test is written as one testable sentence.

- Write five lines: who was taught, the mean immediate score out of twenty, the mean retest score, the mean individual retention percentage, and what that loss is worth in minutes of teaching per week and in hours per year at the rate teaching is actually paid for here.
- Show the yearly arithmetic in full on the page - minutes lost a week, times fifty-two, divided by sixty - and write beside it: this assumes the week I measured is typical, and here is one reason it might not be. If you state it per month instead, use 4.33 weeks in a month, not 4.
- Draw the group's two points as one line on squared paper to a stated scale, one axis in one unit - mean score out of twenty - labelled with the number of people and the real gap in hours, with the finding as the title.
- List three possible changes: a two-minute recap at day one, one practice question at day one, the learner explaining the lesson back at the end, a written summary in their own words.
- Choose one and write the sentence: 'The second group gets X and nothing else changes; I expect mean retention to rise from A per cent to B per cent.'
- Read the page aloud to one person who was not involved, write down the first thing they did not understand, and write two lines underneath: what must stay identical for the comparison to hold, and the one difference between the groups you already know you will have to report.

WRITE THIS DOWN

The one-page costed problem statement with the yearly arithmetic shown and its caveat, the three candidate changes, the chosen change as one testable sentence, and the known limit stated in advance.

DONE WHEN

Somebody who was not there reads the page once and repeats your retention figure and its caveat back correctly.

Watch out. Watch out. Changing the topic as well as the revision because the first lesson felt weak. One variable moves; if the lesson was weak, it stays exactly as weak for the second group.

7 Match the second group and name the method

60 MINUTES · Ten minutes of this is the identity card, written once the change has been chosen and before any teaching happens.

A second comparable group has consented under its own code series, every difference between the groups is written down before teaching, and the method you are testing has a name.

- Recruit at least five people who had no contact with the first group's lesson and who have not heard the topic discussed.
- Read the same consent sentence aloud, including the sentence about the second test and its window, record consent by code and date, and use a separate letter series so the two groups are never mixed up.
- Write the same one-line self-reported note for each person - prior knowledge and the language of the lesson - and nothing about anybody's ability.
- Rule two columns on one page, one group each, and write every way the groups are not alike under a heading that says 'limits'.
- Write the identity card for the revision method you are testing: a name, a one-line promise a teacher could ask for by name, and the single sentence you want repeated by somebody who has just finished teaching.
- Write both test moments and the exact moment of the change on the calendar - the same target hour and the same sixty-eight to seventy-six hour window as the first group - and rule the answer sheets for both tests.

WRITE THIS DOWN

The second group's consent record, the profiles, the side-by-side comparison of the two groups, the written list of differences, and the identity card.

DONE WHEN

Five or more people have consented, hold codes in a separate series, the ways the groups differ are written down before any teaching happens, and the method has a name and a one-line promise on a card.

Watch out. Watch out. Claiming the groups are the same because they are the same size. Same size is not same group; write what actually differs and say plainly that it limits what you can conclude.

8 Teach group two

70 MINUTES · Same shape as step 4: ten minutes of lesson, about fifteen of test, the rest marking twenty items for five people.

The second group hears the identical ten minutes and answers the identical questions immediately, so any later difference is not a difference in the lesson.

- Read the same script word for word, timed against the same clock, adding nothing and answering no extra questions.
- Deliver the change here if it belongs at teaching time, such as the learner explaining it back or writing a summary in their own words, and time that separately.
- Hand out the coded answer sheets the moment the lesson ends, read the twenty questions aloud from the same master page, collect the sheets into the envelope and check every sheet carries a code.
- Mark against the same key page and write the scores out of twenty in the notebook under the second group's codes.
- Compare the two immediate means longhand and write one line on whether the groups started level; if they did not, say so now rather than at the end.

WRITE THIS DOWN

The second group's immediate score per code, the timed session length, the time taken by the change, and the comparison of the two immediate means.

DONE WHEN

Every code in the second group has a first score, and you have stated in writing whether the two groups started level.

Watch out. Watch out. Teaching the second group better because you have had practice. Read the script; a lesson delivered more warmly the second time is a second variable you cannot separate out.

9 Change and retest

100 MINUTES · Spread across four days: the change is delivered at day one and the retest lands inside the same window you used for the first group. The waiting is not work. No-Tech is longer because both sets of ratios and the scale of the chart are worked out longhand.

The change is delivered as written, the second group is retested inside the same window, and the two retention lines sit side by side with their uncertainty stated.

- Deliver the change exactly as written and at the agreed hour, timing it and recording who received it and who was missed.
- Retest inside the same sixty-eight to seventy-six hour window you used for the first group, ask consent again, record any withdrawal, and write the real gap in hours beside every score.
- Mark to the same key page, work out each person's retention percentage longhand, and take the mean of those percentages for the second group exactly as you did for the first.
- Draw both groups on one sheet of squared paper to a stated scale, as two two-point lines from the immediate mean to the retest mean, one axis in one unit, each labelled with its number of people; if you also want the retention percentages, draw them on a second sheet rather than on the same axis.
- Write the difference between the two mean retention percentages as a number, and write beneath it: five people against five, chosen rather than randomised, cannot settle which method is better. What it can show is that the method ran, one honest figure for each group with the size of one mark stated, and whether the difference is large enough to be worth a proper trial.
- List every confounder: different people, a different day of the week, one group taught in a noisier room, somebody who discussed the topic with a friend, somebody who revised because they knew a test was coming, a lesson that ran a minute long.

WRITE THIS DOWN

The second group's retest scores and real gaps, both mean retention percentages, the two-line chart, the difference between the groups, the sentence on what five against five cannot settle, and the confounder list.

DONE WHEN

You can state both retention percentages, the difference between them, the size of one mark in points, and at least two reasons that difference might not be caused by your change.

Watch out. Watch out. Reporting the difference as proof. With five people per group a difference can easily be the people rather than the method, so report the number and the uncertainty in the same breath.

10 Defend it and close it down

100 MINUTES · The defence itself is ten to twelve minutes of that, and both witnesses stay in the room for all of it.

The finding is defended live to unseen questions, every participant hears their own result privately, and the code page is destroyed in front of a witness.

- Answer ten to twelve minutes of unseen questions live, in front of two witnesses who sign and date the page: the topic, both groups, both retention lines, the one change, the difference and the limits, using codes and never names. There is no recording on this route; the two signatures are the record.
- Read the one-page explainer to three people who teach or train and write down what each of them said.
- Hand the two-line page to your teacher to pass on to the teacher or trainer you interviewed, with one question: what would you have controlled that I did not.
- Tell every participant their own result privately if they want it, tell them nobody else has seen it, then tear up the code-to-name page in front of one witness who signs and dates a line saying it was destroyed. Do not burn anything.
- Complete the relations ledger by code, never by name: E1 the expert, A1 to A3 the people the forgetting affects, P1 to P3 the peers who checked your key, R1 to R3 the people who answered when the chart was passed on, each with a role, a date and what they said.
- The name-to-code key for the ledger is written once on the teacher's sheet; the school holds it and destroys it after moderation.

WRITE THIS DOWN

The defence page signed and dated by both witnesses, the one-page explainer, the witnessed line recording that the code page was torn up, and the relations ledger holding ten coded relationships.

DONE WHEN

Ten relationships are logged by code with dates and replies, both witness signatures are on the defence page, and no participant's score can be traced back to a name by anybody, including you.

Watch out. Watch out. Showing the chart with a name or a recognisable description beside a low score. Codes only, in the defence, the explainer and the ledger, with no exceptions for people who say they do not mind.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One card written by hand naming the ten-minute topic, how many people were taught, the window in hours between the two tests, and the question: how much survives about seventy-two hours, and does one change to revision keep more.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a teacher, trainer, tutor or learning researcher, your first two-point retention line attached as one page, the date and how you asked, the request passed on by your teacher, and the reply recorded word for word on paper.

3 - RESEARCH - WEEK 5

Evidence log

The script, the master question page, the marking key page written before any answer existed, the consent record by code and date, every score out of twenty against its code, each retention percentage with its division shown, and the real gap in hours for every person tested.

4 - PROCESS - WEEK 5

Failure log

The person tested at ninety hours instead of inside the window, the withdrawal whose first score you removed and whose sheets you destroyed, the lesson that ran twelve minutes, the participant who revised because they knew a second test was coming, and what each one did to the comparison.

5 - DESIGN - WEEK 4

The build

The study instrument itself - script, master question page, marking key, coded answer sheets and consent wording - together with the first group's two-point retention line on squared paper, drawn to a stated scale, running from the immediate mean score to the retest mean score.

6 - DESIGN - WEEK 6

One-page explainer

One page one professional reads in ninety seconds, written by hand: the topic, the mean retention percentage at about seventy-two hours, the one change, the second group's result, the difference, the size of one mark in points, and what a study this small cannot tell anybody.

7 - BRANDING - WEEK 4

Identity card

A name and a one-line promise for the revision method you tested, written on one card so a teacher can ask for it by name, plus the single sentence you want repeated by somebody who has just finished teaching. Written in step 7, before the second group is taught.

8 - OUTREACH - WEEK 6

Relations ledger

Ten relationships by code, never by name: E1 the expert, A1 to A3 the people the forgetting affects, P1 to P3 the peers who checked your key, R1 to R3 the people who answered when the chart was passed on, each with a role, a date and how you asked. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the topic, both groups, both retention lines, the one change, the difference, and the limits of five people per group accepted without argument. There is no recording on this route; the two signatures are the record.

The four tiers, in this project

Starter

You teach the same ten minutes to five people, test them immediately and again inside the stated window with the identical twenty questions, and report the mean individual retention percentage with everybody's consent recorded and the real gap written in hours beside every score.

Practitioner

Everything in Starter, and you choose and defend your own topic and sample, write the marking key before any answer exists, cite anything you borrowed, state the size of one mark in points, and produce one chart one professional reads correctly without you explaining the axes.

Researcher

Contributor

Everything in Practitioner, and you write the whole protocol before teaching, justify twenty items and a sixty-eight to seventy-six hour window rather than fewer items or a longer gap, run both groups to the same window, and quantify what a single marker, a group of five and volunteer recruitment do to your result.

Everything in Researcher, and you set your own retention figures beside a named printed source on spaced revision with its author, title, page and date written out; you defend your controls to a specialist who disagrees and record what they would have changed; and you offer the script, the questions, the key and the anonymised scores through your school, where your school agrees they may be shared on request.

The one professional you must hear from

Who. A teacher, a corporate or vocational trainer, a private tutor or a learning researcher - somebody who has to make material stick and finds out when it does not.

Where your school finds one. Institutions and roles only, always approached through your school: a letter or a phone call from the school office to a nearby school or college staff room; the training department of a hospital, a bank or a factory; a university education department, addressed to the departmental office; the lead tutor at a tutoring centre. Your teacher makes the approach and holds the reply. Never approach anybody in person on your own.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has taught the same ten minutes to two small groups, testing each group twice to see how much is still there after about three days. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you teach something once, how much do you expect to be there three days later, and what makes you think that?
2. What do you do differently for the material you cannot afford to have forgotten?
3. How would you check whether your teaching worked, if nobody gave you a test to use?
4. What makes a test question a fair test of a lesson rather than a test of general knowledge?
5. If you had two small groups and one change between them, what would you be most worried about in the comparison?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the second group have remembered more anyway without your change, and how do you know?
2. Your two groups were different people. Name every way they differed and tell me which difference could have produced your whole result on its own.
3. Five people per group. Convince me that is enough to say anything, and tell me what number would have satisfied you.
4. You told everybody a second test was coming. What did that do to your figure, and how did you find out?
5. Show me how you got your retention percentage. Why is the mean of the five individual ratios not the same number as the second mean divided by the first?
6. Somebody in the second group says they thought about the topic on day two. What does that do to your finding, and what did you do about it?

If you get stuck

- If nobody will be taught by you - then run the school variant: ask your teacher for ten minutes of a lunchtime club or a tutor group, with the member of staff in the room, and report plainly that a convenience sample is what you had.
- If the household or the site says no - then move the whole study onto school property with a member of staff present, keep the same script, the same twenty questions and the same window, and write one line saying where it ran and why.
- If the expert never replies - then submit the five questions exactly as your teacher sent them, the dated record of every attempt, and one named published substitute source on spaced revision with its author, title, page and date, saying which of your five questions it answers and which it does not. That path scores.
- If you could not retest inside the window - then record the real gap in hours for every person, hold the second group to the same real gap, and report the gap you used rather than the gap you meant to use.
- If your two groups look the same - then report the null result, check first whether the change was actually delivered to every person and at the agreed hour, and put the delivery record beside the chart.
- If you run out of time - then keep both groups and shorten nothing about the method, dropping the three explainer readings rather than the second test, because without the second test there is no finding at all.

Finished early?

Run a third group with a second revision change and put all three two-point lines on one axis in one unit, keeping every other condition identical.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 07 - FINTECH & ETHICAL ECONOMY

Where The Money Actually Went

Write down what you think you spend, seal it, log every outflow for fourteen days, then compare.

THE QUESTION

Which category holds the largest gap between the share of one purse's outflow somebody believed it took and the share it actually took?

A shop that cannot say where its cash went is one bad month from closing, and a household that cannot say it argues about the wrong thing. Bookkeepers, accountants and microfinance officers earn their living from the same two moves you make here: capture an outflow at the moment it happens, then sort it into a category somebody else can audit. The gap between what people believe they spend and what they actually spend is the reason budgeting products exist, and you measure it before anyone sells you one.

ACT 1 - FIND

You track every outflow leaving one small purse for fourteen days - your own pocket money, a household grocery float, or a small shop's daily till logged with the owner's written permission - recording the amount, the category and who decided it as a role, at the moment the money goes. On day one, before a single row exists, the person who holds that purse writes down what share they believe each category takes, and that page is sealed and not looked at again until day fourteen.

A one-page costed problem statement carrying four lines: whose purse this is in role terms, how many outflows you logged over how many days, the category where the believed share and the actual share differ most, and the size of that gap in percentage points. Beside it sits a bar chart of each category's share of outflow, guessed bar against actual bar, largest gap first.

ACT 2 - FIX

You change exactly one thing - a written limit on one category, a separate envelope for one category, one category written up where everybody can see it, or one habit dropped - and you leave the categories and the logging method untouched. You then log fourteen more consecutive days under the identical rule, so the only moving part is the change you named.

Two fortnights set side by side per category as shares of outflow, a paired bar chart of before against after, the change in percentage points, a named list of confounders, and the purse holder's recorded answer on whether the change stays.

YOU MEASURE

the share of one purse's outflow taken by each category, in per cent, and the change in that share between two fortnights, in percentage points

BEFORE

Fourteen consecutive days of logging every outflow from one purse at the moment it happens, each row carrying the amount, the category, the decider written as a role rather than a name, and what it was for. Totalled by category, then turned into each category's share of the fortnight's outflow and set against the shares sealed on day one.

AFTER

Fourteen more consecutive days from the same purse, with the same categories, the same log and the same at-the-moment rule, beginning the day after the change starts. Reported as each category's share of the second fortnight's outflow beside the first fortnight's share, and as the change in that share in percentage points.

The calendar this needs

Twenty-eight consecutive logging days at ten minutes a day, plus the mid-point analysis that has to be finished in the gap between day 14 and day 15 - 150 minutes on the High-Tech route and about 235 on the No-Tech route - so block that evening before you start, or the second fortnight begins before you know what the first one said.

Safety and ethics - not optional

- You never handle money that is not yours. You are logging what leaves a purse, not carrying it, spending it or holding it - if the purse belongs to somebody else, they move every rupee and you write the row.
- Nobody's spending is logged without their explicit permission, asked again every time you log, and the log stops the day they ask it to stop, without them having to give a reason. A shop till is logged only with the owner's written permission, and the shop is never named.
- This project touches money, so nothing about a named person's finances enters a submission: no card or account numbers, no PINs, no passwords, no income figure for anybody, no debt, loan or repayment belonging to a named person, no interest charge or late fee tied to a person, and no copy of a card or a statement.
- What you hand in is category shares and the change in those shares. You may run the whole project on percentages from the first day if your household prefers it: keep the rupee amounts at home with the purse, and submit the shares, the row count and the dates.
- The needed, chosen and neither split applies to your own spending and to nothing else. Do not sort another person's outflows into it, do not write it up as a judgement of anybody, and if anything in the log would embarrass the person who holds the purse, it comes out before anything is shared.
- If the logging itself starts to feel bad - if the rows make somebody tense, defensive or unwilling to open the log - stop that day, tell the adult who knows where you are, tell your teacher before the next session, and write in the write-up what you stopped and why. That is a recorded finding and it is marked as one, not a failure.
- If anyone reacts badly to being asked about money, stop asking, leave it, and write down what happened. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

What you use - no-tech route

A folded index card or small notebook kept with the purse, ruled into five columns - date and time, amount, category, who decided as a role, what it was for

A pen kept with the card, and a spare - a log that depends on finding a pen fails on day three

An envelope for the day-one guess, sealed and signed across the flap by both people - so the date cannot be argued with later

A second dated envelope holding the used daily cards - so a marker your school allows can recount your totals

Squared paper and a ruler - the share bars and the paired before-and-after bars, drawn to a stated scale

A ruled sheet with one box per day for twenty-eight days - the daily totals and the nightly failure line

Nothing here needs power, a signal or an account, but the arithmetic a formula does in one second on the other route is the longest single block of work on this one, which is why steps 3, 5 and 9 carry roughly double the minutes.

The school version of this project

Run the same method on a school purse with a member of staff. The tuck shop float, the stationery cupboard budget, the library fines tin or a trip fund all leave money in small amounts every day. The member of staff signs the permission page, holds the sealed guess and moves every rupee; you write the rows and work out the shares. Nothing about anybody's household appears anywhere, and the school keeps the working. This is the version most schools should pilot first, and it marks exactly like the others.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Choose the purse 45 MINUTES

Pick the one purse you will track for twenty-eight days, and settle in writing what may be written down about it.

- Choose one of three: your own pocket money, a household grocery float, or a small shop's daily till.
- Write at the top of a fresh page the one sentence that defines an outflow: any money leaving that purse, of any amount, including coins and including money spent for somebody else.
- Agree the privacy rule and write it on the permission page: category shares are submitted, rupee amounts are not, unless the purse holder ticks a box saying the school may see them.
- Where the purse is not yours, ask the holder face to face and have them sign and date a page saying they agree and may stop the log on any day without giving a reason.
- Where it is a shop till, get the owner's permission in writing on that same page, and write on it that the shop will never be named.
- Fold the signed page into the evidence envelope, write the date on the outside, and hand it to your teacher to hold.

WRITE THIS DOWN

The purse chosen, the one-sentence definition of an outflow, the privacy rule, and the signed, dated permission page.

DONE WHEN

You can state in one sentence which purse you are logging, and where it is not yours a signed permission page carrying today's date exists with the privacy box either ticked or deliberately left blank.

Watch out. Choosing a purse you only see once a week. Every outflow has to be caught at the moment it happens, so pick the purse that is in the room with you.

2 Seal the guess 35 MINUTES

Get the guess written down before a single rupee is logged.

- Ask the person who holds the purse to write, in their own hand, what share they think each category takes in a normal week, in per cent, adding to a hundred.
- Write your own guess on a separate slip in the same shape, even where it is your own purse and your own money.
- Put both slips in an envelope, seal it, and have both of you sign across the flap so it cannot be opened and rewritten.
- Write on the front: today's date, and 'not to be opened until' with the day-fourteen date beside it.
- Hand the envelope to your teacher to hold for the fortnight, so nobody can be tempted to look.

WRITE THIS DOWN

Two guesses - the purse holder's and your own - each a set of category shares adding to a hundred, both dated.

DONE WHEN

The guess is sealed or timestamped, neither of you can edit it away, and it is closed.

Watch out. Guessing after you have started logging. A guess written on day three is not a guess, and the whole finding rests on this guess predating the data.

3 Build the log

60 MINUTES · The No-Tech route is 60 minutes rather than 40 because ruling and dating fourteen cards into five columns by hand is the whole of the build.

Build a log that records one outflow in under fifteen seconds.

- Write your category list on one page, between six and ten categories, each one a thing somebody who does not live with you could sort a purchase into without asking you.
- Rule a pocket card into five columns: date and time, amount, category, who decided as a role, what it was for.
- Make fourteen cards at once, one per day, each headed with its date, and keep them with a pen where the purse lives.
- Write three invented rows on a spare card to check the columns work in your hand, then tear that card up.
- Add a small box headed 'estimated' on every card, to tick against any amount you reconstructed rather than saw.

WRITE THIS DOWN

The category list, the column headings, and fourteen dated blank days ready to receive rows.

DONE WHEN

You record a test row in under fifteen seconds and every column has something in it.

Watch out. Building fifteen categories because every purchase feels different. Above ten you start guessing which one a row belongs in, which puts your own noise inside the finding.

4 Log fourteen days

15 MINUTES · Plus 10 minutes a day for 14 days - 140 minutes spread across the fortnight, not a block you can catch up on at the end.

Record every outflow from that purse at the moment it happens, for fourteen consecutive days.

- Write the row before the money is out of your hand, not later that evening.
- Where you genuinely could not write it at the moment, write it the same day and tick the estimated box.
- Write the decider as a role - me, the purse holder, another member of the household, the shop owner - and never as a name.
- Write a zero on a day nothing left the purse, so that day exists in the count.
- Each night put the day's card in the dated envelope and write one line on anything missed or reconstructed.

WRITE THIS DOWN

One row per outflow with amount, category, decider role, purpose and time, plus fourteen nightly failure-log lines.

DONE WHEN

Fourteen consecutive dates exist, including the days with nothing on them, and no row has a blank amount.

Watch out. Leaving the small ones out. Tea, a bus fare, a top-up and a packet of biscuits are exactly where the invisible weekly total hides, so log every amount, down to single rupees.

5 Turn the fortnight into shares

120 MINUTES · Steps 5, 6 and 7 all sit in the gap between day 14 and day 15: 150 minutes on the High-Tech route, about 235 on the No-Tech route. The No-Tech figure here is double because adding six to ten categories across fourteen cards longhand, twice, is the work.

Turn the fortnight into category shares, then open the sealed guess and measure the gap.

- Add each category across the fourteen cards longhand, twice, and accept a total only when the two runs agree.
- Add the category totals to get the fortnight total, work out each category's share of it as a percentage with the working left visible on the page, and check that the shares add to 100.
- Work out your granularity: divide a typical single outflow by the fortnight total and multiply by 100. That is the smallest share change that means anything, and you do not claim a change smaller than it.
- Only now cut open the sealed envelope, in front of the purse holder, and write the guessed share beside the actual share for every category.
- Draw the bars on squared paper to a stated scale: guessed bar and actual bar side by side for each category, largest gap first.
- Optional, and only if you want it: mark each of your own outflows N for needed, C for chosen or X for neither. This is your own reflection on your own spending, never a verdict on anybody else's, and nothing about interest, a late fee or a missed payment belonging to anybody goes near it.

WRITE THIS DOWN

Each category's share of outflow, the guessed share beside it, the gap in percentage points, your granularity figure, and the name of the category carrying the largest gap.

DONE WHEN

You can say one sentence aloud: we thought this category took X per cent of what leaves the purse, and it actually took Y.

Watch out. Reporting only the biggest category. The finding is the biggest gap, not the biggest total - the category everybody already knew about is not news.

Worked fragment - the fortnight turned into category shares

Category	Fortnight total (rupees)	Actual share (%)	Guessed share (%)	Gap (points)
Food and groceries	1560	39.0	50	-11.0
Transport	880	22.0	20	+2.0
Tea and snacks	720	18.0	5	+13.0
Phone top-up	400	10.0	10	0.0
Household items	280	7.0	10	-3.0
School and stationery	160	4.0	5	-1.0

The arithmetic, written out: Fortnight total = 1560 + 880 + 720 + 400 + 280 + 160 = 4000 rupees. Tea and snacks = 720 / 4000 x 100 = 18.0 per cent, against a guessed 5 per cent, so the gap is 13.0 percentage points. A typical single outflow here is 40 rupees, and 40 / 4000 x 100 = 1.0 point, so a 13.0 point gap is real and anything under 1.0 point is not.

What a marker looks for: A marker checks that the shares add to 100, that the gap column is actual minus guessed and sums to zero, that the largest gap rather than the largest category is named as the finding, and that the rupee column is working rather than submission - where the household has not agreed to it, that column is blank and the shares stand alone.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost 65 MINUTES

Finish the costed problem statement on one page and choose the single change you will make.

- Write four lines: whose purse this is in role terms, how many outflows you logged over how many days, the category with the largest gap between believed and actual share, and the size of that gap in percentage points.
- Draw the paired guessed-against-actual bars on squared paper with the scale stated and the finding as the title, shares in per cent only. Any rupee figure goes on a second set of bars - never two units on one axis.
- Only where the purse holder has agreed in writing to a rupee figure, add one line: what the target category costs per week, and what that comes to over a year at 52 weeks. Write beside it: this assumes the fortnight is typical, and one reason it might not be. If you give a monthly figure, the weeks in a month is 4.33, not 4 - state that beside it.
- List three candidate changes - a written limit on one category, a separate envelope for one category, one category written up where everybody can see it daily, or one habit dropped - with the share each might move.
- Choose one and write: for fourteen days I will change X and expect this category's share to fall from A to B per cent.
- Read the page aloud to the purse holder and have them sign and date it where they agree to the change.

WRITE THIS DOWN

The one-page costed problem statement, the three candidate changes with their predicted effect on the share, and the chosen change as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once and repeats your gap figure back correctly.

Watch out. Choosing the change that saves most on paper but nobody will keep. A change abandoned on day three measures nothing - choose the one that survives fourteen days.

7 Write the rules 50 MINUTES

Write the protocol that keeps the second fortnight measurable against the first, and name the log.

- Write what stays fixed: the same purse, the same categories, the same card, the same at-the-moment rule, the same fourteen days.
- Write what is allowed to move: only the one change you named in step six.
- Write the change on a card as an instruction somebody could follow without you in the room, and pin it where the purse lives.
- Give the log a name and write its one-line promise on that same card: what it records, what it never records, and who may see it. That is your identity card.
- Rule and date fourteen fresh blank cards before any data exists, and put them with the pen.
- Write your prediction on the page, date it, and have one person witness it with a signature.

WRITE THIS DOWN

The protocol as a numbered list, the change written as an instruction, the named log with its one-line promise, the fourteen dates, and the witnessed prediction.

DONE WHEN

Fourteen empty dated days are ready, the log has a name, and a signed prediction exists that predates the data.

Watch out. Renaming the categories between fortnights because the first set annoyed you. Fix them now; one category renamed halfway makes the two fortnights uncomparable.

8 Log week one of the change

15 MINUTES · Plus 10 minutes a day for 7 days.

Run the change and log the first seven days exactly as you logged the baseline.

- Write every outflow on the day's card, at the moment it happens, using the same five columns.
- Total these seven days by category and compare them against the matching seven days of the baseline rather than against the whole fortnight.
- Write down every occasion the change was not kept, and why, without softening it.
- Ask the purse holder once, on day seven, whether the change is annoying, and write the answer word for word.
- Do not alter the change mid-week; where it turns out to be unworkable, write that down and keep logging.

WRITE THIS DOWN

Seven days of rows, the seven-day category totals, and a dated failure entry for every day the change slipped.

DONE WHEN

Seven consecutive dates exist in the second fortnight and the failure log holds at least one honest entry.

Watch out. Quietly loosening the change when it starts to pinch. Log the slip - a change kept nine days out of fourteen is a real result, and a change you pretend was kept is not.

9 Days eight to fourteen

80 MINUTES · Plus 10 minutes a day for 7 days. The No-Tech block is 80 minutes rather than 45 because the second fortnight is added longhand, twice, exactly as the first was.

Finish the second fortnight and compare the two fortnights honestly.

- Log the remaining seven days with nothing altered.
- Total the second fortnight by category longhand, twice, then work out each category's share of that fortnight's outflow and set it beside the first fortnight's share.
- Draw the paired bars on squared paper to the same scale you used before: before and after for each category, shares in per cent only, largest change first, with any rupee figure the purse holder agreed to on a separate set of bars.
- State the change for the target category in percentage points, check it against your granularity figure, and say plainly whether twenty-eight days is enough to be sure.
- List every confounder you can name: a wedding, a festival, a price rise, a guest, an illness, a different pay date, and the fact that logging money tends to reduce it on its own.
- Report the change you measured. Where you quote a printed published figure for how far people misjudge their own spending, put it beside yours with its source, never instead of it.

WRITE THIS DOWN

The paired before-and-after shares, the change in percentage points per category, your granularity figure, and the named confounder list.

DONE WHEN

You can state the before share, the after share, and at least two reasons the difference might not be your doing.

Watch out. Reporting the good week and burying the other. Report both weeks, including the one that went backwards - a well-measured failure outscores an unmeasured success.

10 Defend it and record what stays 100 MINUTES

Defend the finding to real people, and record what the purse holder will keep.

- Read every page and every chart before anything is shared and cross out all of it: card or account numbers, income, any debt or repayment belonging to a named person, any interest charge or late fee tied to a person, the shop's name, and any rupee amount the purse holder did not agree to.
- Answer ten to twelve minutes of unseen questions aloud, in front of two witnesses who sign and date the page. There is no recording on this route - the two signatures are the record.
- Read the one-page explainer to three people this purse actually pays for, and write down what each of them said.
- Hand the share chart to your teacher to pass to the expert with one question: what would you have categorised differently.
- Complete the relations ledger in codes, never names: E1 the expert, A1 to A3 the affected, P1 to P3 the peers, R1 to R3 who replied, each with a role, a date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Ask the purse holder, on the record, whether the change stays, and write their answer word for word.

WRITE THIS DOWN

The signed and dated defence page, the one-page explainer, and the coded relations ledger holding ten entries.

DONE WHEN

Ten coded relationships are logged with roles, dates and replies, two witnesses have signed the defence page, nothing identifying survives in the shared version, and the purse holder has said on record whether the change stays.

Watch out. Passing the raw rows around. The rows are evidence for the assessor, not for anybody else - show the category shares and keep the rows where your school holds them.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-written card naming the purse in role terms, the fourteen days and the category list, and the question: which category holds the largest gap between the share of this purse's outflow somebody believed it took and the share it actually took. No amounts, no names.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions, your category shares attached as one hand-copied page carrying no names, no amounts and no account details, the date and how you asked, and the reply word for word. Where nobody replied, the dated attempts and one named printed source stand in its place.

3 - RESEARCH - WEEK 5

Evidence log

Every outflow written on its dated card with time, category and decider role, the row count, an estimated tick against every reconstructed amount, and the sealed day-one guess still signed across the flap. The cards stay in the envelope your teacher holds, and the rupee amounts leave it only where the purse holder ticked the box on the permission page. No card or account numbers, no income figures.

4 - PROCESS - WEEK 5

Failure log

The outflows you caught late, the days the change was not kept, any category you renamed, the week a festival broke the pattern, and what each did to the comparison, all dated.

5 - DESIGN - WEEK 4

The build

The logging system itself: the ruled daily card, the two dated envelopes, the category list, the estimated box, and the paired before-and-after bars drawn on squared paper to a stated scale.

6 - DESIGN - WEEK 6

One-page explainer

One hand-written page read in ninety seconds: the purse in role terms, the category shares, the guessed share beside the actual one, the single change, the fortnight result in percentage points, and what twenty-eight days cannot tell anybody.

7 - BRANDING - WEEK 5

Identity card

A name and a one-line promise for the log, written on the card that stays with the purse - what it records, what it never records, and who may see it - plus the single sentence you want repeated at somebody else's table.

8 - OUTREACH - WEEK 6

Relations ledger

Ten entries in codes, never names: E1 the expert, A1 to A3 the people this purse pays for, P1 to P3 the peers who checked your arithmetic, R1 to R3 who answered when the chart was passed on. Each carries a role, a date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the purse without naming anybody, the category shares, the largest gap, the single change, the result in percentage points, and the limits you accept without argument. There is no recording on this route - the two signatures are the record.

The four tiers, in this project

Starter

You log every outflow from one purse for fourteen days without a gap, turn the fortnight into category shares, open the sealed guess, and put your five questions to one professional through your school.

Practitioner

You do all of that, and you choose and defend your own category list, cite any borrowed budgeting method to its source, state your granularity figure, and produce one chart a reader gets right without you explaining what the two bars mean.

Researcher

Contributor

You do all of that, and you write the categories and the recording rule before day one, justify fourteen days rather than seven, and quantify how much of the outflow you probably missed and which way that biases the gap.

You do all of that, and you set your gap against a named published source on how far people misjudge their own spending - a printed one counts - report your own measured figure beside it rather than instead of it, defend your categories to a professional who disagrees with them, and offer the anonymised shares and the raw day totals to other schools on request, through your school, where your school agrees they may be published.

The one professional you must hear from

Who. An accountant, a bookkeeper, a bank teller, a microfinance loan officer, or a shopkeeper who keeps a daily cash book - anybody who has to sort other people's outflows into categories for a living, and who can tell you whether your categories would survive somebody else checking them.

Where your school finds one. The same institutions, on paper. Your teacher writes from the school office: the school bursar in person with your teacher present; the commerce department of a nearby college by posted letter; the regional branch of a professional accounting body, whose address sits in a printed directory in the library; and the school's own list of parents who have offered to help. You never call or write on your own account, and you never go looking for a named person.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has logged every outflow from one purse for fourteen days, then reported the result as category shares rather than amounts. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you write down a day's spending, which categories do you actually use, and why those ones?
2. How far out are people usually when they guess what share of their spending goes where, and in which direction?
3. Which kind of spending do people forget to record most often, in your experience?
4. What is the simplest record-keeping change you have seen actually stick for more than a month?
5. If you had my fourteen days of rows, what one column would you have asked me to record that I did not?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would that fall in the category's share have happened anyway without your change, and how do you know?
2. Logging money tends to reduce it on its own. How much of your Act 2 result is the change and how much is simply being watched?
3. You logged twenty-eight days. Which weeks of the year would have given you a completely different answer, and why?
4. Your category list decided your finding. Show me two outflows that could honestly have gone in either of two categories, and tell me what that does to your gap figure.
5. A share can fall because that category shrank or because everything else grew. Which happened in yours, and what shows it?
6. What is the smallest share change your fortnight can detect, and how did you work that out?

If you get stuck

- If nobody replies to the interview requests - then take the expert-unreachable path, which still scores: file your five questions exactly as your teacher sent them, the dated attempts, and one named published source on household spending categories, and write which of your five questions it answers and which it does not.
- If the household or the site says no - then run the school variant on a school purse with a member of staff, and write down the date you asked and what was refused, without naming anybody.
- If the logging itself becomes uncomfortable - then stop that day, tell the adult who knows where you are and your teacher before the next session, and write in the write-up what you stopped and why. That is a recorded finding and it is marked as one, not a failure.
- If your before and after look the same - then report that as the finding, check the daily rows to see whether the change was actually kept on all fourteen days, and look for the category whose share grew while your target category shrank.
- If you could not catch every outflow - then log one category completely rather than all of them badly, state on every chart that the figure covers that category only, and mark every reconstructed amount as estimated.
- If you run out of time - then keep both fortnights at fourteen days and drop the optional needed-and-chosen columns rather than the log, writing on the page what you dropped and why.

Finished early?

Run the same fourteen-day log a second time on a school purse with a member of staff, and set the two share charts side by side to the same scale, with no household named on either.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 08 - LAW & GOVERNANCE

The Rule Nobody Follows

Count how often one real rule near you is actually kept, then find out who pays for the breaking.

THE QUESTION

How often is one real rule in a place you already belong actually followed, and who carries the cost, in minutes or rupees, when it is not?

A rule that most people break is not a small annoyance; it is a cost quietly moved onto whoever is least able to refuse it. Regulators, compliance teams, councils, unions and housing committees all live on the same two moves you make here: count how often a rule is actually followed, then find out who pays when it is not. Writing a rule the people bound by it agreed to, can appeal against and can change is paid work everywhere from a market committee to a national regulator.

ACT 1 - FIND

You pick one real rule in a place you already belong and can name every member of - a household, a shared room, a class, a workshop, the staff of a shop - that most people break, and you count it: ten observation sessions across two weeks, always at the same time, in the same place, for the same fixed length, every instance tallied as followed or not followed.

You then ask at least five people whom the breaking affects what it costs them in minutes, rupees, safety or fairness. Out of it comes a one-page costed problem statement carrying four lines: the rule written as an observable event, the compliance rate as a percentage with the number of instances behind it, who carries the cost of the breaking, and what that cost comes to across the instances you observed in a week. Beside it sits a bar chart of compliance per session with the instance count on every bar, and one line quoting, without naming anybody, what the people who pay actually said.

ACT 2 - FIX

You draft a changed rule, put it to everybody it affects, and rewrite it until they agree - the signed sheet carries the rule, the way to change it, the way to appeal a decision under it, and the plain statement that anybody may leave the group at any time. You then count compliance for two more weeks under the identical method: same sessions, same times, same place, same length, same tally sheet, same counter.

The signed rule sheet, ten more sessions counted identically, the two compliance rates side by side as a bar chart with the instance count on each bar, the change in percentage points beside the granularity step that says whether the change is a finding at all, the observed weekly cost recalculated, and a named list of confounders. Where the group refused the new rule, that refusal, its reasons and what it says about the original rule stand as the result and are written up as one.

YOU MEASURE

compliance rate for one rule, as a percentage of observed instances, with the instance count written beside it

BEFORE

Ten sessions across two weeks, each at the same time, in the same shared place, for the same fixed length, every instance tallied as followed or not followed by the same counter. The rate is instances followed divided by total instances, reported per session and per fortnight with the instance count beside it. Taken before anything is proposed to anybody.

AFTER

Ten more sessions across two weeks: same times, same place, same length, same tally sheet, same counter, same definition of an instance, beginning the day after the new rule is signed. Reported per session and per fortnight beside the first, with the instance count on both and the change written in percentage points.

The calendar this needs

Twenty counting days across four counting weeks, with the rule signed in week 4 between the two fortnights. Start the baseline in week 2 or the second fortnight will not finish.

Safety and ethics - not optional

- You count only in a place whose membership you can name, and only from a shared or common spot inside it - a shared room, a corridor, a workshop floor, a queue inside the place, a ground. Never observe anybody in a private space: not through a window, not in a bedroom or a bathroom, not in a home you were not invited into, and never on a camera, a photograph or a recording of any kind.
- Before session one, tell the adult responsible for that place - the head of the household, the teacher whose room it is, the workshop supervisor, the shopkeeper - what you are counting, and get their agreement. You do not count in a place where no adult has agreed to it.
- Observation is counting, not policing. You never confront, correct, warn or film a person breaking the rule, and you never wait somewhere in order to catch somebody. Where anybody asks what you are doing, tell them plainly, and stop counting if they ask you to.
- You count behaviour in the aggregate and never an identifiable person: strokes in two columns, nothing else. No name, no description, no relationship, no role, no seat, no sketch. If anybody objects or is angry, stop for that day, put the clipboard away, and leave. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.
- No named complaints, ever. Every note describes a situation and never a person - the bin was left out overnight, two people went ahead of the queue - not by name, not by description, not by relationship, not by where they sit. Anything already written that identifies somebody is crossed out before the page leaves your hand.
- The cost survey asks about minutes, rupees, safety and fairness only. Nothing about any named person's health, money troubles or reading ever enters a page of this project, and if somebody offers it you do not write it down.
- The new rule may not punish, shame, exclude, fine or cost anybody money, and it may not name a single person. It must carry a way to change it, a way to appeal a decision under it, and the plain sentence that anybody may leave the group at any time. Where everybody affected does not agree to it, it is not written into force: the refusal is the result and you write it up as one.

What you use - no-tech route

A clipboard and twenty identical tally sheets, each ruled into two columns headed followed and not followed, with date, place, start time and session length written at the top

A pen, and a spare, because a session missed for want of a pen cannot be repeated

A watch or clock with a second hand, or any household timer, so every session is exactly the same length

One page for the rule sheet carrying the rule, the way to change it, the way to appeal, the right to leave, and a signature and date line for every person affected

Squared paper and a ruler for the per-session bars and the paired before-and-after bars, drawn to a stated scale

An envelope, dated, holding the used tally sheets so anybody can recount your totals

A clipboard, a ruled tally sheet and a watch produce the identical compliance rate; the rule sheet is one page passed round for objections and then for signatures, and the bars are drawn on squared paper to a stated scale.

The school version of this project

Run it on school property with a member of staff. The class is the membership: you can name everybody in it, and everybody can sign or decline. Count a school rule you can watch from one fixed spot - the corridor, the library, the queue for the canteen - at the same lesson change each day, for the same fifteen minutes, with your form teacher as the adult responsible for the place. The changed rule is put to the class and signed by the class.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Find the rule

45 MINUTES · The No-Tech figure is higher because the written version of the rule is copied out by hand.

You leave this step with one rule written as an event anybody could watch and agree on.

- List five rules you already live under in places whose members you could name on one line: at home, in a shared room, in your class, in a workshop, behind the counter of a shop where you help.
- Cross out any rule you cannot watch from a shared or common spot, any that would mean watching one particular person, and any whose members you could not sit down with and put a changed rule to.
- Write the survivor at the top of a fresh page in one sentence: the rule is X, one instance is Y, and an instance counts as followed when Z.
- Find out whether it is written anywhere, and copy the written version onto the page by hand with the source written across the top; where it exists only as something people say, write down who says it and when it started, as far as anybody can tell.
- Ask three people who live under it whether they knew it existed, and write down all three answers.
- Tell the adult responsible for the place what you are going to count, and write down that they agreed and on what date.

WRITE THIS DOWN

The rule in one sentence, the definition of one instance, whether it is written down anywhere, the three answers on whether people knew of it, and the dated agreement of the adult responsible for the place.

DONE WHEN

Somebody who has never been to the place reads your sentence and says correctly whether a described instance followed the rule.

Watch out. Watch out. Choosing a rule about one person you find annoying. That is a complaint, not a rule - pick something that happens many times a day to many people. And pick a place whose membership you can list: in Act 2 you have to put the changed rule to every person it affects and hold a signature or a recorded decline from each of them, which you can do in a household, a class, a shared room, a workshop or a shop's staff, and cannot do in a street or a bus queue.

2 Define the count

70 MINUTES · Includes the fifteen-minute pilot session. The No-Tech figure is higher because twenty tally sheets are ruled and headed by hand.

You fix the time, the place, the session length and the counting rule, and prove all four in one pilot session.

- Choose one fixed time of day and one fixed shared or common spot where instances happen often enough to count.
- Set the session length at fifteen minutes. Every session in this project is exactly fifteen minutes, so that a counting day is fifteen minutes counting plus ten minutes to total the sheet and work out the rate: twenty-five minutes, ten times, and the project total can be checked by anybody.
- If instances are too rare to see in fifteen minutes you may use twenty-five minutes instead - but then every session is twenty-five minutes, every counting day is ten minutes longer, and you write the chosen length on the front of the envelope and on every chart.
- Rule twenty tally sheets in advance, each headed with the place, the session length and a blank date, two columns only: followed, not followed.
- Run one pilot session with a watch, and write 'pilot' across that sheet so it never enters the ten.
- Write the edge cases the pilot exposed - an instance half-done, two at once, one you could not see clearly - and fix the answer to each before session one.

WRITE THIS DOWN

The fixed time, the fixed place, the session length in minutes, the edge-case rules, and the pilot counts marked as a pilot.

DONE WHEN

The pilot count exists, the edge-case rules are written, and ten blank dated rows or ten blank headed sheets are waiting.

Watch out. Watch out. Counting for as long as it stays interesting. Sessions of unequal length cannot be compared, and a project whose sessions vary cannot be added up honestly, so set the timer and stop when it goes.

3 Count ten sessions

25 MINUTES · Twenty minutes on each of ten counting days across two weeks - fifteen minutes counting plus five to total and enter it - so 200 minutes in all, or 250 on the No-Tech route where the rate is worked out longhand. At the twenty-five-minute session length every counting day is ten minutes longer: 300 minutes High-Tech, 350 No-Tech.

You run ten identical observation sessions and tally every instance.

- Turn up at the same time and the same place for every session, and start counting when the watch says so, not before.
- Mark one stroke in followed or not followed for every instance, and nothing else - no names, no descriptions, no roles, no seats, no drawings of anybody. You are counting behaviour in the aggregate, never a person.
- Total both columns at the foot of the sheet before you leave, and work out the rate longhand in the margin.
- Where a session could not happen, write the date and the reason in the failure log rather than moving that session to another time.
- Where anybody asks what you are doing, say plainly that you are counting how often a rule is followed for a school project, and stop counting if they ask you to.
- If anybody objects or is angry, stop for that day. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

WRITE THIS DOWN

Ten rows or ten sheets with date, start time, both counts, the total instances and the rate, plus a failure-log line for every session that went wrong.

DONE WHEN

Ten sessions of identical length exist, each with its total instance count beside its rate, and no note anywhere identifies a person.

Watch out. Watch out. Counting harder on the days you expect breaking. The count has to be blind to what you hope for, so keep the time, the place and the length fixed even when it is dull.

4 Ask who pays

80 MINUTES · Spread across two or three days. Nobody has to answer on the spot, and the days you spend waiting for an answer are not work.

You find out who carries the cost of the breaking, and in what.

- List everybody the breaking affects: whoever clears up, whoever waits, whoever pays, whoever is made less safe.
- Write five questions on a card - minutes lost, rupees spent, something made less safe, something made less fair, and one line in their own words - and take no names.
- Ask at least five of them face to face and write each answer on its own slip, coded A1, A2, A3 and so on rather than named.
- Where the cost is minutes, time it yourself once with a watch rather than trusting the estimate.
- Write down anybody who says it costs them nothing, because that answer matters as much as the rest.
- Ask nothing about anybody's health, money troubles or reading, and write none of it down if it is offered.

WRITE THIS DOWN

Five or more coded answers giving the cost in minutes, rupees or a stated harm, and at least one cost you timed yourself.

DONE WHEN

You can name who pays for the breaking without naming a person, and there is a figure or a timed measurement behind it.

Watch out. Watch out. Asking only the people who complain. Ask the people who break the rule what it costs them to follow it, or your changed rule will fail for a reason you never saw coming.

5 Price the breaking

75 MINUTES · The No-Tech figure is higher because the rate, both multiplications and the bar chart are done longhand and ruled on squared paper.

You turn the tally into a compliance rate and a weekly cost that says exactly what it counted.

- Work out the fortnight rate longhand: instances followed divided by total instances, as a percentage, with the total instance count written beside it. Then write the granularity line - with n instances your rate moves in steps of 100 divided by n percentage points; work the number out, write it down, and never claim a change smaller than it.
- Multiply instances not followed per session by the five sessions you run in a week, longhand with the working visible, and label the answer instances not followed observed per week. Five fifteen-minute sessions is seventy-five minutes out of the 10,080 minutes in a week, so this is what you saw, not what happened.
- Multiply that observed figure by the minutes or the rupees one instance costs, taken from the slips and from your own timing, and label the answer observed cost per week.
- If you want a figure for the whole week, put it on its own line and label it estimate: observed instances not followed divided by 75 minutes watched, multiplied by the minutes the place is genuinely in use in a week, which you count rather than guess. Write on the same line: this assumes the rate in the seventy-five minutes I watched holds in every minute I did not watch, which I did not measure. This assumes the fortnight is typical. Write one reason it might not be.
- Where the cost is safety or fairness rather than money, write it as a count of instances plus one sentence in the words the affected people used, and do not invent a rupee figure for it.
- Draw the per-session compliance bars on squared paper to a stated scale with the two-week rate ruled across as a line: percentages up the side, instance counts written on the bars as labels, never a second unit on the same scale.

WRITE THIS DOWN

The fortnight rate with its instance count, the granularity line, instances not followed observed per week, the observed cost per week, the estimate on its own labelled line if you made one, the per-session chart, and the limits: how many instances you saw in total, how many you might have missed, and what a different hour of the day would probably have shown.

DONE WHEN

You can say one sentence aloud with nothing hidden in it: the rule is followed X per cent of the time across N instances, and the breaking costs whoever pays Y across the instances I observed in a week.

Watch out. Watch out. Calling an observed count a weekly total. Five sessions of fifteen minutes is seventy-five minutes, which is under one per cent of a week, so the word observed stays on every weekly figure you write. Watch out too for putting a rupee figure on unfairness because a number looks stronger: count what you counted, and say in words what you could not.

Worked fragment - one baseline week of a fifteen-minute session count

Session	Date	Followed	Not followed	Rate
1	05 May	3	5	38%
2	06 May	2	6	25%
3	07 May	4	4	50%
4	08 May	3	7	30%
5	09 May	2	5	29%

The arithmetic, written out: Week totals: 14 followed and 27 not followed, so 41 instances. 14 / 41 = 0.341 = 34 per cent, and with 41 instances the rate moves in steps of 100 / 41 = 2.4 percentage points. 27 not followed across five 15-minute sessions = 27 instances not followed observed per week, seen in 75 minutes out of the 10,080 minutes in a week - not 27 breakings in the week.

What a marker looks for: A marker looks for the instance count beside every rate, and for the word observed on every figure that carries the words per week.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost 80 MINUTES

You finish the costed problem statement, name the rule sheet, and draft the change everybody will be asked to agree to.

- Write four lines: the rule as an observable event; the compliance rate with the instance count behind it; who carries the cost; and what the breaking cost across the instances you observed in a week, with the word observed left in.
- List three candidate changes - make the rule easier to follow, move where or when it applies, change what it asks for, or drop it because nobody ever consented to it - with what each would need from whom.
- Draft the changed rule on one page: the rule, why it exists, how to change it, how to appeal a decision under it, and the sentence that anybody may leave this group at any time.
- Check the draft against the hard line: it may not punish, shame, exclude, fine or cost anybody money, and it may not name a person. Rewrite anything that does.
- Give the rule sheet a name and a one-line promise at the head of the page, and write the sentence you want repeated afterwards, so the group refers to it by name rather than by whose idea it was. That page is your identity card.
- Write the prediction at the foot of the page and date it: compliance will move from A per cent to B per cent across two weeks, and the move has to be larger than your granularity step to count as a move at all.

WRITE THIS DOWN

The one-page costed problem statement, the three candidate changes, the drafted rule sheet, the named identity card with its one-line promise, and the dated prediction.

DONE WHEN

Somebody who was not there reads the page once and repeats your compliance rate, its instance count and the observed weekly cost back correctly, and the draft breaks none of the four bans.

Watch out. Watch out. Writing the rule you want rather than the rule people will agree to. A rule imposed is obeyed for two weeks and ignored for ever after.

7 Agree the rule 70 MINUTES · Plus up to three days while people read the draft and answer. Waiting is not work, and the second fortnight does not start until the sheet is signed.

You put the draft to everybody it affects, rewrite it until they agree, and get it signed.

- Read the draft aloud to everybody affected, in one sitting where you can, and ask each of them for one objection.
- Write every objection on the back of the page, then rewrite the rule to answer at least one of them and read the new version aloud.
- Copy the final version out cleanly with a signature and date line for each person, and record how many declined as a number, without naming any of them and without pressing anybody for a reason.
- Where somebody has not answered at all, they have not consented: write the number who did not answer beside the number who declined.
- Say aloud, and write on the sheet, that anybody may ask to change it, may appeal a decision under it, and may leave the group at any time.
- Pin the signed sheet where the rule applies and keep the drafts, objections and all, in the envelope.

WRITE THIS DOWN

The signed rule sheet, the list of objections and what each one changed, the number of people who declined, and the number who never answered.

DONE WHEN

Everybody affected has either signed or declined on the record, and at least one objection visibly changed the wording.

Watch out. Watch out. Counting silence as agreement. Somebody who did not answer has not consented, and where the group as a whole refuses, that refusal is your finding and you write it up as one rather than coming back with a softer version.

8 Count week one

25 MINUTES · Twenty minutes on each of five counting days, or twenty-five on the No-Tech route: 100 minutes in all, or 125. The five days begin the day after the sheet is signed.

You run five sessions under the new rule, changing nothing about how you count.

- Keep the same time, the same place, the same session length, the same headed sheets and the same counter.
- Count five sessions and total both columns at the foot of each sheet before you leave.
- Write down every occasion the rule was not kept as a situation, never as a person.
- Ask two people on day seven whether the new rule is workable, and write their answers word for word under their codes, without naming them.
- Do not remind anybody of the rule during a session; a count you influenced is not a count.

WRITE THIS DOWN

Five rows or five sheets with both counts, the total and the rate, plus a dated failure entry for every session that did not go to plan.

DONE WHEN

Five identical sessions exist in the second fortnight and the failure log holds at least one honest entry.

Watch out. Watch out. Standing somewhere new so people notice you counting. Stand where you stood in the baseline, doing exactly what you did then, or the two fortnights are not comparable.

9 Count week two

70 MINUTES · Plus twenty minutes on each of the five remaining counting days, or twenty-five on the No-Tech route. The block above is the comparison, done once, after the last session.

You finish the ten sessions and compare the two fortnights honestly.

- Run the last five sessions with nothing altered.
- Add the ten sheets, work out the second fortnight's rate longhand, and set it beside the first in percentage points with the instance count behind each.
- Work out the granularity step for both fortnights and use the coarser of the two: a change smaller than that step is not a change you can claim.
- Draw the two rates as a pair of bars on squared paper to a stated scale, writing the instance count on each bar: percentages up the side, counts as labels.
- Recalculate the observed cost per week at the new rate and write the difference in minutes or rupees, keeping the word observed on both figures.
- List every confounder: a holiday, an examination week, the weather, a new person in the group, the fact that people knew they were being counted, and the fact that you asked them to sign something. Then write one reason this fortnight might not be typical.

WRITE THIS DOWN

The paired before-and-after chart with the instance count on each bar, the change in percentage points, the granularity step you used, the recalculated observed weekly cost, and the named confounder list.

DONE WHEN

You can state the before rate, the after rate, the instance count behind both, and at least two reasons the difference might not be your doing.

Watch out. Watch out. Reporting a rate without its denominator. Eighty per cent of five instances and eighty per cent of two hundred are not the same finding, so put the instance count on every bar.

10 Share and reflect

80 MINUTES · Plus ten to twelve minutes for the defence itself, and the time your two witnesses need to read the page and sign it.

You defend the finding to the people it affects and record what happens to the rule now.

- Deliver the defence aloud in front of two witnesses who sign and date the page: ten to twelve minutes of unseen questions on the rule, the baseline rate and its instance count, who paid and how much across the instances observed in a week, the agreed change, the after rate, and the limits. There is no recording on this route; the signatures are the record.
- Read every page for anything that identifies a person and cross it out before the pages leave your hand.
- Read the one-page explainer to three people the breaking costs, and write down what each of them said.
- Hand or post the bar chart to the expert through the school office, with one question: what would you have written into the rule that I did not.
- Write the relations ledger in codes and never in names - E1 the expert, A1 to A3 the affected, P1 to P3 the peers who checked your counting method, R1 to R3 those who replied - each with role, date and what they said. The key from name to code is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Ask the group in front of a witness whether the rule stays, changes again or ends, write the answer down word for word, and share the finding through your school, where your school agrees it may be shared.

WRITE THIS DOWN

The witnessed and dated defence page, the one-page explainer, the group's recorded decision on the rule, and the relations ledger holding ten coded relationships.

DONE WHEN

Ten relationships are logged under codes with dates and replies, nothing identifying a person survives in the shared version, and the group has said on record what happens to the rule.

Watch out. Watch out. Calling it a success because the rate went up. Say who still pays at the new rate, and by how much, before you say anything else.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One card naming the rule, the place and its membership, the fixed session time and the fixed session length in minutes, and the question: what share of instances actually follow this rule, and who carries the cost of the ones that do not.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a lawyer, councillor, school administrator, union representative or community organiser, carried out on school paper by the school office with your compliance rate attached as one page, the date and how you asked, and the reply written word for word. Where nobody replies, the pack holds the five questions as sent, every dated attempt, and one named printed source used in place of an interview.

3 - RESEARCH - WEEK 3

Evidence log

The ten baseline tally sheets, dated, sealed in the envelope and initialled by your teacher at the end of week 3 so they cannot be changed once the new rule is signed, with the ten after-sheets added at moderation. Each carries start time, session length, both counts, the total and the rate, and the envelope holds the coded cost slips and the cost you timed yourself.

4 - PROCESS - WEEK 5

Failure log

The sessions that did not happen and why, the instances you could not judge, the day the definition was tightened, anybody who asked you to stop counting, and what each did to the rate, dated. Handed in at the end of week 5 and finished in the same hand before moderation.

5 - DESIGN - WEEK 4

The build

The signed rule sheet itself: the rule, the reason, how to change it, how to appeal, the right to leave, and the signatures, with the drafts and their objections kept in the envelope behind it, and the number who declined and the number who never answered written at the foot.

6 - DESIGN - WEEK 6

One-page explainer

One page read in ninety seconds, written by hand: the rule, the baseline compliance rate with its instance count, who pays and how much across the instances observed in a week, the agreed change, the two-week result in percentage points beside the granularity step, and what twenty sessions of fifteen minutes cannot tell anybody.

7 - BRANDING - WEEK 4

Identity card

A name and a one-line promise for the rule sheet, so the group refers to it by name rather than by whose idea it was, plus the sentence you want repeated afterwards. Written in step 6 and set at the head of the sheet everybody signs.

8 - OUTREACH - WEEK 6

Relations ledger

Ten relationships under codes, never names: E1 the expert; A1 to A3 the people the breaking costs; P1 to P3 the peers who checked your counting method; R1 to R3 the people you showed the chart to who replied. Each carries role, date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page: the rule, the baseline rate and its instance count, who paid and how much across the instances observed in a week, the agreed change, the after rate, and the limits you accept. There is no recording on this route; the two signatures on the page are the record.

The four tiers, in this project

Starter

You define one rule as an observable event, count ten identical sessions, ask five affected people what the breaking costs them, produce a compliance chart with the instance count on every bar, and put your five questions to

Practitioner

All of the above, and you choose your own session length and defend the choice against the instances it was losing you, cite any borrowed tally or survey method to its printed source, and produce one chart that somebody who was not

one professional whose work is writing rules people have to follow.

there reads correctly without you explaining what an instance is.

Researcher

All of the above, and you write the definition of an instance and the counting rule before session one, justify ten sessions rather than three, state your granularity step in percentage points, and quantify how many instances you probably missed and which way that biases the rate.

Contributor

All of the above, and you set your compliance figure beside one named published source on rule compliance or consent that you can hand a marker in print, defend your method in writing to a lawyer, councillor or administrator who disagrees with you, and offer the anonymised tally sheets through your school, where your school agrees they may be shared, so anybody can recount them.

The one professional you must hear from

Who. A lawyer, a union representative, an elected councillor or union-council member, a school administrator who writes and enforces rules, or a community organiser who has got neighbours to agree to something - anybody whose work is making rules that people actually follow.

Where your school finds one. Your teacher makes the approach, on school paper, from the school office. Start with the roles inside your own school: the administrator who writes and enforces school rules, seen in person with your teacher present. Beyond the school: a letter posted or hand-delivered by the school office to the district or union-council public complaints desk, the bar association's public enquiry desk, a trade union's local branch office, or a housing society's or market committee's secretary, with the address taken from the printed directory held in the school office or the public library.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has counted, across [number] observation sessions, how often one rule in a place they belong to is actually followed. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you write a rule, how do you decide who counts as affected and therefore gets a say in it?
2. What makes people follow a rule they did not want, and what makes them ignore one they did?
3. How do you build a way to appeal into a small rule without turning it into a court?
4. What do you do when the people bound by a rule refuse to agree to it?
5. If you had my ten sessions of counts, what would you have measured that I did not?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would compliance have risen anyway without your change, and how do you know?
2. You counted at one hour of the day in one place. What would a different hour have shown, and why should I believe your rate?
3. You watched seventy-five minutes of a week that holds ten thousand and eighty. Tell me exactly what your weekly figure counts, and what it does not.
4. Your rate moved by a few points. What is your granularity step, and is that move a finding or a rounding?
5. Whose consent did you not get, and what does that do to the legitimacy of the rule you wrote?
6. Your new rule carries no punishment. Tell me why it worked, or why it did not, without using the word discipline.

If you get stuck

- If nobody replies to your interview request - then ask your teacher for the next name on the school's brokered contact list and send the same five questions from the school for a written reply; and if that comes back empty too, submit the five questions as they were sent, every dated attempt, and one named published source in place of the interview. That path scores full marks for outreach. Going to an office on your own does not.
- If the household or the site says no - then take the school variant: run the identical method on school property with a member of staff, with your class as the membership, and write on the front page that the setting changed, on what date and why.
- If your before and after look the same - then report that as the finding, check whether everybody affected actually knew the new rule existed, and count how many of the signatures belong to people who are ever present during a session.
- If you cannot count the instances - then narrow the definition to a version you can see clearly from one fixed spot, keep every session at the length you fixed, and state the definition and the session length on every chart.
- If somebody objects to being counted - then stop that session, write it in the failure log, tell the adult who knows where you are the same day, and tell your teacher before the next session.
- If you run out of time - then keep both halves at the same number of sessions and cut the cost survey to three answers rather than five, writing on the page what you shortened and why.

Finished early?

Count the same rule in a second place with a different membership, using the identical definition and session length, and set the two compliance rates side by side with both instance counts shown.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 09 - MEDIA & DEEPFAKE

The Lie This Street Believes

Ask twenty people whether the claim your street forwards every week is true, then count how many say yes.

THE QUESTION

Which false claim is circulating hardest in the groups around you, how many out of twenty people believe it, and what has believing it already cost them in money you can check?

Every platform, newsroom, hospital and election office now pays people to decide whether a claim is true and to publish the working behind that decision. Verification is a trade with a method: trace the earliest version, check three sources that did not copy one another, record exactly how each was checked, and measure who believes the claim. Machine-made voices, faces and video are making that method more valuable rather than less, because the cheap part is now producing the lie and the expensive part is proving it.

ACT 1 - FIND

You log every forwarded message, voice note, image and clip reaching the groups around you for seven days, then take the single claim that appears most often and test it against three independent sources, writing down exactly how each check was done. You then ask twenty people the identical, neutrally worded question, one at a time, and record how many say the claim is true.

A one-page costed problem statement carrying four lines: the claim in the words people actually use, the verdict with its three checks and their dates, the percentage of twenty people who say it is true, and what it has cost - taken from a price you checked yourself at a counter, never from anybody's medical history. Beside it sits a bar chart of believe, do not believe and not sure, with the refusal count printed underneath.

ACT 2 - FIX

You build a correction of sixty seconds or less - a voice note, a card or a short clip - in the same format and the same language the claim travels in. Your teacher reads it and signs it before it goes to a single person. Then you share it with the same groups and the same twenty people, and seven days later you ask the identical question, in identical words, to the same twenty and compare.

A two-bar chart of the percentage who say the claim is true, before against after, with the whole-people count on its own second panel rather than on the same axis, the number who saw the correction, the number you could not reach, and a named list of every reason the change might not be yours.

YOU MEASURE

percentage of twenty people who say the claim is true, which can only move in steps of five points

BEFORE

The same neutrally worded question, read word for word from the page, put to each of twenty people separately before any correction exists, with each answer recorded as true, false or not sure against a code number, and every refusal counted in its own column.

AFTER

The identical wording, read from the same page, put to the same twenty coded people seven days after the correction was shared, with anyone who cannot be reached recorded as unreachable rather than assumed unchanged, and both percentages written as multiples of five.

The calendar this needs

Thirty-two calendar days at least: seven days of logging, four days for the first twenty conversations, seven days of waiting after the correction goes out, and four days for the second twenty. Start the seven-day log in week 1 or this will not finish.

Safety and ethics - not optional

- Never name the person who sent a message, and never keep a picture of a private chat with a name, a number or a profile picture visible. Type the claim out in your own words and give every group a code letter instead of its name.
- Never collect or write down anything about a named person's medical treatment, medication or diagnosis - not on a slip, not in a file, not in a note to yourself, not in a quotation. If the claim you are testing is about health, you record one thing only: whether that person believed it. You never ask, and never write, what they took, what they stopped taking, what a doctor told them or what treatment they delayed. A health claim is costed from the published price of what it tells people to buy, never from what a person did about their own body.
- Never test a claim about religion, politics, a sect, an ethnic group or a named person. Choose a practical, local claim instead: a remedy, a price rumour, a scam, a claim about a school, a water supply or an electricity bill.
- Every conversation on a doorstep, a street, a gate or a shop front happens in daylight, from the script your school has approved, with a named adult who goes with you and stays within sight of you. You never enter anybody's home and nobody comes into yours. If that adult cannot come, that day's conversations do not happen and you run the school-site variant instead.
- Your teacher reads the correction sheet, checks the source line and signs and dates it before it is given to one single person. An unsigned correction never leaves your hands.
- Never accuse anybody of lying. The message is wrong; the person who forwarded it is not attacked, not named and not corrected in public. Never publish anyone's belief with their name attached - beliefs live against code numbers only, and nothing goes out on an open link.
- The correction is polite, sourced and short. If a group turns hostile, stop posting there at once, do not argue back, leave, and write down what was said and what you did. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session. That write-up is a finding and it is marked as one.

What you use - no-tech route

A notebook ruled into five columns with a pen and a ruler: date, group code, format, the claim in one sentence, times heard

A card with the question written out once, read word for word at every asking so the wording never drifts

Twenty numbered slips of paper, one per person, so an answer sits against a number and never against a name

A printed source you can hold in your hand: a medicine leaflet, a published tariff sheet, a public notice, a newspaper cutting from the library

Squared paper for the belief chart and the before-and-after chart, each drawn to a stated scale

Plain cards and a pen for the correction, copied by hand or duplicated at a copy shop

The claim travels by mouth as much as by message, so this route logs what people repeat out loud, checks it against a printed source you can hold and a person with direct authority reached through your school, and delivers the sixty seconds face to face with a hand-copied card.

The school version of this project

Run the whole method inside the school community. Your twenty are staff, office and site workers, and other learners your teacher names, asked in a corridor, a staffroom or at the gate at collection time with a member of staff present. The claim is one circulating in the school's own parent groups. The correction goes on a noticeboard the school owns and into the school newsletter. Before and after are asked in the same rooms, seven days apart. No street, no doorstep, no travel, and the same numbers.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Collect what circulates

30 MINUTES · Plus about 6 minutes a day for 7 days to log claims as they reach you - 42 minutes of logging on top of the set-up.

You end with seven days of evidence showing which claim actually travels hardest, not which one you remember.

- Rule five columns across a fresh page: date, group code, format, the claim in one sentence, times heard.
- Give every group and every gathering a code letter, and write no name, no house and no telephone number anywhere on the page.
- Write each claim in your own words in one sentence, and mark how it arrived - said aloud, read aloud to you by somebody else, a picture shown to you, a card handed over.
- When the same claim comes round again, add a stroke to the times-heard tally rather than starting a new row.
- Carry the notebook with you and write it down the same hour you hear it, because a claim recalled at night has already changed shape.
- Log only what reaches you where you already are. This step never sends you out looking for anything.

WRITE THIS DOWN

One row per distinct claim, with dates, format, group code and a running times-seen count for the full seven days.

DONE WHEN

Seven days are logged, every group appears as a code letter, and no name, telephone number or profile picture exists anywhere in the record.

Watch out. Keeping a picture of a chat with names and numbers showing. Type the claim yourself; a record that identifies the sender cannot be used, cannot be shown, and cannot be defended.

2 Pick one claim 50 MINUTES

You end with one claim written so plainly that evidence can settle it either way.

- Count the tallies, list the top five on a clean page, and read them aloud.
- Cross out anything about religion, politics, a sect, an ethnic group or a named person, and write 'out of bounds' beside each.
- If a claim you keep is about medicine, treatment or diagnosis, write across the top of its line: no person's own health is recorded in this project, only whether they believed the claim.
- From the rest, take the most practical and local: a remedy, a price, a scam, a claim about a school, a water supply or an electricity bill.
- Rewrite it with no hedging, in the words people actually use, so evidence can settle it either way.
- Write one line on what somebody would do, spend or avoid if they believed it, because that is what you will cost later.

WRITE THIS DOWN

The chosen claim as one testable sentence, the four claims you rejected, and the reason each was rejected.

DONE WHEN

Somebody reading your sentence can tell you what evidence would prove it wrong.

Watch out. Choosing the claim that annoys you most rather than the one that spreads most. The count decides, not your temper.

3 Check it three ways

210 MINUTES · The visit to the person with direct authority is made in daylight with the named adult who goes with you; count the travel inside this time. No-Tech is longer because both the printed source and the authority are reached on foot.

You end with three checks that did not copy one another, each written down so it can be repeated without you.

- Go with the named adult, in daylight, to a person with direct authority - a pharmacist for a remedy, the utility office for a bill claim, the school office for a school claim - and write their answer and the date at the doorway before you forget it.
- Ask that person only whether the claim itself is true. You never ask any individual about their own treatment, and no person's medical detail is written down here.
- Get a printed source into your hand: a medicine leaflet, the published tariff sheet, a public notice, a newspaper cutting from the library, and copy the exact line and its date into the notebook with the title of the printed source written across the top.
- Trace the chain: ask the person who repeated it who they heard it from, then ask that person the same, until the chain stops, and write down where it stopped.
- Rule a check table with four columns - source, what it says, how you checked it, date checked - and fill one row per check.
- If two of your three checks turn out to come from the same origin, say so and find a third that does not.

WRITE THIS DOWN

The three checks in full, each with a dated verdict or a named role, the method used, the date, and the verdict the claim ends with: true, false or unproven.

DONE WHEN

Three independent checks exist and a stranger could repeat any one of them from your notes alone.

Watch out. Counting three websites that all quote the same original post as three sources. Follow each back to where it started; if they meet, you have one source and two echoes.

4 Ask the twenty

240 MINUTES · Spread over four days. Allow ten minutes for each of the twenty, including finding the person and writing the answer down - that is 200 minutes of conversation on its own, before the question card and the practice. The named adult is with you for all of it.

You end with twenty answers to one sentence that never changed a word.

- Write the question once on a card: 'Have you heard that [claim]? Do you think that is true, false, or are you not sure?' and read it from the card every single time.
- Practise saying it flat, with no tone and no expression, on two people first, and leave those two out of the count.
- Ask each of the twenty alone, and write the answer on a numbered slip - true, false or not sure - with no name on the slip.
- Ask in daylight, from the script your school approved, with the named adult who goes with you within sight, and never inside anybody's home.
- Keep a separate refusal tally, and thank anybody who declines without asking twice.
- Ask one follow-up only - 'where did you first hear it' - and write the reply in their own words on the same slip. If the claim is about health, that is the last question you ask; you do not ask what anybody did about it.

WRITE THIS DOWN

Twenty coded rows or twenty numbered slips, one answer each, the refusal count, and the place each person said they first heard the claim.

DONE WHEN

Twenty answers exist, all given to identical wording read from the page, and no name sits beside any belief anywhere in the record.

Watch out. Adding 'but that is not true, is it' to the end of the question. That sentence collects your own answer twenty times over.

5 Count the cost

120 MINUTES · Includes one price check at a counter, made in daylight with the named adult who goes with you. No-Tech takes longer because the averaging and the multiplication are done longhand.

You end with a money figure that comes from a price you checked yourself, and from nobody's medical history.

- If your claim is about health, you ask nobody what they did about their own health. You record only whether they believed it. No named person's treatment, medication, diagnosis or delayed appointment goes on a slip, in the notebook, or on any loose page.
- Cost a health claim from the outside instead: walk with the named adult to the counter, write down the real shelf price of whatever the claim tells people to buy, with the shop and the date beside it.
- Where the claim is about money and not medicine, return to the slips marked true and ask one question only: what did you spend, or avoid spending, because of this. Write the figure on the numbered slip and nothing else about the person.
- Write any harm that is not money in one line each with no names and no medical detail: a shop or a person blamed, an argument in the family, a payment made twice.
- Multiply the checked price by the number who answered true, work it longhand, and write the total across the twenty with the words 'estimate from a small sample' beside it.
- Where a believer says it cost them nothing, write a zero rather than leaving the line blank.

WRITE THIS DOWN

The checked price with its shop and its date, what each coded believer spent or avoided where the claim is about money, the non-money harm where there is any, and the estimated cost across the twenty.

DONE WHEN

You can state one sentence of the form 'this many of twenty believe it, and at the price I checked myself that is this much across the twenty' - and there is no medical detail about any named person anywhere in your file.

Watch out. Rounding one dramatic case up into a street-wide figure. Report the cases you actually collected and say how many there were.

Worked fragment - the before-and-after belief log for five of the twenty

Code	Before answer	After answer	Saw the correction	Moved
04	true	false	yes	yes
07	true	true	yes	no
11	not sure	false	yes	yes
15	true	true	no	no
19	false	false	yes	no

The arithmetic, written out: Before: 13 of 20 said true, so 13 divided by 20, times 100 = 65 per cent. After: 9 of 20 said true, so 9 divided by 20, times 100 = 45 per cent. The fall is 65 minus 45 = 20 percentage points, which is 4 people out of 20. With 20 people the smallest step possible is 100 divided by 20 = 5 percentage points, so a 20-point fall is four whole steps and not a rounding.

What a marker looks for: A marker checks that every row carries a code and never a name, that the after-answer sits beside the before-answer for the same code, that anybody who did not see the correction is still counted in the total rather than dropped, that both percentages are multiples of five, and that no row carries anything about a person's treatment, medication or diagnosis.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost

100 MINUTES · No-Tech works both percentages longhand and draws the chart to a stated scale on squared paper, which is why this step runs close to twice the High-Tech time.

You end with one page carrying the claim, the verdict, the percentage and the cost, and a prediction you can be held to.

- Write four lines: the claim in its own words, the verdict with its three checks, the percentage of twenty who say it is true, and what it has cost so far.
- Draw the belief chart on squared paper - believe, do not believe, not sure - in whole people only, to a stated scale, with the refusal count written underneath.
- Choose the format that reaches these people: sixty seconds said out loud face to face, a hand-copied card, or both together.
- Write the prediction: 'I will give a sixty-second correction to the same twenty people and expect belief to fall from A per cent to B per cent in seven days.'
- With twenty people your figure moves in steps of five percentage points. A and B must both be multiples of five, and you may not predict or claim a change smaller than five points.
- Read the page to one person who believed the claim, ask what would make them stop repeating it, and write the answer word for word.

WRITE THIS DOWN

The one-page costed problem statement, the chart, the chosen format with the reason it was chosen, and the dated prediction with both figures written as multiples of five.

DONE WHEN

Somebody who was not there reads the page once and repeats your percentage back correctly, and both figures in your prediction divide by five.

Watch out. Choosing the format you enjoy making rather than the one that reaches these people. If the claim travels by voice note, a printed poster will never catch it.

7 Make the sixty seconds

120 MINUTES · Your teacher must read and sign the correction before step 8 begins. Leave a day for that; the signing itself is not your working time. No-Tech is longer because every copy is written out by hand.

You end with a correction of sixty seconds that names nobody, carries one source, and carries your teacher's signature.

- Write it in this order: what the message says, what is actually true, the one source that shows it, and what to do instead. Read it aloud against a watch with a second hand and cut words until it fits inside sixty seconds every time.
- Correct the message and never the sender: say 'this message is wrong', never 'whoever sent this is lying', and name nobody.
- Write the master card out in full by hand, in the language the claim circulates in, with the source line written on the back.
- Give the correction a name and a one-line promise on a separate card, and write underneath it the single sentence you want repeated when somebody forwards the claim again. That card is deliverable 7.
- Say it to two people first - one who believed the claim, one who did not - and write down every word each of them changed.
- Hand the master card to your teacher. Your teacher reads it, checks the source line, and signs and dates it. No copy is made and nothing is handed to anybody until that signature is on it.

WRITE THIS DOWN

The script, both reviewers' comments word for word, the identity card with its name and one-line promise, and your teacher's signature and date on the correction.

DONE WHEN

It runs in sixty seconds or under, shows one named source, names no person at all, and carries your teacher's signature and the date.

Watch out. Repeating the false claim loudly at the start so that it is the part people remember. Say it once, plainly, then spend the rest of the time on what is true.

8 Deliver it

200 MINUTES · No-Tech says the sixty seconds face to face to each of the twenty, about eight minutes each including finding the person, spread over three days, with the named adult present throughout.

You end with the correction in the hands of the same twenty and the same groups the claim came from, and a log that proves where it went.

- Check your teacher's signature is on the master card before a single copy is handed over. An unsigned correction does not leave your hands.
- Say the sixty seconds face to face to each of the twenty, one at a time, in daylight with the named adult within sight, and hand over a card afterwards.
- Deliver it once in each gathering it belongs in, with one polite sentence of your own and no accusation in it.
- Log the date, the group code, roughly how many people heard it, and anything said back, in a ruled table.
- Ask three people to pass the card on, and record whether they actually did.
- If any gathering turns hostile, stop at once, do not argue back, leave, and write down what was said and what you did. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.

WRITE THIS DOWN

The delivery log with dates, group codes, numbers reached and replies, plus any hostility recorded in full alongside your own response and the date you told your adult and your teacher.

DONE WHEN

All twenty have received it, every group is logged, any hostile response is written up rather than argued with, and the signature sits on the correction that went out.

Watch out. Replying to every angry message. One polite reply carrying the source, then stop. An argument in a group is a finding to record, not a fight to win.

9 Ask the same twenty again

200 MINUTES · Starts on day seven after delivery and spreads over four days. Allow eight minutes for each of the twenty, including finding the person; the waiting week itself is not work and is not counted here.

You end with a before and an after for the same coded people, asked in the same words.

- Wait a full seven days from delivery, and write the exact date beside each re-asking.
- Read the question from the same card, word for word, exactly as it was asked the first time, with the named adult present as before.
- Ask 'did you hear the correction' only after they have answered, never before.
- Write each answer on the slip that already carries that person's number, so before and after sit on one slip, and keep a separate unreachable tally.
- With twenty people the smallest change your method can show is five percentage points. Work both percentages longhand, state the change in whole people first, then in points, and never claim a movement smaller than five points.
- Draw two bars on squared paper for the percentage saying true, before and after, to a stated scale. Draw the whole-people count as a second chart underneath; never put per cent and people on one axis.

WRITE THIS DOWN

The twenty after-answers against their codes, the unreachable count, both percentages as multiples of five, and the change stated in whole people as well as in points.

DONE WHEN

Before and after exist for the same coded people, asked in identical words, and you can say how many people actually moved.

Watch out. Counting anybody you could not reach as convinced. Report them separately and say what your percentage becomes either way.

10 Defend it and record what it did

110 MINUTES · The defence itself is ten to twelve minutes of that time; the rest is the explainer, the ledger and the honest write-up.

You end by answering questions you have not seen, in front of witnesses, and stating plainly what the correction did not do.

- Sit the defence: ten to twelve minutes of unseen questions, answered out loud in front of two witnesses who sign and date the page. There is no recording on this route; the signatures are the evidence.
- Read the one-page explainer to three people the claim affected and write down what each of them said.
- Hand the before-and-after charts to the expert, through your teacher, with one question: what would you have checked that I did not.
- Write plainly whether the correction moved anybody, including if it moved nobody, and name every reason the change might not be yours.
- Complete the relations ledger as codes and roles only: E1 the expert, A1-A3 the people the claim affected, P1-P3 the peers who checked your checking, R1-R3 the people who replied to the correction, each with role, date and what they said.
- Write the name-to-code key once on your teacher's sheet. The school holds it and destroys it after moderation; it never enters your submission.

WRITE THIS DOWN

The defence page signed and dated by two witnesses, the one-page explainer, and the relations ledger of ten coded entries with roles, dates and replies.

DONE WHEN

Ten relationships are logged as codes with dates and replies, the after-percentage is reported whether it fell, held or rose, and the name-to-code key sits on the teacher's sheet and nowhere else.

Watch out. Hiding a correction nobody watched. A correction that reached four people and moved none is a result, and it is worth more than a number you cannot show.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-written card naming the claim in the words people use, the groups it circulates in as code letters, and the question: how many of twenty believe it, and what has it cost them at a price you checked.

2 - OUTREACH - WEEK 3

Expert question pack

Five questions written out by hand for a fact-checker, newsroom journalist or pharmacist, your three checks copied onto one page, the date and how you asked, and the reply recorded word for word.

3 - RESEARCH - WEEK 4

Evidence log

The seven-day ruled tally, the check table with source, method and date for all three checks with the title of each printed source written across the top, and twenty numbered slips carrying before and after. No name sits beside any belief, and no medical detail sits beside anybody.

4 - PROCESS - WEEK 6

Failure log

The check that led nowhere, the two sources that turned out to be one, the people you could not find again, the gathering that turned hostile and what you did and who you told, all dated.

5 - DESIGN - WEEK 5

The build

The hand-copied correction card itself, with its source line on the back and your teacher's signature and date on the master card, together with the before-and-after bars drawn on squared paper to a stated scale.

6 - DESIGN - WEEK 5

One-page explainer

One hand-written page a neighbour reads in ninety seconds: the claim, how it was checked three ways, the percentage who believed it, what it cost at the price you checked, the correction, and the after number.

7 - BRANDING - WEEK 5

Identity card

The hand-written name and one-line promise you wrote in step 7, so people can ask for the correction by name, plus the single sentence you want repeated when somebody repeats the claim again.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries with role, date and reply: E1 the expert, A1-A3 the people the claim affected, P1-P3 the peers who checked your checking, R1-R3 the people who replied to the correction. No names appear. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions, answered out loud in front of two witnesses who sign and date the page: the claim, the three checks and their dates, the before percentage, the correction, the after percentage, and the limits you accept without argument. The signatures are the evidence; there is no recording on this route.

The four tiers, in this project

Starter

You log seven days of what circulates, check the most repeated claim against three sources, ask twenty people the same fixed words read from the page, and put your five questions to one professional through your school.

Practitioner

All of the above, and you choose the twenty yourself and defend who they are, cite every check to its printed page or its dated verdict, and make one chart that one professional reads correctly without you standing beside it.

Researcher

All of the above, and you fix the question wording and the checking method in writing before you collect anything, justify twenty rather than five, and state in both directions what the refusals and the unreachable people do to your percentage.

Contributor

All of the above, and you set your finding against a named published fact-check of the same claim that you can hold in your hand or cite by publisher and date, you take your checking method to a working fact-checker who disagrees with part of it and record what they said word for word, and your coded answers and every check are made available

through your school, where your school agrees they may be published, and to any school that asks for them.

The one professional you must hear from

Who. A working fact-checker or a newsroom journalist who publishes verification work - deciding claims like yours is their trade, and they can name the check you missed. If your claim is about a remedy, a pharmacist reached through a hospital or a licensed pharmacy is the right person. If it is about how something works, a science teacher in your own school will take it apart with you.

Where your school finds one. The same roles, reached on paper through the school office. Your teacher writes on school letterhead to the newsroom desk of a newspaper the school takes, to the press club, to a university journalism department, or to a hospital's public-relations office, and the office posts it or telephones it. A pharmacist or a science teacher inside your own school community is reached by your teacher asking them directly. You hand your five questions to your teacher; you never deliver them yourself.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project on a false claim circulating locally. They have tested it against [number] independent sources and asked [number] people whether they believe it. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When a claim reaches you, what is the first check you run, and why that one before any other?
2. How do you decide that two sources are genuinely independent rather than quoting the same original post?
3. What do you do with a claim you cannot prove either way, and how do you publish that without helping it spread?
4. Which corrections have you seen actually change what people forward, and what did those have in common?
5. When a group turns hostile at being corrected, what do you do next, and what have you learnt not to do?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the belief have dropped anyway without your correction, and how do you know?
2. You called your three sources independent. Show me they do not all trace back to one original post.
3. Twenty people, and you chose them. Who did you leave out, and which way would including them push your percentage?
4. Your figure moved by five points. With twenty people, is that a real change or simply the smallest step your method is capable of showing?
5. Show me the page where you recorded what a believer did about their own health. If there is no such page, tell me why there is not.
6. The same claim comes back next month in slightly different words. What did your sixty seconds actually achieve, in numbers?

If you get stuck

- If nobody will answer your question - then ask your teacher to open the school's own community to you: staff, office and site workers, and parents at collection time with a member of staff standing beside you, and record every refusal as a refusal in its own column.
- If the household or the site says no - then run the school-site variant instead: the twenty come from the school community, the claim is one circulating in the school's parent groups, and the correction goes on a noticeboard the school owns. The numbers are worth exactly the same.
- If your expert never replies - then submit the five questions as your teacher sent them, the dated record of every attempt, and one named published substitute source - a fact-check with its publisher and date, or a printed leaflet, tariff sheet or public notice - and answer your five questions out of that source. A documented unanswered request is evidence, not a gap, and it scores.
- If your before and after look the same - then report that as the finding, check first how many of the twenty actually saw the correction, and write that number beside the result.
- If you cannot check the claim properly - then record it as unproven rather than false, say plainly which check you could not complete, and correct only the part you can prove.
- If you run out of time - then re-ask ten of the twenty rather than dropping the baseline, and write on the chart that the after figure rests on ten people and therefore moves in steps of ten points, not five.

Finished early?

Ask the identical question of twenty people in a second group that never saw your correction, with the same named adult present, and set the two after-percentages side by side; the gap between them is the closest thing you have to a control.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 10 - PSYCHOLOGY & BEHAVIOUR

The Trigger

Log one small habit of your own for twenty-eight days and find the cue that carries the largest share.

THE QUESTION

How many times a day does one small habit of yours actually happen, which single cue is present in the largest share of those times, and what is that share as a percentage?

Almost nobody can say how often they do the ordinary things they do, which is why serious work counts behaviour rather than remembering it. Behavioural researchers, product designers and safety engineers earn their living from the two moves you make here: define one observable event, then log what reliably comes immediately before it. The value is not in the habit you pick. It is in writing an event down within a minute of it happening for four straight weeks, then reporting a comparison that may go against you.

ACT 1 - FIND

You pick one small, harmless, everyday habit of your own and count it for fourteen consecutive days, writing down the time, the place, whether anyone else was present as alone or one other or two or more, and what happened in the minute immediately before. You then time ten consecutive occurrences so the count can be turned into minutes.

It ends in a one-page costed problem statement carrying four lines: the habit defined as an observable event, occurrences per day averaged over fourteen days, minutes per day and hours per year that count represents, and the one cue present in the largest share of occurrences with that share written beside it as a percentage. A bar chart of occurrences by cue, largest bar first, and a line of the daily count sit next to it.

ACT 2 - FIX

You remove or change exactly one thing, the single cue that carried the largest share of occurrences, and you leave the habit itself alone rather than trying to stop it by willpower. You then log fourteen more consecutive days with the identical definition, the identical log and the identical recording rule, so the only moving part is the cue.

It ends in a twenty-eight-day line of the daily count with the change day marked, the two fortnight means set side by side, the difference stated in occurrences per day, in per cent and in minutes per week, a named list of confounders, and one honest paragraph on whether the cue moved the habit, moved it somewhere else, or did nothing.

YOU MEASURE

occurrences per day of one defined habit of your own, and the share of those occurrences carrying the top cue, written as a percentage

BEFORE

Fourteen consecutive days of logging every occurrence of one habit of your own, entered within a minute of it happening, each row carrying the time, the place, whether you were alone or with others, and what happened in the minute before. Reported as a mean with every daily count shown, taken before any cue is touched.

AFTER

Fourteen more consecutive days logged with the same definition, the same log, the same within-a-minute rule and the same fourteen-day length, beginning the day after the cue is changed. Reported as a mean with every daily count shown beside the first fortnight, and the difference stated in occurrences per day, in per cent and in minutes per week.

The calendar this needs

Twenty-eight logging days plus one change day between the two fortnights. Start the baseline in week 1 or this will not finish.

Safety and ethics - not optional

- You log your own habit and nobody else's. Not a family member's, not a friend's, not a classmate's, not even with their permission and not even if they offer. No third party's behaviour is logged in this project, with their consent or without it.
- Anyone who happens to be present is recorded only as alone, one other person, or two or more people, and never by name, relationship or description.
- Choose something small and harmless: checking your phone, snoozing the alarm, opening a new browser tab, checking the front door is locked, picking up the remote, saying one filler word. This project does not touch food, eating, weight, appearance, sleep restriction, medication, self-harm, or any behaviour you feel bad or worried about. If a candidate habit is on that list, or you are not sure, pick a different one.
- If any of that list is close to home, tell an adult you trust or your school's welfare lead today. Nothing about that conversation affects this project, your mark or your tier.
- If the logging itself starts to feel bad - if counting makes you tense, self-critical or unwilling to open the log - stop that day, pick a different habit, and write in the write-up what you stopped and why. That is a recorded finding and it is marked as one, not as a failure.
- No diagnosis language anywhere in this project. You are measuring the frequency of one event and one cue, nothing more. Do not describe yourself or anyone else as having a condition, do not use the word addiction, and do not offer advice to anybody about their own behaviour on the strength of twenty-eight days of your own data.
- This project makes a twenty-eight-day personal behavioural log, and that log stays with you. Only the daily totals, the two fortnight means and the cue table are submitted. The occurrence rows are never handed in, never put on an open link, and no health, money or reading information about any named person enters the submission.

What you use - no-tech route

A folded index card or pocket notebook ruled into five columns - time, place, alone or one other or two or more, what happened in the minute before, and O or R for observed or recalled

A pen kept with the card, and a spare - a logging system that depends on finding a pen fails on day three

A wall calendar or a ruled sheet - one box per day for twenty-eight daily totals

A watch or clock with a second hand, or any household timer - timing ten consecutive occurrences

Squared paper and a ruler - the twenty-eight-day line and the occurrences-by-cue bars, each drawn to a stated scale

A dated envelope for the used cards - so every count can be recounted by somebody else

Nothing here stamps the time for you, so the card carries the honesty rule instead: a row marked at the moment it happens is an observation and is marked O, a row written up later is marked R for recalled, and the recalled rows are counted and reported separately rather than mixed into the count as though they had been observed.

The school version of this project

Run the whole method on school premises with a member of staff. Choose a habit that only happens at school, log it in a fixed four-hour window written on every chart, and keep the card in a sealed envelope in the staff room between sessions so it never leaves the site. Time occurrences with the classroom clock, draw both charts on school squared paper, and sit the defence in front of two staff witnesses. This is the version a learner with no private space and no quiet household can finish.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Choose the habit 45 MINUTES

Pick one small, harmless, everyday habit of your own and check it against the exclusion list before anything else.

- Write down five ordinary things you do without deciding to: checking the lock, snoozing the alarm, picking up the remote, saying one filler word, straightening something on a desk.
- Strike out anything touching food, eating, weight, appearance, sleep restriction, medication, self-harm, or anything you feel bad or worried about, and strike out anything that is somebody else's habit.
- From what survives, choose the one that happens often enough to count and matters little enough to log calmly, and write one sentence on why you chose it.
- Write the safety line at the top of the notebook: I log only my own habit, I name nobody, and if the logging feels bad I stop and change habit.
- Write the privacy line under it: the cards stay with me, only the daily totals and the cue table are submitted, and no other person's behaviour is logged in this project at all.
- Write and date your guess at how many times a day it happens, and have one person witness the guess with a signature.

WRITE THIS DOWN

The five candidates, the ones struck out and why, the habit chosen, the safety line, the privacy line, and your dated guess at the daily count.

DONE WHEN

One habit is named, it survives the exclusion list in writing, and your guess is recorded before day one.

Watch out. Picking the habit you most want to be rid of. That one is loaded, it makes the logging feel like judgement, and judgement makes people log less. Pick a small dull one; the method is the point.

2 Define one occurrence 65 MINUTES · Plus one hour on an ordinary afternoon for the live test of the definition, and about 15 minutes to collect the three sets of rulings.

Turn the habit into an event so clearly defined that two people watching would count the same number.

- Write the definition as one sentence somebody who has never met you could apply, naming exactly where the occurrence starts and where it ends.
- Write the boundary rules that stop double counting: the minimum gap between two occurrences, and what happens if the habit is interrupted halfway.
- Rule a pocket card into five columns - time, place, alone or one other or two or more, what happened in the minute before, and a narrow column headed O or R - and make seven of them, one per day.
- Write out five borderline events and ask three people who have not been taught your definition to rule on each one on their own, without you explaining, then record the result as agreements out of fifteen.
- If only one person is available, write that on the page and state the limit in full: one person ruling on five events is weak evidence that a definition is unambiguous, so report it as untested rather than tested.
- Test the card for one hour on an ordinary afternoon and rewrite any rule that turned out to be ambiguous.

WRITE THIS DOWN

The one-sentence definition, the boundary rules, the columns of the log, the five borderline events with the rulings scored out of fifteen, and the corrections the one-hour test forced.

DONE WHEN

Three people who were never taught your definition can rule on five described events without asking you a question, the score is written down, and the log is ruled and ready for day one.

Watch out. Defining the habit as a feeling rather than an event. An urge cannot be counted by anyone but you and cannot be checked by anybody. Define something a person standing in the room would see.

3 Log week one

30 MINUTES · Plus 10 minutes a day for 7 days for the nightly count and the completeness line, and a few seconds at each occurrence through the day.

Record every occurrence for seven consecutive days, within a minute of it happening.

- Keep the card and pen in the same pocket every day and mark the row the moment the occurrence ends, never at the end of the day from memory.
- Mark O in the last column for a row written at the moment, and R for any row written later from memory; recalled rows are counted separately and never presented as observations.
- In the fourth column write what physically happened in the minute before in five words or fewer: phone buzzed, walked into kitchen, finished a task, sat down, conversation stopped.
- Each night count the rows on the card, write the day's total in the calendar box, and add one line on how complete the day was, with the number of R rows in it.
- Mark any day you know you missed a run of occurrences as partial, rather than repairing it from memory.
- Put each finished card in the envelope with its date on it, start a fresh card each morning, and do not try to change the habit this week.

WRITE THIS DOWN

One row per occurrence, seven daily totals, seven completeness lines, any day marked partial with its reason, and the count of rows marked recalled.

DONE WHEN

Seven consecutive days have a total, including any zeros, the completeness lines exist including the ones admitting you missed some, and every row is marked observed or recalled.

Watch out. Filling in the day on the way home. Recall flattens counts badly and destroys the before-column entirely, because nobody remembers what happened in the minute before something they were not paying attention to.

4 Log week two and time it

55 MINUTES · Plus 10 minutes a day for 7 days, and the ten timings are taken inside three ordinary days rather than in a work block.

Log seven more days the same way and time ten consecutive occurrences so the count can be turned into minutes.

- Keep the card design identical; if you must change a column, write the change on the card with its date and hour.
- On three of the seven days, use a watch or timer on the next ten occurrences that happen and write the seconds each one lasted on the back of the card.
- Add the ten timings and divide by ten longhand to get seconds per occurrence, writing the sample size and the shortest and longest timing beside it.
- Write the limit under it: ten timings is a small sample, so a mean that sits near the middle of a wide range is weak, and the range is what a reader should judge.
- Add the two weekend totals and compare them with the ten weekday totals in one written line.
- Check the calendar has fourteen filled boxes with no gaps, and write missing in any box that has no card behind it.

WRITE THIS DOWN

Fourteen complete days, the timed sample with its mean seconds per occurrence, its range and its sample size, the limit line, and the weekend against weekday line.

DONE WHEN

Fourteen consecutive daily counts exist and a measured seconds-per-occurrence figure sits on the page with its sample size and its range written beside it.

Watch out. Timing only the long occurrences because they are easier to catch. Time the next ten that happen, whatever their length, and say plainly that the sample was ten consecutive events rather than ten chosen ones.

5 Find the cue 90 MINUTES

Count what came immediately before, and find the single cue present in the largest share of occurrences.

- Lay the fourteen cards out and read every entry in the fourth column aloud, sorting them into no more than six named categories with the sorting rule written down.
- Tally each category with five-bar gates on a fresh sheet, add the tallies, and work out each category's share of the total as a percentage longhand, showing the division.
- Write the granularity line: with n occurrences each single row moves a share by 100 divided by n percentage points, so with 142 occurrences one row is worth 0.7 points. Do not claim a gap between two cues smaller than that.
- Tally place, hour of day, and whether you were alone or with others the same way, so you know which column actually separates the data.
- Draw the occurrences-by-cue bars on squared paper, largest bar first, to a stated scale, titled with the finding, with counts and minutes never on the same axis.
- Write the finding as one sentence: the top cue was present in [number] of [total] occurrences, which is [number] per cent, the largest share of any cue. Say largest share and print the percentage; a share under fifty per cent is not most of them.

WRITE THIS DOWN

The sorting rule, the counts and percentages for cue, place, hour and company with the total beside them, the granularity line, the cue bar chart, and the fourteen-day line.

DONE WHEN

You can name one cue, state the share it carried as a percentage with the number of occurrences behind it, and pull out the rows that percentage came from.

Watch out. Naming a cue that carries the largest share and also sits there all day long. Being at home is not a cue if you are always at home. Ask whether the cue is also there during the hours the habit does not happen.

Worked fragment - the cue table for fortnight one, 142 occurrences over 14 days

Cue category (minute before)	Occurrences	Share of 142	Rows marked recalled
Phone buzzed	40	28.2 per cent	3
Sat down	33	23.2 per cent	2
Conversation stopped	26	18.3 per cent	1
Finished a task	22	15.5 per cent	4
Walked into kitchen	13	9.2 per cent	0
Nothing noted	8	5.6 per cent	2

The arithmetic, written out: 142 occurrences divided by 14 days = 10.1 occurrences per day; the top cue is 40 divided by 142 = 0.282, which is 28.2 per cent, the largest share; one occurrence is worth 100 divided by 142 = 0.7 percentage points, so the 5.0-point gap to the next cue is real.

What a marker looks for: A marker checks that the six shares add to 100 per cent, that the claim reads the largest share at 28.2 per cent and never most, and that the 12 rows marked recalled are counted and reported apart from the 130 observed rows.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost 80 MINUTES

Finish the costed problem statement on one page and choose the one cue you will remove or change.

- Write four lines: the habit as defined, occurrences per day averaged over fourteen days, minutes per day and hours per year from your timed sample, and the top cue with the largest share written as a percentage. If you quote a figure from a printed source, copy the source across the top of the page and print your own measured figure beside it, never instead of it.
- Do the conversion longhand and leave the working on the page: occurrences per day multiplied by seconds per occurrence and divided by 60 gives minutes per day; minutes per day multiplied by 7 gives minutes per week; minutes per day multiplied by 365 and divided by 60 gives hours per year. If you state a monthly figure, multiply the weekly figure by 4.33, the weeks in a month, and print 4.33 on the page.
- Write the caveat beside the yearly figure: this assumes the fortnight is typical, and give one reason it might not be.
- Copy the cue bar chart and the fourteen-day line onto the same page, to a stated scale, with the timing sample size written underneath and minutes kept to their own panel.
- List three ways the top cue could be removed or changed physically rather than by willpower: move an object, silence a notification, change a route, change what sits on a surface, change the order of two things.
- Choose one and write: for fourteen days I will change X and expect the daily count to fall from A to B. Then read your step-one guess back and write one line on how wrong it was.

WRITE THIS DOWN

The one-page costed problem statement with its conversions and caveat shown, the three candidate cue changes, the chosen change as one testable sentence, and the guess-against-measurement line.

DONE WHEN

Somebody who was not there reads the page once and repeats your occurrences-per-day figure and your top cue with its percentage back to you correctly.

Watch out. Choosing to try harder instead of changing a cue. Trying harder is not a change anybody can observe, cannot be repeated by a reader, and gives you nothing to report when the count moves.

7 Set the protocol 60 MINUTES

Write down what must stay identical across the second fortnight so the two halves can be compared at all.

- Write what is fixed: same definition, same boundary rules, same five card columns, same within-a-minute rule, same fourteen-day length.
- Write what is allowed to move: only the one cue named in step six.
- Make the cue change physically today and draw it to a stated scale on the page, describing exactly what you moved, silenced or rearranged and the hour you did it.
- Rule fourteen fresh cards and fourteen calendar boxes before any data exists, and draw the change line on the calendar now.
- Write your prediction at the foot of the page, date it, and have one person witness it with a signature.
- Write the identity card: a name for the measurement, a one-line promise, and the single sentence you want repeated - the count, the cue with its share as a percentage, and no claim about anybody's character.

WRITE THIS DOWN

The protocol as a numbered list, the fourteen dates, the record of the cue change with its hour, the dated prediction, and the identity card.

DONE WHEN

The cue is physically changed, the change is recorded with its hour, a dated prediction plainly predates the second fortnight, and the identity card exists.

Watch out. Changing the cue and the definition at the same time, usually by tightening the definition because week two felt sloppy. Tighten nothing now. Anything you must change goes in the failure log with the date and hour.

8 Log fortnight two, first week

30 MINUTES · Plus 10 minutes a day for 7 days for the nightly total and the line on whether the cue change held.

Log the first seven days after the cue change exactly as you logged the baseline.

- Mark the same five columns within a minute of every occurrence, using the same categories.
- Keep writing the fourth column even though you think you know the answer, because the interesting result is a new cue replacing the old one.
- Keep marking O or R on every row, and keep the two counts separate.
- Each night write one line on whether the cue change held, was partly held, or was undone, and why.
- If you undid the change on any day, log that day normally and write cue restored across the top of that card.
- Stop and write it down if the logging starts to feel bad; changing habit at this point is a recorded finding, not a failed project.

WRITE THIS DOWN

Seven dated days of rows, seven daily totals, seven nightly lines on whether the cue change held, and any cue-restored day marked.

DONE WHEN

Seven days carry totals with the same columns as the baseline, and the failure log holds at least one honest entry.

Watch out. Not logging on the days the count is high because it feels like the project is going wrong. A high day with its before-column intact is worth more than a whole clean week without one.

9 Compare the fortnights

100 MINUTES · Plus 10 minutes a day for the last 7 days of logging, which finish before this analysis starts.

Set twenty-eight days side by side and report the difference honestly.

- With the last seven days logged, add each fortnight's daily totals and divide by fourteen longhand to get the two means, leaving the working on the page.
- Draw all twenty-eight daily totals as one line on squared paper to a stated scale, with a vertical mark on the change day, and keep minutes to a separate panel with its own scale.
- Tally the second fortnight's cues the same way and draw the second bar chart beside the first, to show whether the old cue vanished and something else took its place.
- List every confounder by name: exam weeks, travel, illness, a holiday, weather, a changed timetable, and the plain fact that you were watching yourself.
- State the change three ways: in occurrences per day, as a percentage of the first fortnight mean, and in minutes per week, using the seconds-per-occurrence figure you measured.
- Write the granularity line: with fourteen days in each half, one extra occurrence across a fortnight moves a mean by 1 divided by 14, which is 0.07 occurrences per day, so claim nothing smaller than that. Then write one sentence on whether fourteen days either side is enough to be sure.

WRITE THIS DOWN

The twenty-eight-day line with the change day marked, both fortnight means, both cue charts, the difference in occurrences per day, in per cent and in minutes per week, the granularity line, and the confounder list.

DONE WHEN

You can state the before mean, the after mean, the difference in all three units, and at least two reasons the difference might not be your doing.

Watch out. Claiming the cue change worked when the count was already falling through the first fortnight. Look at the shape of the twenty-eight-day line before you claim anything; a trend that started before the change is not your change.

10 Present and defend

90 MINUTES · The defence itself is 10 to 12 minutes of that, booked with your teacher and two witnesses.

Defend the finding to people who can question it, and record what you will keep.

- Sit the defence: ten to twelve minutes of unseen questions answered out loud in front of two witnesses who sign and date the page, naming nobody. There is no recording on this route; the signed page is the record.
- Read the one-page explainer to three people and write down what each of them said, including anyone who did not believe the count.
- Ask your teacher to post or hand the twenty-eight-day chart to the expert with one question: what would you have recorded that I did not.
- Write one paragraph on whether you are keeping the cue change, and why, without turning it into advice for anybody else.
- Complete the relations ledger in codes: E1 the expert, A1 to A3 those the measurement affects, P1 to P3 peers, R1 to R3 those who replied, each with role, date and what they said. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Hand in the daily totals, the two means and the cue table only. The dated cards stay with you in their envelope, and anything shared beyond the class goes through your school, where your school agrees it may be shared.

WRITE THIS DOWN

The defence page signed and dated by two witnesses, the one-page explainer, the keep-or-drop paragraph, and the coded relations ledger holding ten entries.

DONE WHEN

Ten relationships are logged by code with dates and replies, no other person's behaviour appears anywhere in what you handed in, and no diagnosis language appears in any of it.

Watch out. Ending on a lesson about willpower. You measured one event, one cue and one physical change across twenty-eight days. Report those, report the limits, and stop there.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-ruled card carrying the habit written as an observable event with its boundary rules, the twenty-eight dates, your dated guess witnessed by one signature, and the question: how often, and after what.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a psychologist, counsellor or behavioural researcher, your hand-drawn fourteen-day count and cue chart attached as one page, the date and how you asked, and the reply recorded word for word. The expert appears as E1, never by name.

3 - RESEARCH - WEEK 4

Evidence log

The dated cards in their envelope, each row carrying time, place, company as alone, one other or two or more, what happened in the minute before, and O or R for observed or recalled, with the two counts totalled separately, plus the timed sample with its size and range and the nightly completeness lines. The cards stay with you; the daily totals and the cue table are what you submit.

4 - PROCESS - WEEK 4

Failure log

The days logged from memory, the days marked partial, the hour any rule was changed, the days the cue change was undone, and any point the logging felt bad and you stopped, all dated in the notebook.

5 - DESIGN - WEEK 5

The build

The logging system itself - the ruled pocket card with its five columns - together with the twenty-eight-day daily count line drawn to a stated scale with the change day marked, and the two occurrences-by-cue bar charts side by side.

6 - DESIGN - WEEK 5

One-page explainer

One hand-written page somebody who was not there reads in ninety seconds: the habit, occurrences per day, hours per year with its caveat, the cue and the share it carried as a percentage, the one physical change, the second fortnight, and what twenty-eight days cannot tell anybody.

7 - BRANDING - WEEK 5

Identity card

Written by hand in step seven: a name and a one-line promise for the measurement so it can be referred to by name, plus the single sentence you want repeated - the count, the cue with its share as a percentage, and no claim about anybody's character.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries written by hand, each with role, date and what was said: E1 the expert, A1 to A3 the people the measurement affects, P1 to P3 the peers who checked your counting rule, R1 to R3 the people who replied to the chart. No names appear anywhere in the ledger. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered out loud in front of two witnesses who sign and date the page, naming nobody: the definition, the count, the cue with its largest share as a percentage, the physical change, the twenty-eight-day line, the result, and the limits you accept without argument. There is no recording option on this route; the signed and dated page is the record.

The four tiers, in this project

Starter

You define one habit as an observable event, log fourteen days without a gap, name the cue that carried the largest share with its percentage printed beside it, produce a daily count chart, and put your five questions to one professional through your school.

Practitioner

Everything in Starter, and you defend why your definition counts one event and not two, cite any borrowed logging method to its printed source with author and date, report your observed and recalled rows as two separate counts, and produce one chart a reader reads correctly without you explaining what a cue is.

Researcher

Everything in Practitioner, and you write the definition and the recording rule before day one, justify fourteen days rather than seven, state the granularity of every percentage you report, and quantify how much of the count you probably missed and which way that biases the cue ranking.

Contributor

Everything in Researcher, and you set your cue finding against one named printed source on antecedents and habit interruption with its author and date, defend your method to a professional who disagrees with it and write down where they were right, and offer the anonymised daily totals and cue table through your school, where your school agrees they may be shared, so somebody else can recount them on request.

The one professional you must hear from

Who. A psychologist, a school or workplace counsellor, an educational psychologist, or a behavioural researcher in a university, a product team or a safety team - anybody whose job involves counting what people do rather than asking them what they do.

Where your school finds one. The same institutions and the same roles, found offline: the printed prospectus or department leaflet in the school or public library, the local authority directory on the library shelf, and the school office's own list of visiting professionals. Your teacher telephones or posts the letter, and any reply comes back to the school.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has logged one small habit of their own for fourteen days, finding one cue present in the largest share of occurrences, [number] per cent. Could you spare fifteen minutes, on a call with me present or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you count a behaviour, how do you decide where one occurrence ends and the next begins?
2. How much does the act of logging change the thing being logged, and how do people usually detect that?
3. How would you tell a real cue apart from something that is simply present all day?
4. When one cue is removed, what usually happens next, and how would that show up in a fourteen-day count?
5. If you had my twenty-eight days of data, what one column would you have asked me to record that I did not?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the count have fallen anyway without your cue change, and how do you know?
2. You were watching yourself for twenty-eight days. Show me where in your data you can separate the effect of the cue change from the effect of being watched.
3. Your top cue carried the largest share. Say that share as a percentage, then tell me how many hours a day the cue was present when the habit did not happen, and what that does to your claim.
4. Somebody applies your definition to a day of your life and gets a different number from yours. Where would the disagreement come from, and which of you would be right?
5. How many of your rows were written at the moment and how many from memory, and which way would that bias your cue ranking?
6. One extra occurrence across a fortnight moves your mean by how much? Now tell me whether the change you are reporting is bigger than that.

If you get stuck

- If nobody replies to the requests your school sent - then submit the five questions exactly as they were sent, the dated list of attempts with the roles they went to, and one named printed source you read instead with its title, author and date. That route scores in full; an unreachable expert does not cost you the strand.
- If the household or the site says no - then move to the school variant: a habit that only happens on school premises, logged in a fixed four-hour window with a member of staff, the card kept in a sealed envelope on site, and the window written on every chart.
- If your two fortnights look the same - then report that as the finding, check the nightly lines to see whether the cue change actually held on all fourteen days, and look at the second cue chart for something that took the old cue's place.
- If you could not catch the occurrences in time - then narrow the definition to a version you can catch, log a fixed four-hour window each day instead of the whole day, and state the window on every chart.
- If you run out of time - then keep both halves at fourteen days and drop the timing sample rather than the log, reporting the count without the minutes and saying on the page why the minutes are missing.
- If the logging starts to feel bad at any point - then stop that day, tell the adult who knows where you are the same day and your teacher before the next session, change the habit or the project, and record what you stopped and why as a finding.

Finished early?

Log a second habit of your own alongside the first for the same twenty-eight days, changing nothing about it, so you have an untouched comparison line to set against your changed one.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 11 - MATTER & CHEMISTRY

The Cheapest Clean

Test five cleaning methods on identical stained patches, one product at a time, and price every use in rupees.

THE QUESTION

Which of five cleaning methods already in your house shifts the same stain best, and what does each one cost per use?

Every claim printed on a cleaning label started as a controlled comparison somebody ran on a bench, and the industry that runs them, formulation, quality control, consumer testing, pays for people who can hold conditions still. A result means nothing without its controls, which is why the same cloth, the same dose, the same water and the same contact time matter more than the product does. Cost per use is how procurement teams in hospitals, hotels and factories choose between products, and almost nobody at home works it out.

ACT 1 - FIND

You take one stain that keeps returning in this house, cut fifteen identical patches from one cloth, three for each of five methods already in the cupboard, and test them under conditions you hold still and write down first. Only one product is ever out at a time, in one bowl, rinsed and emptied and put away before the next is opened.

You then measure how much of each product a single test consumed and divide the pack price by the pack quantity, so every method ends in the same unit, rupees per use, printed beside its mean score. The result is a one-page costed problem statement: the stain, how often it happens, the five methods ranked by removal score out of five, the rupees per use beside each score, and the household's yearly spend on its current method at the real stain frequency.

ACT 2 - FIX

The household switches to the winning method for fourteen days, and every stain event is logged exactly as it was logged during the baseline fortnight: item, product, quantity used, rupees, minutes of scrubbing and the score afterwards. Both periods are fourteen days, so both divide by two and can be set against each other without arithmetic tricks.

Two comparisons on the same page, in two panels: rupees per week in one, minutes per week in the other, baseline fortnight against switched fortnight, with the mean score achieved, the named confounders, and the household's recorded answer on whether the switch stays.

YOU MEASURE

rupees per use to shift one standard stain, and the mean removal score out of five those rupees buy

BEFORE

Fifteen patches cut from one cloth, three for each of the five methods, the same stain quantity at the same age, the same water volume, the same contact time and the same scrub count, each scored blind by three people against a written five-point scale, beside a 14-day log of what the household spends and scrubs now.

AFTER

The same log kept for fourteen days on the winning method: item, product, quantity used, rupees, minutes and score for every stain event. Both periods are fourteen days, so each is divided by two to give rupees per week and minutes per week, and the two are set side by side in their own panels.

The calendar this needs

28 measurement days inside six weeks: a 14-day baseline log from day one of week 1, then a 14-day switched period across weeks 4 and 5, leaving week 6 for the comparison and the defence, so if the baseline does not start in week 1 nothing lands.

Safety and ethics - not optional

- Never mix cleaning products with each other. Bleach with an acid, in a toilet cleaner or a descaler, or bleach with ammonia, releases a gas that damages lungs. This rule is absolute: one product out at a time, one bowl, rinsed and emptied and put away before the next is opened, and no leftovers poured together.
- Gloves and eye protection are worn by everyone at the bowl, for every treatment. Air has to move: an open window, an open door, or an outdoor tap. One named adult is in the room for the whole test, from the first product coming out to the last one going back in the cupboard, not merely aware that you are testing.
- If you smell fumes, or anything stings your skin, eyes, nose or throat, stop at once, leave the room, tell the adult, and rinse the skin or eyes under cool running water for several minutes. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.
- Nothing is heated, boiled or put near a flame; every test uses water straight from the tap. Nothing is tasted, nothing is deliberately smelled, nothing is inhaled to identify it.
- Any product carrying a hazard symbol is used exactly as its label instructs, or it is left out of the test. If the label is missing, or you cannot read what is inside, it does not go near a patch. No product is ever decanted onto a cloth, into a bowl or into another container in a way its own label forbids, every product stays in its own labelled container, and nothing goes into a drinks bottle.
- This project touches money and it touches labels. Record what the household spends on cleaning; never record what anybody can or cannot afford, never put a money figure beside a named person, and never write down that somebody could not read a label.
- You do not go out for this project on your own. If a pack price has to be checked in a shop, a named adult goes with you.

What you use - no-tech route

Gloves and eye protection - worn by everyone at the bowl, for every treatment

One old cotton item nobody needs, cut into fifteen identical squares, with a pencil for labelling the backs

A quarter-teaspoon or a dropper kept for the project, a measuring jug, one brush, and one bowl rinsed and emptied between methods

A watch with a second hand for contact time, and a notebook ruled into columns: method, dose, pack price, pack quantity, rupees per use, three scores, mean

Tracing or greaseproof paper and a sharp pencil for the traced outline of every patch

Squared paper and a ruler for the hand-shaded five-point scale, the counted stain area and the bar panels

A hand-drawn five-point scale, a traced outline of every patch and squared paper give the same ranking and the same rupees per use; the arithmetic is done longhand in the margin where anybody can check it.

The school version of this project

The same protocol runs on school property with a member of staff present. The site team supplies the products with labels intact, and the school's own purchase invoices give real pack prices and quantities, which are better evidence than a home shelf. One bowl, one product at a time, at a bench by an open window. The baseline is the site team's own cleaning record for one area over fourteen days; the switched fortnight is the same area on the winning method.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Pick the stain

50 MINUTES · Plus 5 minutes on each day of the 14-day baseline log; those days are elapsed time, not work. The No-Tech route rules the log and copies every label by hand, so it runs longer.

You fix on one stain that keeps coming back, and start the 14-day baseline log on day one.

- Ask whoever does the washing which stain returns most, cooking oil, tea, ink, turmeric or grease, and write their answer down word for word.
- Count how many garments or cloths carry that stain right now and draw or list them on the first page.
- Rule a 14-day household stain log with columns: date, item stained, product used, quantity used, rupees, minutes spent, result.
- Copy every cleaning product's name, pack price and pack quantity off its label into the notebook, exactly as printed, units included.
- Write the household's usual method for this stain at the top of the page, in the words of the person who does it.
- Write today's date on the first row. The baseline has to run all fourteen days inside weeks 1 and 2, or the switched fortnight will not close before week 6.

WRITE THIS DOWN

The chosen stain, the count of items carrying it now, the first dated row of the 14-day log, and every product with its pack price and pack quantity as printed on the pack.

DONE WHEN

The log has its first dated row and every cleaning product in the house is listed with a price and a quantity taken off the pack.

Watch out. Choosing a rare, dramatic stain because it looks impressive. The number that matters is rupees per year, and that comes from the boring stain that happens weekly.

2 Make the patches

85 MINUTES · Plus the drying hours, the same for every patch, which is waiting, not work; overnight is easiest. The No-Tech route also traces fifteen starting outlines and counts their squares by hand, so allow half as long again.

You cut fifteen identical patches, three for every method, and stain them all inside the same few minutes.

- Take one old cotton item nobody needs and cut fifteen squares of the same size from the same part of it, three for each of the five methods, so weave and colour match across all fifteen.
- Apply the stain with the same tool every time, one level quarter-teaspoon, or three drops from the same dropper, to the centre of each square.
- Stain all fifteen within the same fifteen minutes, so every patch is close to the same age when it is treated.
- Lay them flat on a covered surface, number them 1 to 15 in pencil on the back only, and leave them all the same number of hours to dry.
- Write which three numbers belong to which method on one sheet that goes to your teacher, not on the patches and not on the wall.
- Lay tracing paper over each dried patch, trace the outline of the stain, count the squares it covers on squared paper, and write that starting count down against the patch number.

WRITE THIS DOWN

The cloth used, the square size, the stain quantity per patch, the clock time each was stained, the drying hours, and which three patch numbers belong to each method on the teacher's sheet.

DONE WHEN

Fifteen squares carry the same stain applied within the same fifteen minutes, three per method, labelled only on the back, dried for the same time.

Watch out. Cutting patches from different garments because one square was short. Different weave holds stain differently, and the test then measures cloth instead of method.

3 Fix the conditions

60 MINUTES · The No-Tech route draws and shades the five-point scale by hand, so allow longer.

You write the protocol that holds everything still except the one method under test, and you write the safety drill into it.

- Write the fixed conditions down before anything is opened: same water volume in the jug, same water from the same tap, same contact time, same scrub count, same brush.
- Draw the five-point scale by hand: five shaded reference squares running from unchanged to no stain visible, each labelled in words, and pin it on the wall.
- Write the running order and the safety drill as numbered lines: one product out at a time, one bowl, rinsed and emptied and put away before the next is opened, gloves and eye protection on, window open or outdoor tap, the named adult in the room throughout, and what everybody does if fumes are smelled or anything stings.
- Write the blinding rule: after treatment, a second person who will not score relabels every patch with a fresh random letter, writes the letter-to-number key on a separate sheet, keeps that sheet away from the scorers, and is the only one who handles or turns a patch.
- Write how a patch gets scored: three people look at the front only, in the same daylight, and each writes a number without speaking; then the traced outline is counted in squares to a stated scale.
- List the five methods, one per row, each with the exact dose it will be given, and check each label allows that dose used that way; if it does not, that method is out.

WRITE THIS DOWN

The protocol as a numbered list, the five-point scale in words, the running order and safety drill, the blinding rule with the name of the person holding the key, and the five methods with their doses.

DONE WHEN

Another person could run the whole test from your written protocol without asking you a single question, and could say from the page alone which product comes out first and what happens if anybody smells fumes.

Watch out. Deciding the scale after seeing the results. A scale written afterwards always flatters the method you were hoping would win.

4 Run the tests, one product at a time

145 MINUTES · Run it in two sittings on the same day with the same adult present. The drying hours between treatment and scoring are waiting, not work. The No-Tech route traces and counts fifteen outlines again after treatment, so allow longer.

You treat fifteen patches, one method at a time out of one bowl, and get three blind scores on every patch.

- Put gloves and eye protection on, open the window or move to an outdoor tap, and do not start until the named adult is in the room; the adult stays for the whole test.
- Take out one product only. Treat that method's three patches from that one bowl, same jugful, same contact time on the watch, same scrub count counted aloud so somebody else can hear it. Then rinse the bowl, empty it, dry it and put the product back in the cupboard before the next product is opened. Nothing is ever poured together.
- Rinse each patch with the same jugful from the same tap and hang all fifteen to dry in the same place for the same hours; nothing is heated at any point.
- Have the second person, who will not score, relabel every dried patch with a fresh random letter, write the letter-to-number key on a separate sheet, and hand that sheet to your teacher until every score is in.
- Trace each dried patch again on fresh tracing paper and count the squares the remaining stain covers, giving a measured area beside the human score.
- Have three people score every patch against the drawn wall scale, in shuffled order, handling nothing and turning nothing over, and write all nine scores per method down separately rather than agreeing one.

WRITE THIS DOWN

The five treatments with their timings and scrub counts, the letter each patch carried while it was scored, the nine scores behind each method, and the mean and the range for each method.

DONE WHEN

Every method has three treated patches and nine independent scores, no scorer could name a method while scoring, only one product was ever out of the cupboard at a time, and the key sat with your teacher until the last score was written.

Watch out. Scrubbing the stubborn patch a little longer to be fair to it. Those extra scrubs become the reason it won, and the test then measures your arm rather than the method.

5 Cost each use

90 MINUTES · The No-Tech route does every division and multiplication longhand in the margin, so it takes about half as long again.

You turn doses and pack prices into one figure in one unit: rupees per use.

- Measure each product before and after its test with the scale, the jug or a counted number of drops or level spoons, and record the quantity consumed in grams for solids and millilitres for liquids.
- Divide the pack price by the pack quantity longhand in the margin, leaving the working visible, to get rupees per gram or rupees per millilitre.
- Multiply each rate by the dose actually used, so every method ends in the same unit, rupees per use. Write fuel: zero by protocol, because nothing was heated. Record the water volume, and cost it only if your household is billed by the litre, with the tariff written beside it.
- Draw the result on squared paper to a stated scale: rupees per use up the side, mean score along the bottom, one labelled point per method. Rupees per gram and rupees per millilitre never share an axis with each other; if you want to show the rates, draw them as a second panel with its own axis.
- Set the counted stain areas, before and after, beside the human scores, and write this line under them: the counted area is squares on a traced outline, it depends on where you judged the edge of the stain, and it does not replace the scores.
- With three patches and three scorers, each mean is built from nine scores and moves in steps of 0.11 points. Write that beside the ranking and do not claim a difference smaller than that.

WRITE THIS DOWN

Rupees per use for all five methods in one unit, the dose behind each figure, the second measure beside the human scores with its limits written out, and the cost-against-score chart with both axes named.

DONE WHEN

You can name the cheapest method that scored well and the expensive one that did not, show the arithmetic behind both, and say why two methods 0.1 points apart cannot be separated.

Watch out. Costing by pack price instead of by dose. A large expensive bottle can be the cheapest per use, and only the quantity consumed tells you which.

Worked fragment - turning pack prices and doses into one unit, rupees per use

Method	Pack price divided by pack quantity	Dose per test	Rupees per use	Mean score of nine
Bar soap	35 rupees / 100 g = 0.35 per g	4 g	1.40	3.6
Dish liquid	120 rupees / 500 ml = 0.24 per ml	5 ml	1.20	4.2
Washing powder	180 rupees / 1000 g = 0.18 per g	10 g	1.80	4.4
Vinegar	60 rupees / 500 ml = 0.12 per ml	15 ml	1.80	2.4
Bicarbonate paste	50 rupees / 200 g = 0.25 per g	8 g	2.00	3.1

The arithmetic, written out: Dish liquid: 120 rupees / 500 ml = 0.24 rupees per ml; 0.24 rupees per ml x 5 ml used = 1.20 rupees per use; fuel = 0 rupees, because nothing is heated.

What a marker looks for: A marker checks that every rupees-per-use figure is the rate multiplied by the dose actually measured in the test rather than the pack price, that grams and millilitres never appear on the same axis, and that washing powder at 4.4 and dish liquid at 4.2 are reported as inseparable, because nine scores move in steps of 0.11.

Act 2 - fix it and measure

steps 6 to 10, ending with a proven effect

6 Name the cost

75 MINUTES · The No-Tech route scales to the year longhand and writes the page out by hand, so allow longer.

You finish the one-page costed problem statement and choose the method the household will run for a fortnight.

- Write four lines: whose problem this is, how often the stain happened in the 14-day log, what the current method costs per use and per year at that frequency, and what the winner would cost instead.
- Get to the year the same way every time, longhand: rupees per use, times stain events per week from the baseline, times 52 weeks. If anybody hands you a monthly figure, a month is 4.33 weeks, not four; divide by 4.33 and write that you did.
- Write beside the yearly figure: this assumes the fortnight is typical, and then write one reason it might not be.
- Pin the fifteen patches themselves in method order across the page with the five cost figures written under them and the mean score beside each.
- Choose the winner on cost and score together and write it as one testable sentence: the household will use X for fourteen days, and I expect rupees per week to fall from A to B and minutes per week from C to D.
- Read the page aloud to whoever does the washing and have them sign and date it if they agree to the switch, or write down their refusal. Record what the household spends on cleaning and nothing else about anybody's money.

WRITE THIS DOWN

The one-page costed problem statement, the yearly figures for the current method and the winner with the assumption written beside them, and the switch written as one testable sentence.

DONE WHEN

Somebody who was not there reads the page once and repeats your rupees-per-use figures back correctly.

Watch out. Picking the top score whatever it costs or however long it takes. A method nobody will keep using for a fortnight measures nothing at all.

7 Agree the switch and name it 55 MINUTES

You lock the rules for the switched fortnight and give the winning method a name the household will actually use.

- Write what stays fixed: same log columns, same drawn scale, same watch, same scorers, same tap, same brush.
- Write what is allowed to move: only the product used to treat the stain.
- Set the winning product aside in one container, weigh it or mark its level on day one with a pen line, and write that starting reading down with the date.
- Rule two blank labelled rows for switched week one and switched week two, with their dates beside them, before any data exists.
- Make the identity card: a name for the winning method, a one-line promise under it, the rupees-per-use figure written on it, and the single sentence you want repeated in somebody else's kitchen.
- Write your prediction, date it, and have one person witness it with a signature before the fortnight starts.

WRITE THIS DOWN

The protocol as a numbered list, the two week dates, the starting weight or marked level with its date, the identity card, and the witnessed dated prediction.

DONE WHEN

The page holds empty labelled rows waiting for two weeks, an identity card a household member can read aloud, and a signed prediction that predates the data.

Watch out. Starting the fortnight with a fresh bottle and no starting weight. Weigh or mark the container on day one, or the period's real cost can never be recovered.

8 Switched week one

35 MINUTES · Plus about 5 minutes on each day a stain happens, written the day it happens. The week itself is elapsed time, not work.

You run the household on the winning method for one week and log every stain event the day it happens.

- Log each event on the day: item, product, quantity used, minutes spent scrubbing, and the score against the drawn scale.
- Read the container level or weight at the end of the week and compare it against the sum of the logged doses; write the difference down rather than correcting it.
- Trace one treated item's stain before and after and count the squares, so the fortnight carries a measured record beside the patch tracings.
- Write down what went wrong: a forgotten entry, somebody reaching for the old bottle, a stain treated twice, an event nobody told you about.
- If the person who does the washing wants to stop, stop. Write the date and the reason in the failure log and carry the shortened period through to the chart.

WRITE THIS DOWN

The week one rows complete, events, rupees, minutes and scores, the container reading, and at least one dated failure entry.

DONE WHEN

Week one carries every column the baseline fortnight had, and the failure log holds at least one honest entry.

Watch out. Reconstructing the whole week from memory on Sunday. Entries written days later lose the minutes, and minutes are half the finding.

9 Switched week two and the comparison

100 MINUTES · Plus about 5 minutes on each stain day in week two. The No-Tech route divides longhand and draws both panels on squared paper, so allow half as long again.

You close the switched fortnight, normalise both periods to the same length and compare them honestly.

- Keep logging every stain event for the second week, changing nothing the protocol does not allow.
- Divide each period by two longhand, because both are fourteen days, to get rupees per week and minutes per week for the baseline and for the switched fortnight.
- Draw the comparison on squared paper as two panels to a stated scale: rupees per week before and after in the first, minutes per week before and after in the second, each with its own axis named and its own unit. Rupees and minutes never share an axis.
- Count the stain events in the switched fortnight. One event is 100 divided by that count per cent of the period; write that number beside your percentage and do not claim a change smaller than it.
- List every confounder you can name: fewer stains this fortnight, a cook away from home, a price change, warmer water, somebody scrubbing harder than before.
- State the change as a rupee figure, as a percentage and in minutes, and say plainly whether two weeks is enough to be sure.

WRITE THIS DOWN

The two comparison panels, the per-week figures for both periods, the difference in rupees, in minutes and as a percentage with its granularity beside it, and the confounder list.

DONE WHEN

You can state the before figure, the after figure, the smallest change your event count lets you claim, and at least two reasons the difference might not be your doing.

Watch out. Comparing one period's total against another's without dividing. Normalise both to the same length, or the longer period will look more expensive than it is.

10 Share and defend

85 MINUTES · The defence itself is ten to twelve minutes of it, unseen and live; the rest is the readings, the ledger and the household's answer.

You defend the finding live to two witnesses and record what the household will keep.

- Sit the defence: ten to twelve minutes of questions you have not seen, answered live in front of two witnesses who sign and date the page. There is no recording on this route; the signed page is the evidence.
- Read the one-page explainer to three people who wash clothes in this house or nearby and write down what each of them said.
- Hand the drawn cost-against-score panels to your teacher to pass on to the expert, with one question: what would you have controlled that I did not.
- Ask the household in front of a witness whether the switch stays and why, let them answer without prompting, and write the answer down word for word.
- Complete the relations ledger in codes, not names: E1 the expert, A1 to A3 the people affected, P1 to P3 the peers who checked your controls, R1 to R3 those who replied, each with a role, a date and what they said.
- The name-to-code key is written once on the teacher's sheet, held by the school and destroyed after moderation. Nothing leaves the school without your school agreeing it may.

WRITE THIS DOWN

The defence page signed and dated by two witnesses, the one-page explainer, the three readings with what each person said, and the coded relations ledger holding ten entries.

DONE WHEN

Ten relationships are logged as codes with dates and replies, the key is with your teacher, and the household has said on record whether the switch stays.

Watch out. Calling it a success because the house smells better. The metric is rupees per week and minutes per week; report those first and opinions second.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One card, hand-written, naming the stain, the cloth, the five methods to be tested, and the question: which one shifts this stain best, and what does each cost per use. The first dated row of the 14-day baseline log is copied on the back.

2 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a dry cleaner, a housekeeping supervisor or a formulation chemist, sent on school paper by your teacher, your drawn cost-against-score chart attached, the date and how you asked, and the reply copied out word for word. If no reply comes, the pack holds the dated attempts and one named printed source instead.

3 - RESEARCH - WEEK 4

Evidence log

Every dose measured with its unit, every contact time and scrub count, all nine scores per method with the letter each patch carried, who held the letter key and when they handed it over, every pack price with its pack quantity copied off the pack, the traced areas counted in squares, and every stain event logged on the day it happened.

4 - PROCESS - WEEK 5

Failure log

The patch scrubbed longer than the protocol allowed, the entry written three days late, the day somebody reached for the old bottle, the method dropped because its label forbade the dose, and what each one did to the comparison, all dated.

5 - DESIGN - WEEK 3

The build

The test set-up itself: one bowl, one brush, one jug, one watch, gloves and eye protection, the written running order, the hand-drawn five-point scale, and the fifteen patches laid out in method order with the letter each carried while it was scored.

6 - DESIGN - WEEK 4

One-page explainer

One hand-written page a neighbour reads in ninety seconds: the stain, the five methods, the rupees per use beside each mean score, the switch, the fortnight's result, and what this cannot tell them.

7 - BRANDING - WEEK 4

Identity card

Made in step 7: a name and a one-line promise for the winning method with its rupees-per-use figure written on it, so the household can refer to it by name, plus the single sentence you want repeated in somebody else's kitchen.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries with roles, dates and replies: E1 one cleaning professional or chemist, A1 to A3 the people who wash clothes here, P1 to P3 peers who checked your controls, R1 to R3 people your teacher passed the chart to who answered. No names. The name-to-code key is written once on the teacher's sheet, held by the school and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions, answered live in front of two witnesses who sign and date the page: the stain, the controls held still, the blinding and who held the key, the nine scores per method, the rupees per use, the switched fortnight, and the limits you accept without argument. There is no recording on this route; the signed page is the evidence.

The four tiers, in this project

Starter

You run five methods on three patches each, one product out of the cupboard at a time, score every patch blind against a scale written beforehand, cost each use from the pack price and the dose actually measured, and put your five questions to one professional through your teacher.

Practitioner

Everything in Starter, and you defend the choice of stain, cite the pack price and pack quantity behind every cost figure, name who relabelled the patches and who held the key, and produce one chart in one unit that somebody who was not there reads correctly unaided.

Researcher

Contributor

Everything in Practitioner, and the protocol is written, dated and witnessed before the first patch is stained. You justify three patches and three scorers, report the range as well as the mean, say which two methods your data cannot separate, and quantify the error your eye, your water and your dose add.

Everything in Researcher, and you set your ranking against a printed published source your teacher supplies or a library holds, cited beside your own figure and never instead of it. You take a written reply from a specialist who disagrees with one of your controls and answer it in writing, and you offer your raw scores, doses and readings for any school to see on request, published through your school where your school agrees it may be published.

The one professional you must hear from

Who. A dry cleaner or laundry owner, a hotel or hospital housekeeping supervisor, a formulation chemist at a soap or detergent maker, or a quality-control chemist who tests cleaning products for a living. They hold conditions still for a living, and they already know what one use costs.

Where your school finds one. Institutions and roles only, offline, and your teacher makes the approach. A letter on school paper, addressed by role and posted or delivered by the school, to the housekeeping department of a hotel or hospital, to a commercial laundry, or to the quality department of a detergent maker. A printed local business directory in the library gives the postal address. Your school's own science technician is reached through the school office.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has tested five common cleaning methods on identical stained patches, holding water, dose, contact time and scrubbing constant, and costed each at about [number] rupees per use. Could you spare fifteen minutes, on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you test whether a treatment works, what do you hold constant, and which of those has caught you out before?
2. How do you decide a stain is gone: by eye, against a scale, or by something you actually measure?
3. What do you pay per use for the product you reach for most, and how do you know that figure?
4. Which household remedy do people believe in that you have watched fail on your own bench?
5. If a stain like mine arrived at your counter, what would you do first, and why that first?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. Would the household's cleaning spend have fallen anyway this fortnight without your switch, and how do you know?
2. Nine scores stand behind each method. Tell me exactly who relabelled the patches, where the key was kept, and what would have happened to your ranking if a scorer had turned one over.
3. Show me the range inside each method. Which two methods does your data fail to separate, and what is the smallest difference you are entitled to claim?
4. You tested one product at a time, so the first bowl and the last were hours apart. What did that cost you, and how would you check it?
5. A neighbour has harder water and a different cloth. Which part of your result travels to their house, and which part stays in yours?
6. You charted rupees per use against score. Where did rupees per gram and rupees per millilitre go, and why can they not sit on the same axis?

If you get stuck

- If nobody replies to the interview request - then submit the expert-unreachable path, which still scores: the five questions exactly as your teacher sent them, the dated list of attempts, and one named published substitute source, a printed label instruction or a printed consumer test your teacher supplies, answering as many of the five as it can.
- If the household or the site says no - then run the school variant: the same protocol on school property with a member of staff, the school's own products with labels intact, and the school's purchase invoices for pack prices, and write on the page that the baseline is a site cleaning record, not a household's.
- If a product's label forbids what your protocol asks, or the label is missing - then that method is out of the test. Write down which method you dropped and why. Four methods with intact labels is a result, not a failure.
- If you cannot weigh the product used - then count level quarter-teaspoons or drops from the same dropper, weigh one dose once on a scale at school or one a named adult has, write that conversion at the top of the page, and mark every row that uses it as estimated.
- If your before and after look the same - then report that as the finding, check first whether the household actually used the winning method on every stain event, and write what you find in the failure log.
- If you run out of time - then shorten the switched period to seven days rather than dropping the baseline fortnight, normalise both to rupees per week, and print the shortened period on the chart itself.

Finished early?

Run the same five methods against a second stain, three patches each again, and find out whether the winner holds or whether the ranking turns over completely.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

PROJECT 12 - SOCIOLOGY & FUTURE SOCIETY

The Question Nobody Asked

Ask twenty neighbours what quietly wastes their time, then cost the hours your street loses in a month.

THE QUESTION

What is the one problem the people on your street raise without being prompted, and how many hours or how much money does it take from every household each month?

Councils, utilities, housing developers and every organisation that serves a neighbourhood spend money on problems that were assumed rather than asked about, and the assumed problem is rarely the expensive one. Finding the real one takes a fixed open question, answers in the residents' own words, honest grouping, and a cost per household that somebody outside can check. That is the method behind community needs assessment, service design and municipal budgeting, and it is paid work precisely because most organisations skip it and pay twice.

ACT 1 - FIND

You ask fifteen to twenty households on one street the same open question - what is the one thing here that wastes your time or your money that nobody has ever asked you about - and you keep every answer in the words used rather than in your summary of them.

You group the answers, find the problem raised unprompted most often, and cost it in one unit only: minutes per household per week, or money per household per month. You end with a one-page costed problem statement carrying how many households you asked and how many refused, how many raised this problem unprompted, the cost per household with each figure marked M for measured or R for reported, and one modelled street total a month with the number of households it rests on printed beside it. Beside it sits a bar chart of problems by count, largest first.

ACT 2 - FIX

You organise one small change with at least three neighbours - a shared rota, a sign, a bin moved, a step repaired, one pooled purchase - with permission from whoever is responsible for the space, and you keep it running for fourteen days while logging every time it fails.

You then measure the identical quantity again, in the same coded households, at the same time of day, with the same timing rule. You end with a two-bar chart of minutes per household per week before against after, the recalculated modelled street total, the difference stated in minutes and hours, a dated log of every day the change broke or was ignored, and a named list of everything else that could explain the difference.

YOU MEASURE

minutes lost per household per week on the problem residents raise most, and the modelled hours the street loses each month

BEFORE

Three timings taken by you of the activity residents raise most, plus how often it happens each week as reported by each household to a fixed frequency question, multiplied out per household and scaled to the street by the median. Every figure is marked M or R, the two are never mixed, and the street total is labelled modelled.

AFTER

The identical activity timed three times again with the same watch, the same frequency question read word for word, in the same coded households that agreed to a return call, at the same time of day, fourteen days after the change was put in place. The street total is recalculated in the same unit and labelled modelled again.

The calendar this needs

Six weeks: three afternoons of doorstep calls in week 2, fourteen consecutive days with the change in place across weeks 4 and 5, and the re-measurement in week 6. Start the doorstep calls in week 2 or the fortnight will not finish.

Safety and ethics - not optional

- Never go alone. A named adult goes with you and stays within sight of every doorway, every time you are in the street. Daylight only, and you finish before dark. Across the whole project this is about eight to ten hours of adult time, so the school books it into the timetable before week 1 ends.
- Never enter anyone's home. Ask at doorways, at gates or in shared public space, and step back to the pavement to write.
- Record no names, no house numbers, no telephone numbers and no photographs of people. Every household is a code number, and any picture of the place - a drawing on the No-Tech route, a photograph on the High-Tech route - is made with nobody in the frame.
- Anybody may decline. Count refusals and never chase them: never call twice at a door that said no. A household that agreed and asked you to come back at a set time is a different case, and you may return once, at the time they gave.
- If anyone becomes angry, leave immediately, say nothing back, and write down what happened as soon as you are away. Then tell the adult who knows where you are, the same day, and tell your teacher before the next session.
- This project touches money and sometimes health. Never write any household's income, debt, rent, illness, medicine or difficulty with reading into any sheet, even under a code. If a resident tells you something of that kind, leave it out of the record and tell your teacher.
- The school allocates one street or one block to each learner, caps every household at one approach from one learner, and posts a short letter to the neighbourhood - what the project is, which weeks it runs, and who to telephone at the school - before anybody knocks.

What you use - no-tech route

A ruled notebook and a clipboard - so you can write standing up without leaning on anything

A card with the one open question written out once - read word for word at every door

A numbered list of households - every answer recorded against a number, never against a name or a house number

A watch or a clock with a second hand - the three timings, the same one every time

Squared paper - the problems-by-count chart and the before-and-after chart, both drawn to a stated scale

A sheet of paper and a pen - the rota or the sign, lettered by hand

This route needs no electricity and no meter of any kind, and the same kit runs the school-site variant unchanged.

The school version of this project

Run the identical method inside the school's own community instead of a residential street. With the office's agreement, a member of staff walks you to fifteen to twenty doors the school already owns: classrooms, the office, the kitchen, the library, the caretaker's room, the workshop, the gate at collection time. Same fixed question, same coded units, same three timings, same fortnight, same modelled total. The chaperone is already on site, refusals are still counted, and permission for the change is one signature. This is the version a school pilots first.

Act 1 - find the problem steps 1 to 5, ending with a costed problem statement

1 Choose the street

60 MINUTES · The school's own preparation sits before this: the street allocation and the letter to the neighbourhood go out in week 1, before anybody knocks.

You leave this step with one allocated street, one question in fixed wording, and one adult booked for every hour you will spend outside.

- Take the street or block your school allocates you - one learner to one street, no household approached by two learners - and check that the school's letter to the neighbourhood went out before the first knock.
- Draw the street or the building on one page with each household as a numbered box, and write no house number and no name anywhere on it.
- Write the question on a card, once: 'What is the one thing here that wastes your time or your money that nobody has ever asked you about.'
- Write the doorway opening line on the back of the card: who you are, which school, what the question is for, how long it takes, and that they are free to say no.
- Book the adult who walks with you - the dates, the hours, and the agreement that they stay within sight of every doorway. Across the project this is about eight to ten hours of their time.
- Rule the notebook into six columns: household code, key phrases, the full sentence, the minutes between the two, refused, time of day.

WRITE THIS DOWN

The coded street sketch, the question in its final wording, the doorway opening line, the name of the adult who holds the plan with the hours they agreed, and the date the school's letter went out.

DONE WHEN

The question exists in one fixed wording, every household is a code number, the neighbourhood letter has gone out, and one named adult has agreed to the dates and the hours.

Watch out. Writing a question that suggests its own answer, such as asking about rubbish or about water. An open question collects what people actually think; a narrow one collects what you already believed.

2 Ask the doorways

225 MINUTES · This is fieldwork: about three and a half hours across three afternoons, in daylight, with the named adult within sight of every doorway for all of it.

Fifteen to twenty households answer the same open question, and every answer is on the page in their words within five minutes of leaving the door.

- Call in daylight, at the doorway, the gate or the shared space, and never step inside for any reason.
- Read the question from the card exactly as written, then stop talking however long the silence runs.
- At the doorway write key phrases only - their nouns, their verbs, their numbers, one or two lines - and never your summary of what they meant. Nobody can write a conversation down in full while it is happening.
- Read the key phrases back before you leave and ask whether that is what they said, then correct them in front of the resident.
- Within five minutes of leaving, and before you knock at the next door, write the full sentence into the notebook column from those phrases, and write the gap in minutes beside it.
- Mark every refusal in the refused column against a household code, move on without asking twice, and never call again at a door that said no.

WRITE THIS DOWN

Fifteen to twenty answers in the residents' own words against coded households, the gap in minutes for each one, the refusal count, and the time of day each door was called at.

DONE WHEN

Every answer sits in the resident's own words with its completion gap recorded, refusals are counted, and no name, house number or picture of a person exists anywhere.

Watch out. Typing 'complains about water' instead of what they said. The exact words are the data; your summary is your opinion wearing their coat. Three words at the door and a promise to remember does the same damage - finish the sentence within five minutes or write down that it was reconstructed.

3 Group the answers

110 MINUTES · The No-Tech sort takes longer because the slips are copied by hand and the chart is drawn on squared paper. Book the second person for the blind grouping in advance.

The answers become named groups in the residents' own words, and one group carries the highest unprompted count.

- Copy each answer onto its own slip of paper and read all of them through once before sorting anything.
- Lay the slips on a table and push them into piles, giving every pile a name taken from the residents' own words.
- Count the slips in each pile, and count separately how many raised that problem first, before anything else in their answer.
- Shuffle the slips and ask one person who did not do the survey to make their own piles blind, then compare pile by pile.
- Work out each pile's share of the households who answered longhand and write the step size beside it: with 18 answering, one household moves the share by 5.6 points, so claim no difference smaller than that.
- Draw the problems-by-count bar chart on squared paper to a stated scale, largest bar first, with the count written on each bar.

WRITE THIS DOWN

The grouped table, the count per group, the first-mention count, each group's share with its step size beside it, and every answer where your grouping and the blind grouping disagreed.

DONE WHEN

One group carries the highest unprompted count, a second person grouping blind put broadly the same answers into it, and every share carries the step size it moves in.

Watch out. Merging two different problems into one large group to make the count look better. Keep them apart and report both counts, even when neither wins clearly.

4 Cost it per household

165 MINUTES · Plus about two hours of return visits in the street across two afternoons, with the named adult present, and only at the doors that agreed to a return.

The top problem becomes one figure per household in one unit, with every number traceable to a timing you took or a sentence a resident said.

- Return only to households that raised the problem and agreed to a return call, at the time they gave. A door that refused, or asked not to be called on again, is never called at twice.
- Ask two fixed questions: how long does it take each time, and how many times a week does it happen.
- Time it yourself with the watch wherever it can be timed - the walk, the queue, the wait, the second trip - three separate times, writing all three down.
- Choose one unit for the whole project and write it at the top of the page: minutes per household per week, or money per household per month. Do not carry both, because the two scale differently later.
- Walk with the adult who is with you to the shop or the office and write down any price yourself rather than trusting a remembered figure.
- Rule one row per household, work out the median and the mean longhand in the margin and show both, and mark every figure M for measured or R for reported. Never add M and R into one total without saying which is which.

WRITE THIS DOWN

The unit written once at the top, one row per household with all three timings, the figure per household in that unit, each figure marked M or R, and the median and the mean side by side.

DONE WHEN

Every figure traces either to a timing you took or to a sentence a resident actually said, each one carries its M or its R, and the sheet carries one unit only.

Watch out. Asking 'roughly how long does it take' and accepting the first answer. Ask how long each time and how often, then multiply - people badly underestimate what they do daily.

5 Total the street

90 MINUTES · Plus about 30 minutes in the street reading the total back to three residents who agreed to a return call, with the named adult present.

The per-household figure becomes one street total a month, labelled modelled, with the number of households it rests on printed beside it.

- Unit check before you multiply anything. If your figure is minutes per household per week, multiply by 4.33 to reach a month. If your figure is money per household per month, it is already monthly: multiply by households only and never by 4.33, or your street total comes out about four times too big.
- 'The weeks in a month' is 4.33 - fifty-two weeks divided by twelve months. Write 4.33 in the working, never 4.
- Multiply the median per-household figure by the number of households longhand with the working left visible on the page, convert minutes into hours at the very end rather than in the middle, and round exactly once.
- Label the answer modelled and print beside it the households it rests on: 'modelled from 5 timed households, scaled to 18'. A modelled total is never added to a measured figure to make one number.
- Write how many households you asked against how many exist, and count the refusals inside that gap, because every household you did not ask is an assumption and must be labelled one.
- Read the total back to three residents who agreed to a return call and write down whether each said it sounds high, low or about right, then write one line naming what would make this total wrong and roughly by how much. This assumes the week you timed is typical - write one reason it might not be.

WRITE THIS DOWN

The street total in hours or money per month with the word modelled and both household counts beside it, the working with the 4.33 visible, the sample against the street size, and the three residents' reactions word for word.

DONE WHEN

You can say the total in one sentence, name the unit it started in, say how many households it was modelled from, and immediately name the assumption it rests on.

Watch out. Presenting a total as measured when most of it was scaled from five households. Say plainly what you measured and what you multiplied. The other half of that error is multiplying a monthly money figure by the weeks in a month, which inflates the street by roughly four times.

Worked fragment - costing the top problem, per household per week

Household code	Three timings (minutes)	Median time (M)	Times per week (R)	Minutes per week
H03	9, 11, 10	10	4	40
H07	12, 14, 13	13	3	39
H11	8, 9, 8	8	6	48
H14	15, 16, 15	15	2	30
H18	11, 10, 12	11	5	55

The arithmetic, written out: Median across the five households = 40 minutes per household per week (M x R). Street: 40 min x 18 households x 4.33 weeks in a month = 3 117.6 minutes = 52.0 hours a month, modelled from 5 timed households, scaled to 18.

What a marker looks for: A marker checks that each minutes-per-week cell is the median of that household's three timings multiplied by its reported frequency, that every figure carries its M or its R, and that the street total says modelled and prints the five households it rests on.

Act 2 - fix it and measure steps 6 to 10, ending with a proven effect

6 Name the cost

70 MINUTES · Plus about an hour in the street taking the page back to households that agreed to a return call, with the named adult present.

The costed problem statement is finished on one page and one small change is agreed with at least three neighbours.

- Write four lines: whose problem this is, how many households raised it unprompted out of how many answered, the cost per household with its M or R, and the modelled street total a month with the households it rests on.
- List three changes that need nothing bought: a shared rota, a sign, a bin moved, a step repaired, one pooled purchase.
- Take the page back to the households that raised it and agreed to a return call, ask which change they would actually take part in, and write down the refusals as carefully as the agreements. Doors that said no are not visited.
- Get three neighbours to take a role each, recorded as A1, A2 and A3 with what they agreed to do and on which days written beside the code.
- Write the prediction in one sentence: 'We will do X for fourteen days and expect minutes per household per week to fall from A to B.'
- Agree with your teacher which change the school will support, and start the permission request in the same week, because permission takes days rather than minutes.

WRITE THIS DOWN

The one-page costed problem statement, the three candidate changes, the roles agreed against household codes A1 to A3, and the dated prediction.

DONE WHEN

Three neighbours have each taken a named role by code, the prediction is written down before anything changes, and the permission request has been sent.

Watch out. Choosing the change you can organise on your own. A change with no neighbours inside it measures your effort, not the street's problem.

7 Set it up

95 MINUTES · Permission can take several days to come back. Ask in week 3 or the fortnight will not start on time.

The change stands physically in place, named, with the rules that keep the after-measurement identical to the before.

- Ask whoever is responsible for the space before anything is moved, repaired or fixed to a wall, through the school where that space belongs to a council, a landlord or a business, and record the permission by role rather than by name.
- Make the thing itself by hand: letter the sign, rule the rota onto one sheet, move the bin, repair the step with what is already to hand.
- Give the change a name and a one-line promise, letter both onto the rota or the sign itself, and write the single sentence you want repeated at the next doorway. That page is your identity card.
- Write what stays fixed: same coded households, same question wording, same watch, same three-timing rule, same time of day, same unit.
- Write both dates at the top of the page - the start and the re-measurement fourteen days later - and tell each of the three neighbours both dates.
- Draw the sign, the rota or the repair on squared paper to a stated scale, with nobody in the drawing, and date it.

WRITE THIS DOWN

The protocol as a numbered list, the permission recorded by role, the two dates, the identity card, and the dated drawing or picture of the change itself.

DONE WHEN

The change is physically in place, it has a name and a one-line promise, permission is on record by role, and the re-measurement date is fixed before any after-data exists.

Watch out. Fixing something in a shared space without asking first. Ask; a change removed in three days by whoever owns that wall measures nothing at all.

8 Run the fortnight

100 MINUTES · Ten minutes every second day for fourteen days - seven checks - plus fifteen minutes at the end of each week. The waiting is not work; the checks are.

The change survives or fails in the open, and both are written down with dates.

- Walk past the rota, the sign or the repair every second day, in daylight and with the adult who walks with you, and write one dated line on its condition. You do not go back to the street alone.
- Log every time it is ignored, removed or complained about, with the date and no name attached.
- Ask the three neighbours once a week whether they are still doing their part, and write the honest answer rather than the polite one.
- Where it breaks, put it back once and write that you did, then leave it alone if it breaks again.
- Rule a dated failure entry into the log each week whether or not anything went wrong.
- Check once a week that no name, house number or telephone number has crept into the notebook, and strike it out if it has.

WRITE THIS DOWN

A dated condition line every second day, every failure with its date, the three neighbours' weekly answers in their own words, and every repair you made to keep it alive.

DONE WHEN

Fourteen days of dated entries exist, including the days nothing happened, and every failure is written down rather than repaired quietly.

Watch out. Quietly fixing the change every morning so it looks like it worked. Record the repairs; the effort of keeping it alive is part of what it costs.

9 Measure again

150 MINUTES · Fieldwork: about two hours in the street on one afternoon, in daylight, with the named adult within sight of every doorway.

The same quantity is measured a second time in the same households, in the same way, and the two are compared honestly.

- Return to every household that answered the first time and agreed to a return call, in the same order and at the same time of day, including those who chose not to take part in the change. Never call at a door that refused the survey or asked not to be called on again; count those separately instead.
- Time the same activity with the same watch, three times again, and write all three timings down.
- Read the frequency question from the card word for word, exactly as it was asked the first time.
- Redo the arithmetic longhand in the same form as before, using 4.33 only if your unit is per week, and label the new street total modelled with the number of households it rests on.
- State the difference in minutes per household per week and in hours a month. Do not state it as a percentage: five timed households cannot support one. This assumes the fortnight is typical - write one reason it might not be.
- Draw two bars on squared paper to one stated scale with one unit only, put any money figure on a second chart rather than the same axis, and list every confounder: weather, a holiday, a repair by somebody else, a household that moved, a shop that closed.

WRITE THIS DOWN

The after figure for each coded household, the new modelled street total with the households it rests on, the difference in minutes and hours a month, and the confounder list.

DONE WHEN

Before and after exist for the same coded households, measured identically and in one unit, and at least two reasons the difference might not be yours are named.

Watch out. Re-asking only the households that joined in. Ask everybody who answered the first time, including the ones who declined to take part in the change, or your after-number is a survey of your own supporters. The households that refused the survey are still never called again; report their number instead.

10 Share and defend

90 MINUTES · Book the two witnesses a week ahead. The defence is live and cannot be moved into your own time afterwards.

The finding goes back to the street, you defend it live, and the record is closed properly.

- Deliver the defence out loud: ten to twelve minutes of unseen questions answered in front of two witnesses who sign and date the page. There is no recording on this route; the signatures are the evidence.
- Pin the one-page explainer where the street can read it, with permission from whoever owns that wall or board and with no names on it, and give a second copy to the school to share where your school agrees it may be shared.
- Hand the before-and-after chart to your teacher to pass to the expert with one question: what would you have measured that I did not.
- Ask the three neighbours in front of a witness whether the change stays now that the fortnight has ended, and write each answer word for word.
- Complete the relations ledger with ten coded entries carrying role, date and what they said: E1 the expert, A1 to A3 the residents the problem affects, P1 to P3 the peers who checked your grouping, R1 to R3 the people who replied. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.
- Hand every page carrying a code back to your teacher at the end, so the school holds the copy and you hold none.

WRITE THIS DOWN

The signed and dated defence page, the one-page explainer, the three neighbours' answers word for word, and the relations ledger holding ten coded relationships with dates and replies.

DONE WHEN

Two witnesses have signed and dated the defence, ten relationships are logged by code with dates and replies, the street has been given the after-number whether it improved or not, and the coded sheets are with the school.

Watch out. Publishing only because it worked. A street that lost the same hours after fourteen days is a finding - say so, and say what you think stopped it working.

Your nine deliverables in this project

1 - RESEARCH - WEEK 2

Question card

One hand-lettered card carrying the single open question in its final wording, the street drawn as a coded sketch to a stated scale, the number of households on it against the number you intend to ask, and the date the school's letter to the neighbourhood went out.

2 - RESEARCH - WEEK 3

Evidence log

Every answer in the resident's own words against a household code in the ruled notebook, the gap in minutes between the doorway and the completed sentence, the refusal count, all three timings for each measurement, and every figure marked M for measured or R for reported.

3 - OUTREACH - WEEK 3

Expert interview pack

Five written questions for a community organiser, social worker or local authority officer, your grouped answers and modelled street total attached as one hand-copied page, the date and how you asked, and the reply word for word.

4 - DESIGN - WEEK 4

The build

The change itself - the rota sheet, the lettered sign, the moved bin, the repaired step - drawn on squared paper to a stated scale with nobody in the drawing, with the permission recorded by role and the start and re-measurement dates on the same page.

5 - BRANDING - WEEK 4

Identity card

A name and a one-line promise for the change, made in step 7 and lettered by hand onto the rota or the sign itself so neighbours can refer to it by name, plus the single sentence you want repeated at the next doorway.

6 - PROCESS - WEEK 5

Failure log

The doors that never opened, the answers you had to complete after leaving and the gap in minutes for each, the days the rota was ignored, the resident who became angry with what you did and who you told, all dated.

7 - DESIGN - WEEK 6

One-page explainer

One hand-lettered page a neighbour reads in ninety seconds: the question asked, what people said, the cost per household with its M or R, the modelled street total a month with the households it rests on, the change, and the after number.

8 - OUTREACH - WEEK 6

Relations ledger

Ten coded entries with role, date and what they said: E1 the expert, A1 to A3 the residents the problem affects, P1 to P3 the peers who checked your grouping, R1 to R3 the people who replied. The name-to-code key is written once on the teacher's sheet, held by the school, and destroyed after moderation.

9 - DEFENCE - WEEK 6

The defence

Ten to twelve minutes of unseen questions answered live in front of two witnesses who sign and date the page: the question, the counts, the cost per household, the modelled street total and what it rests on, the change, the after number, and the limits you accept without argument. There is no recording on this route; the signed page is the evidence.

The four tiers, in this project

Starter

You ask fifteen to twenty households one fixed open question, take key phrases at the door and complete each sentence within five minutes of leaving, mark every figure M or R, cost the top problem in one unit, and put your five questions to one professional through your school.

Practitioner

Everything in Starter, and you choose the street and defend the choice, have a second person group your answers blind and report every answer where you disagreed, and draw one chart that one professional reads correctly unaided without you speaking.

Researcher

Everything in Practitioner, and you fix the wording and the timing rule in writing before the first doorway, justify your sample against the number of households on the street, label the street total modelled with the households it rests

Contributor

Everything in Researcher, and you set your street's figure against one printed published estimate for the same problem, cited beside your own number and never instead of it, get one professional who disagrees with your costing to

on, and work out what the refusals would do to that total at their highest and lowest plausible values.

say why in writing, and offer the coded readings to any school that asks, published through your school where your school agrees they may be published.

The one professional you must hear from

Who. A community organiser, a social worker, or the officer at the local authority responsible for services on streets like yours. They spend their working life being told what a neighbourhood needs, so they know which complaints arrive unprompted and which only appear once you name them.

Where your school finds one. Institutions and roles, never individuals. Your teacher telephones or posts a letter to the community services or ward office during its public hours, or to a residents' welfare association through the school's own contact list. You give your teacher the five questions on paper and the school makes the approach.

YOUR TEACHER SENDS THIS, FROM A SCHOOL ADDRESS

Dear [name or role], I teach at [school]. One of my learners, [name], is running a six-week measurement project and has asked [number] households on one street a single open question about what wastes their time or money, then timed the problem raised most often. Could you spare fifteen minutes - on a call with me present, or by written reply, whichever suits you? Their five questions are below so you can answer in writing if that is easier.

You ask them

1. When you want to know what a street actually needs, what do you ask, and what have you learnt never to ask?
2. Which problems do residents raise unprompted, and which ones do they only mention when you name them first?
3. How do you put a cost on something like waiting or walking, and what figure would a council accept from a learner?
4. What small changes have you seen a handful of neighbours make stick, and what did the ones that failed have in common?
5. If I brought you this street total tomorrow, what is the first thing you would check before believing it?

You do not send this yourself, you do not chase a reply, and you never call at anybody's workplace. If no reply comes, submit the questions as sent, the dated attempts and one named published source in their place. That route scores.

You will be asked, without warning

1. You scaled five timed households to the whole street. Which part of that number did you measure and which part did you model, and name the two households that would break it.
2. How many doors said no, and what happens to your total if the people who said no lose more time than the people who answered?
3. You took key phrases at the door and finished the sentence afterwards. Show me one answer where the gap was longest, and tell me what you might have lost in it.
4. You wrote the answers in their words and then grouped them yourself. Show me one grouping decision you got wrong and what it did to the count.
5. Would this change have happened anyway without your organising, and how do you know?
6. Two weeks after your fortnight ended, is the rota still running, and what is your number worth if it is not?

If you get stuck

- If the household or the site says no - then do not call at that door again, log it as a refusal with the date and time of day, and ask your school to allocate two replacement doors on the same street so your sample holds at fifteen.
- If nobody on the whole street will open a door - then ask your teacher to move you to the school-site variant at the next session rather than trying another street on your own, and carry the same question card across unchanged.
- If the expert cannot be reached - then submit the five questions exactly as the school sent them, the dated record of every attempt, and one named published substitute source instead: a printed service standard or a printed local report your teacher supplies. This path scores.
- If your before and after look the same - then report it as the finding, check first whether the change was actually kept on all fourteen days, and write what you find in the failure log.
- If you cannot time the thing at all - then ask five households how long each time and how often, mark every figure R for reported, and print that on the chart itself.
- If you run out of time - then shorten the after-period to seven days rather than dropping the baseline, keep the unit as minutes per household per week, and print the shortened period on the chart itself.

Finished early?

Ask the identical question on a second street your school allocates, with no change made there, and set the two after-totals side by side.

Your ten relationships - codes only, never names

Code	Role	Date	What they said, in their words
E1			
A1			
A2			
A3			
P1			
P2			
P3			
R1			
R2			
R3			

Your teacher holds the one sheet matching these codes to names. It is destroyed when marking is finished. This page may be copied freely.

When you have finished

The assessment is free and it comes back within two weeks. Your school submits it, not you.

1	Fill in the **Project Assessment and Submission Template**. Your teacher has it; it is also free from earlyagedevelopment.com/EAD_Labs.html.
2	Check the two gates yourself before you hand it over: ten coded relationships with roles and dates, and a baseline that carries a number, a unit, its dates, its instrument and its written method.
3	Give the pack to your teacher with the code key sheet. The key sheet stays at school and is destroyed after moderation - it never goes to EAD.
4	Your school submits the cohort to **support@earlyagedevelopment.com**, or by post to the address on the back cover if your school has no connection.

What comes back

Written feedback on every section, a mark out of twenty against the bands printed at the front of this booklet, and the attempt number recorded on the result. Resubmission is free and unlimited, and every certificate states which attempt it was, so a mark always means the same thing. A named human moderates every certified result; the machine never certifies alone.

What it costs, said plainly

The twelve projects, the facilitator pack, the marking bands, the assessment and the mark are free, and stay free. **Certification carries a fee per learner.** The gate is the assessment, never the fee: if a learner passes and cannot pay, a school, a sponsor or the community fund covers them. Ask your school for the current figure before you plan a budget.

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Consent form - for the parent or guardian

This page may be copied freely. The school keeps the signed original; nothing on it is sent to EAD.

Your child has chosen a six-week measurement project. They will measure something ordinary - a meal, a meter, a habit, a street - write down the number, change one thing, and measure it again.

What this involves: measurement inside your home with your agreement; in some projects, short conversations with people outside the home, always in daylight and always with a named adult within sight; and one request to a professional, which the school sends on your child's behalf. Your child will not contact any adult outside the school on their own account.

What is recorded: numbers, dates, instruments and sources. People are recorded as codes - E1, A1, P1 - with a role and a date. The list matching codes to names is written once, kept by the school, and destroyed when marking is finished.

What is never recorded: your address, your telephone number, your income, anybody's debt, account or card details, anybody's medical treatment or diagnosis, a photograph of any person's face, or a complaint about a named person.

Where the work goes: to your child's teacher, and then to EAD for marking through the school. It is not published on a public link. If your child's work is ever shown publicly, the school asks you first, in writing.

You may withdraw your agreement at any time, without giving a reason. Your child's mark is not affected. Any readings already taken stop being used from that day.

Learner's name	
Project number and title	
Route (High-Tech / No-Tech)	
Named adult who will accompany measurement outside the home	
Household member who agrees to the measurement at home	
Parent or guardian name	
Signature and date	

School: _____ Teacher: _____
Date: _____

Risk assessment - the named hazards, project by project

This is the hazard table, not your school's risk assessment. Copy the rows for the projects your learners have chosen into your own school format, add anything local, and have it signed before week one. Every project also carries a school version that removes the household hazards entirely.

Applies to every project, without exception

- No fieldwork alone. A named adult goes and stays within sight.
- Daylight only, never inside anybody's home, never at a workplace the school has not agreed.
- No learner contacts an adult outside the school on their own account. The teacher makes every approach.
- Nothing is opened, unscrewed, climbed to or reached into. Meters and machines are read from a normal standing distance.
- Anybody may withdraw at any moment without a reason, and their data stops being used that day.

#	Project	Named hazards	Controls
1	**The Sixty-Litre Dinner**	Kitchen scales, raw meat and fish, food waste. No cooking is done for the project.	Hand-washing after every weighing. Raw items weighed in a bowl, never on the bare scale. No stove, no hot oil, no sharp knife for this project.
2	**The Sugar You Did Not Order**	A shop visit. Household consumption data. Body image.	A named adult goes to the shop. Staff are asked before any label is copied. Nobody is weighed or measured; no calories are counted; the study is of a product, never of a person.
3	**The Prayer-Time Error**	Outdoor observation at dusk. The sun. A correction sheet given to adults.	Ground-level fixed spot only, never a roof or parapet. A named adult present for every observation. Never look at the sun by any means. The teacher approves the sheet before it leaves the learner.
4	**The Thing That Keeps Breaking**	Deliberate failure of an object. Visits to workshops and hardware shops.	Nothing structural and nothing that holds a person off the ground. Bare floor beneath, hands and feet clear, face turned away. A named adult accompanies every shop or workshop visit.
5	**The Four-Hundred-Unit Leak**	Mains electricity. Meter reading, sometimes after dark. Household financial data.	A named adult performs every switching operation; the learner reads and records only. No learner touches a consumer unit, a main switch or a fixed appliance. Adult present at the meter after dark. No account numbers or amounts owed leave the household.
6	**The Ten Minutes That Teach**	Testing other people. Scores about named individuals.	Consent at the start, again at the retest, and withdrawal at any time. Codes replace names before anything is written. No judgement of anybody's ability. No score reaches a mark book.
7	**Where The Money Actually Went**	A household's spending, and possible hardship.	Category shares only. No income, no debt, no account or card details, no late fee tied to a person. The learner may run the whole project on percentages. Stopping is a recorded finding.
8	**The Rule Nobody Follows**	Observing people. Complaints about named individuals.	Aggregate counts only, never an identifiable person. A responsible adult for the setting consents first. No named complaints, ever. Stop if anyone objects, and report it the same day.
9	**The Lie This Street Believes**	Conversations with neighbours. Health claims. Possible hostility.	A named adult within sight of every doorway, daylight only, never entering a home. Nothing about a named person's treatment, medication or diagnosis is recorded. The teacher approves the correction before it is shared.

10	**The Trigger**	A personal behavioural log. Topics close to wellbeing.	The excluded topics list is absolute. The log stays with the learner; only totals are submitted. If the logging feels bad, stop that day - it is a recorded finding. Tell a trusted adult or the welfare lead.
11	**The Cheapest Clean**	Household cleaning chemicals.	One product open at a time, sequentially, then rinsed away and put back before the next. Gloves and eye protection. Open window or outdoors. Named adult in the room throughout. Nothing heated. Fumes or stinging: stop, leave, tell the adult, rinse with cool running water.
12	**The Question Nobody Asked**	Door-to-door work on a residential street.	A named adult within sight of every doorway, daylight only, never entering a home. No names, no house numbers, no photographs of people. Never call twice at a door that said no. The school allocates streets and writes to the neighbourhood first.

The contact protocol

One professional per project is a gate. This is how a learner reaches one without ever being alone with an adult the school has not checked.

Who makes contact	The teacher, from a school address or a school telephone. Never the learner, and never from a personal account. The learner writes the five questions; the teacher sends them.
What the message says	That it comes from the school, the teacher's name, that the sender is a learner on a school project, what was measured in one line, and an offer of a written reply or a short call with the teacher present. It never contains a number the learner has not measured, and never describes what is inside the learner's home.
Where a meeting happens	On a call with the teacher present, or in a public place with the named adult present, or in writing. Never alone, never at anybody's home, and never at a workplace the school has not agreed.
The brokered list	Build it once. Ask the school's own parent body and alumni first - most schools already contain an engineer, a pharmacist, an accountant, an electrician and a surveyor. One good list serves every cohort after.
When nobody replies	The learner does not chase, and does not walk in. They submit the five questions as sent, the dated attempts, and one named published substitute source. That route scores. Gate one is met by the logged attempt and the substitute, not by a reply the learner cannot compel.
The log	The teacher keeps one sheet: who was approached, on what date, by what means, and what came back. It is the evidence for gate one and it is destroyed with the code key after moderation.

What is collected, and what happens to it

Give this page to families with the consent form.

What is collected	Measurements, dates, instruments, sources, and the learner's own written account. Coded roles for the people involved. Nothing else.
What is never collected	Addresses, telephone numbers, email addresses, house numbers, income, debts, account or card details, medical treatment or diagnosis, photographs of any person's face, or complaints naming a person.
Who holds the name key	The school. One sheet, written once, kept apart from the work, destroyed when moderation is complete.
Who sees the work	The learner's teacher, the school's moderator, and EAD's assessment team. Nobody else, unless the school asks the family in writing and the family agrees.
Where it is held	With the school for the school's own retention period; with EAD for as long as the mark stands and no longer than twelve months after certification.
Publication	Nothing is published on an open link. A learner who wants their work public asks through the school, and the school asks the family in writing first.
Deletion	A family may ask the school to delete their child's submission at any time. The school passes the request to EAD at support@earlyagedevelopment.com and the work is removed.

Code key - held by the school, destroyed after moderation

One sheet per learner. This is the only place a name is ever written. It does not travel with the submission and it is destroyed when marking is finished, in front of a witness who signs below.

Learner: _____ Project: _____ Teacher: _____

Code	Role	Name	Date of contact
E1	Professional		
A1	Affected		
A2	Affected		
A3	Affected		
P1	Peer review		
P2	Peer review		
P3	Peer review		
R1	Replied		
R2	Replied		
R3	Replied		

Destroyed on _____ Witnessed by _____ Signature _____

Why this sheet exists

Gate one needs ten real relationships, and a marker needs to know they were real. A code in the ledger proves the relationship; this sheet proves the code. Keeping them apart is what makes it safe to ask a learner to talk to ten people.

Their students apply with a CV. Ours apply with proof.

Every project in this booklet ends the same way: a number measured before a change, the same number measured after it, and an honest answer about what caused the difference. That is what a learner walks out holding.

Act 1 - Find

Steps 1 to 5. Measure something ordinary until you can say what it costs.

The gates

A dated baseline with its method, and ten coded relationships. Nothing is marked without both.

Act 2 - Fix

Steps 6 to 10. Change one thing, measure the same way, report what happened.

The defence

Ten to twelve minutes of unseen questions, before two witnesses who sign. Eight of the twenty marks.

WHAT YOU HAND IN - NINE THINGS

1. **Question card** - Research, week 2
2. **Expert interview pack** - Outreach, week 3
3. **Evidence log** - Research, week 4
4. **Failure log** - Process, week 4
5. **The build** - Design, week 5
6. **One-page explainer** - Design, week 5
7. **Identity card** - Branding, week 5
8. **Relations ledger** - Outreach, week 6
9. **The defence** - Defence, week 6

HOW IT IS MARKED

6	6	8
the artefact	process and failures	the defence

- **The bands are printed inside**, with a worked example in every project.
- **Two gates, neither waivable.** Ten coded relationships, and a baseline taken before the change.
- **A machine marks, a named human certifies.** Every certificate states the attempt number.
- **Tiers, never ages.** Starter, Practitioner, Researcher, Contributor - declared, not assigned.
- **Every project has a school version** that needs nothing from a learner's home.

Put your school's name on this cover. Your logo on the front, ours beneath it. We print and deliver to your campus, and one of your teachers is trained free. Write to support@earlyagedevelopment.com with your school name, the route and the number of copies.

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