THE STRIVING

MUSLIM ACADEMY

Islamic and Academic Education

YEARS 7 TO 9 · SCIENCE

Working scientifically

Turning a question into an enquiry, naming the variables, repeating properly, and what a risk assessment is for.

WHAT IS INSIDE

- What makes an enquiry answerable
- Variables, and the one you change
- Repeatability, reproducibility and anomalies
- Risk, and what a risk assessment is actually for
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1 sets · a hint on every question

Written for a parent teaching at home. No training assumed, and nothing else to buy.

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What makes an enquiry answerable

Read this, then answer the questions on it.



WHAT MAKES AN ENQUIRY ANSWERABLE

A question is scientific when there is an observation that could settle it. Not when it sounds scientific.

So turn the question into a comparison with one thing changed. Which fertiliser is best is unanswerable; whether plants given 20 ml of solution A grow taller in four weeks than identical plants given 20 ml of solution B is answerable, because you can say in advance what result would prove you wrong.

That last part is the test. If no possible result would change your mind, you are not doing an enquiry, and the statutory wording of objectivity means being willing to be wrong before the data arrives rather than after.

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Risk, and what a risk assessment is actually for

Read this, then answer the questions on it.



RISK, AND WHAT A RISK ASSESSMENT IS ACTUALLY FOR

Evaluating risk is a statutory requirement and it is not paperwork. It is two questions asked before you begin: what could go wrong here, and what would make it less likely or less serious.

Name the hazard precisely. Not chemicals but this acid at this concentration. Not heat but a beaker of boiling water at the edge of a bench.

Then control it: a smaller quantity, a lower concentration, a screen, goggles, a different method entirely. The best control is usually not equipment but choosing a method that does not create the hazard.

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How each one is answered

Mark it together. Where a question asks for a list, the order does not matter.



TURNING A QUESTION INTO AN ENQUIRY

1. Rewrite this so it could be tested: do plants grow better in the light?

1. Decide the one thing to change: light or dark.
2. Decide what to measure: height in centimetres, say.
3. Fix everything else and a time: identical seedlings, same water, same pot, two weeks.
4. For example: do bean seedlings grown on a windowsill reach a greater height in two weeks than identical seedlings grown in a dark cupboard, with the same water and soil?

Answer: **a question naming the thing changed, the thing measured, the things kept the same, and the time**

2. In that enquiry, name the independent variable, the dependent variable and three control variables.

1. Independent: whether the seedling gets light.
2. Dependent: the height after two weeks.
3. Control: volume of water, type of soil, size of pot, temperature, starting height, which seeds.

Answer: **independent: light; dependent: height; control: any three of water, soil, pot, temperature, starting height**

3. A pupil changes the light and the amount of water at the same time, and the lit plants grow taller. Explain why the result proves nothing.

1. Two things differ between the groups.
2. The height difference could be caused by the light, by the water, or by both together.
3. Nothing in the data can separate them, so no conclusion about light is available at all.

Answer: **because two things changed, so the difference has at least two possible causes and the data cannot choose between them**

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SAMPLE PAGES

You have read a few pages. The pack is longer.

What you are holding is a short sample, taken from different parts of the pack so that you can see how a week is planned and what a child is actually asked to do, before you decide.

The complete pack, and the rest of the academic materials, are on our website: schemes of work for a parent teaching at home, and practice packs for the skills children get stuck on.

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Members of the homeschool community do not buy these. If you have joined the community, the pack for the term you are working on is given to you at no cost.

Our Islamic Education classes are free. These packs are part of what pays the teachers who teach them.