Revising some basic skills

In August, we'll be looking at skills in science. You've done a fair bit of this already this year, so it would be a good idea to review that work.

Read this document carefully. Take your time. Think about the examples. There'll be a Quiz to do later.

Variables

Variables are things that can **change**. Your weight is variable. The temperature during the day is variable.

In science, we often try to find links between things that vary. Does the height of the diving board affect the size of the splash?

The height of a diving board can vary. So can the size of the splash. Are they linked? You could experiment to find out.

Independent and dependent variables

When we do an experiment, we **change** one thing -and we measure the effect that has on another thing.

The thing we change is called the independent variable.

The things that it affects is called the dependent variable.

We would change the height of the diving board (independent **variable**)

We'd measure the effect on the size of the splash (**dependent variable**).

"I'm going to change the force I use to kick a ball and see how it affects how far it travels."

Force to kick ball – independent variable

Distance it travels – dependent variable

"Does eating more sugar lead to more fillings?"

The amount of sugar eaten – independent variable

Number of fillings – dependent variable

Fair tests

In experiments, it's important to only change one thing. Otherwise, you don't know what's caused the effect you see.

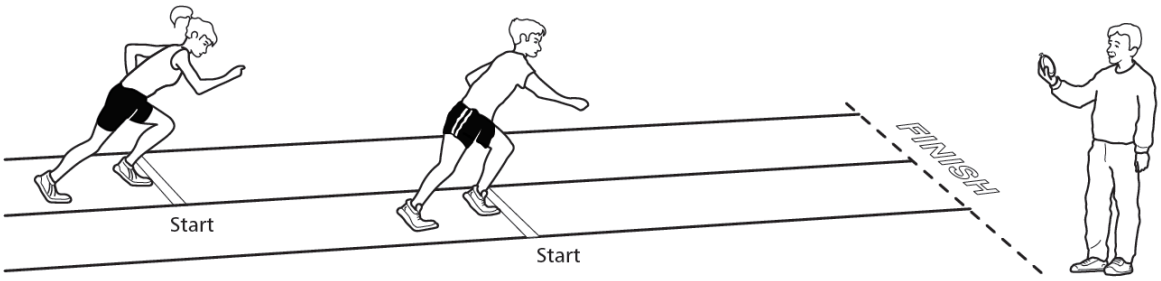
In the diving board example – we should use the same person for all tests. It wouldn't be fair if we used a small child for some dives and a large adult for other dives. We wouldn't know if it was the height of the dive or the size of the person that affected how big the splash was.

Here are some examples

During a school sports afternoon it was decided to see if boys ran faster than girls. John and Jane were timed during this race; they both started to run at the same time.

Was this a fair race?

If not, why not?



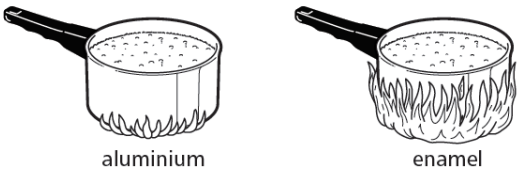
This isn't a fair test. John and Jane aren't running the same distance.

(Even if they did run the same distance, can you think why this wouldn't be a very good test for finding out whether boys run faster than girls?)

When Jack wanted to see if aluminium pans cooked food faster than enamel pans he did this.

Was this a fair test?

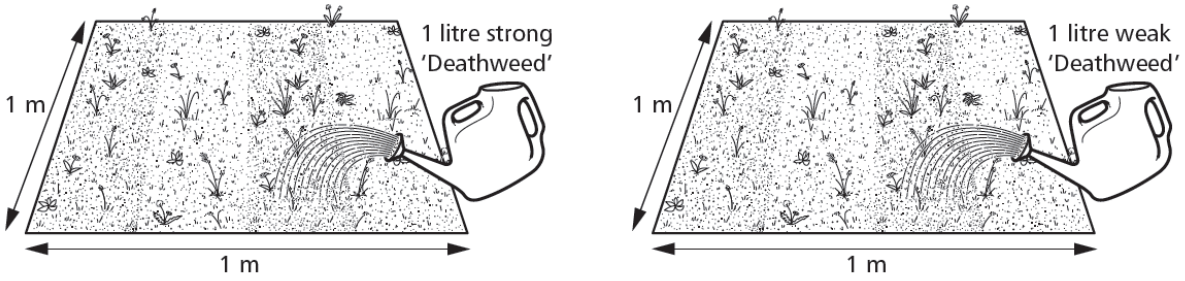
If not, why not?



This isn't a fair test. Although the pans are the same size and they have the same amount of liquid in them, the heating flame is not the same size.

The **only** thing that should change is what the pan is made from.

Miss O'Brien watered two patches of lawn with a weedkiller 'Deathweed', to compare its weedkilling powers at two different strengths.



Has she made a fair test?

If not, why not?

This is a fair test. Both patches of lawn are the same area. Both have the same number of weeds. The same volume (1 litre) of Deathweed is used.

The only thing that changes is the strength of the weedkiller – and that's what Miss O'Brien wants to test.

Here's one for you to think about:

Mrs Scott wanted to see if Shino was a better polish than Gleamer so she cleaned everyone's shoes in class like this.

Was this a fair test?

If not, why not?

Averages

If we just do one test or make just one measurement, it's hard to be sure that we're right.

If we repeat measurements and take averages, then our results are more **reliable**.

To calculate an average – add up all the values, find the total, then divide by the number of values.

Miss O' Brien wanted to be sure about her weedkiller experiment. So she took three sets of results. Here are her results and her averages.

strength of weedkiller	*number of weeds killed*			
	Test 1	*Test 2*	*Test 3*	*average*
strong	32	38	38	36
weak	33	21	24	26

strong: 32 + 38 + 38 = 108 108 ÷ 3 = 36

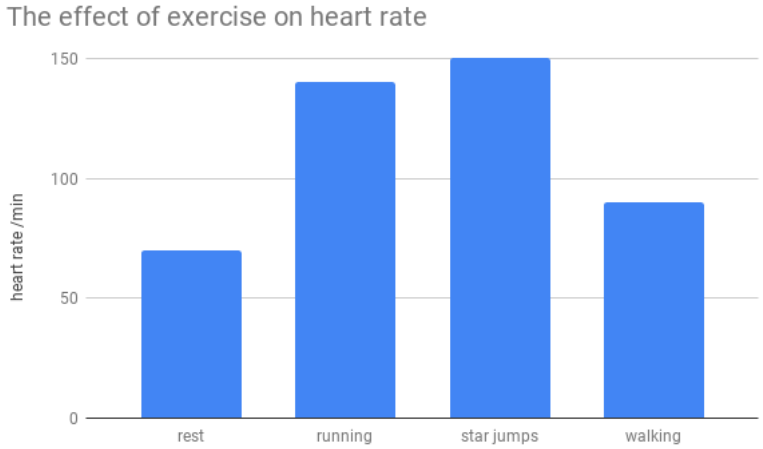
weak: 33 + 21 + 24 = 78 78 ÷ 3 = 26

If Miss O' Brien had only done the first test – she might have decided that weak weedkiller did a better job than strong weedkiller.

Repeating results means you can be more sure about what you have found out.

Bar charts

Bar charts are one way we can display data from experiments. It's important to be able to draw bar charts and read information from them.



This is a good bar chart – but it's not perfect.

Title ✔

Vertical axis labelled ✔

Vertical axis has a scale ✔ - but it's difficult to read off "in-between" values - ✘

Bars the same width ✔

Category label ✘ (It should say "Type of exercise" underneath the four bars.

Do you think this bar chart is better? Why? Why not?