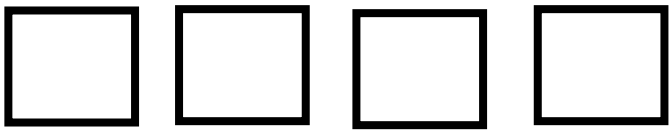
VARIABLES

Variables are what we change or keep the same during an experiment.
They are given two names

- input / independent variable
- output/ dependent variable

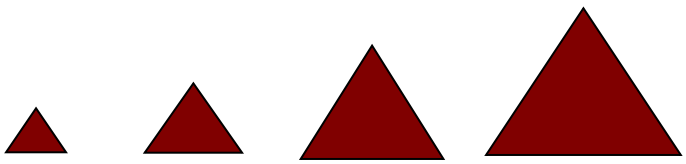
The input variable is WHAT WE CHANGE
The output variable is WHAT WE MEASURE BECAUSE OF OUR CHANGE

Learning About Variables
Below there are pictures of four objects. There are certain things about these objects which we can change. We call these variables.



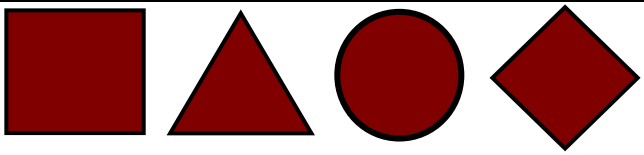
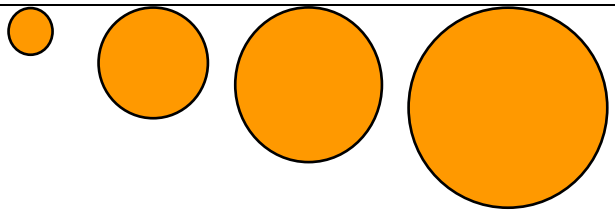
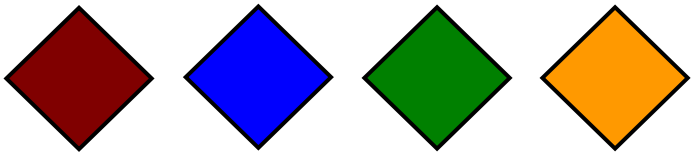
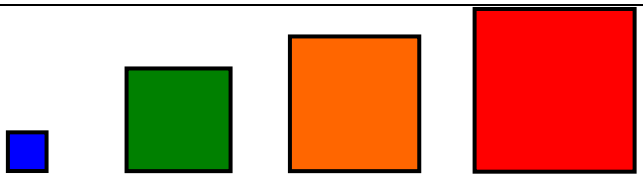
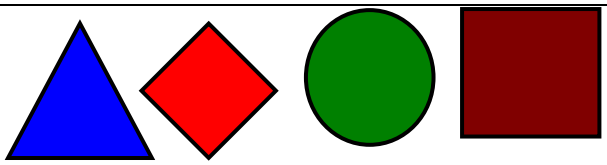
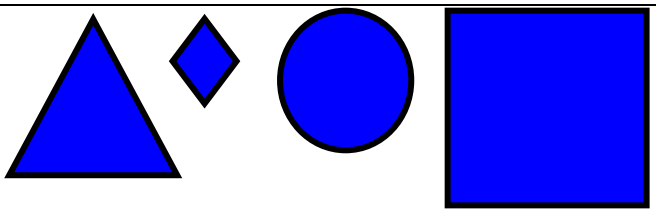
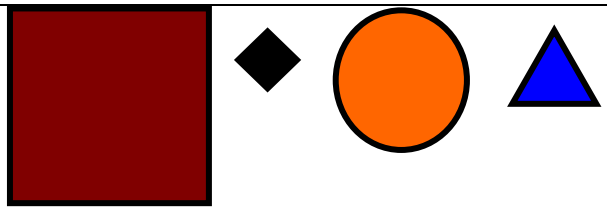
All these objects are the same, size, shape, and colour. These three things things (size, shape, and colour) are the variables. In our picture the variables are the same. We say they are constant.

Look at these objects



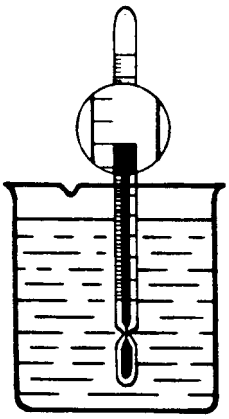
These objects are the same shape and colour but different sizes. We say that the variable which changes is size and the variables that stay the same are shape and colour.

Look at the four objects in each box and write down which variables stay the same and which change.

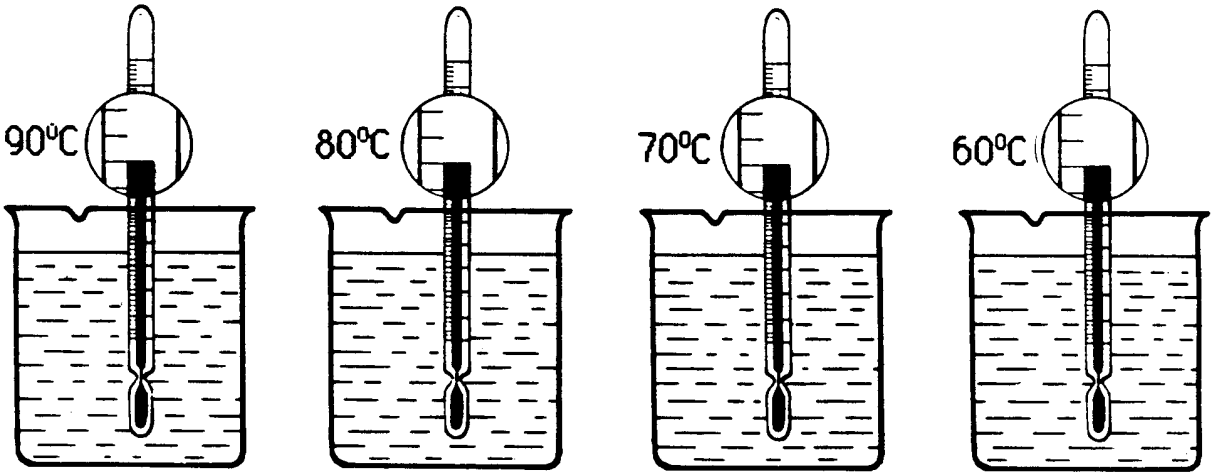
		Variables that change	Variables kept constant
A			
B			
C			
D			
E			
F			
G			

HEAT LOSS

1. We are now going to consider an experiment on heat loss from a beaker of water. Look at this picture of a beaker of hot water. Try to write down things that could be changed in the experiment. (List the variables!)

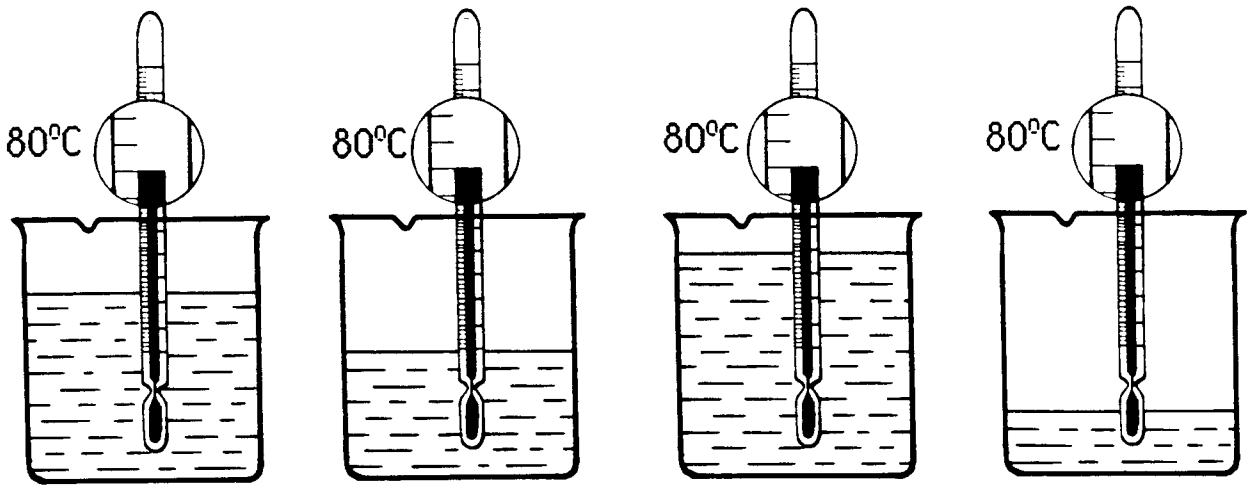


2. Look at the pictures of the four beakers of water.



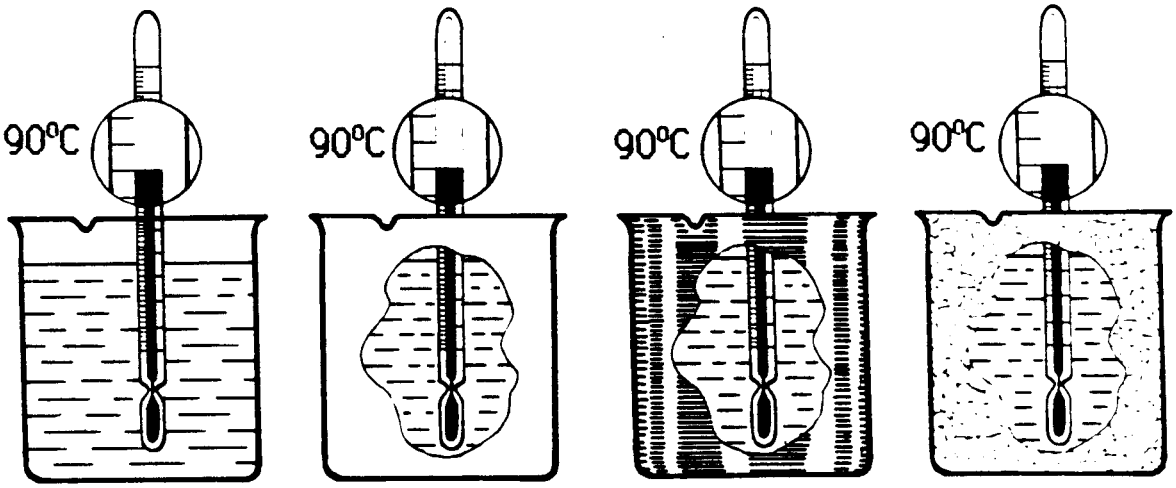
Write down which variables have been changed and which variables have stayed the same.

3. Look at the pictures of the four beakers of water.



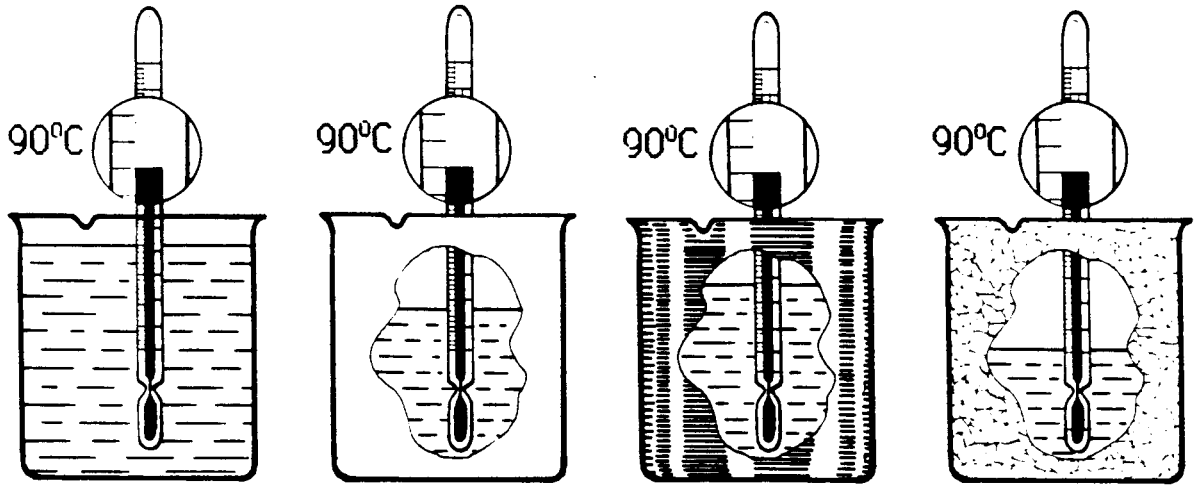
Write down which variables have been changed and which variables have stayed the same.

4. Look at the pictures of the four beakers of water.



Write down which variables have been changed and which variables have stayed the same.

5. A pupil sets up the following experiment to find out how well different materials keep in heat.



Is this a fair experiment?

Explain your answer.

_____.

6. If you were asked to do the same experiment as in 5., which experiment from 2, 3 and 4 would you use?

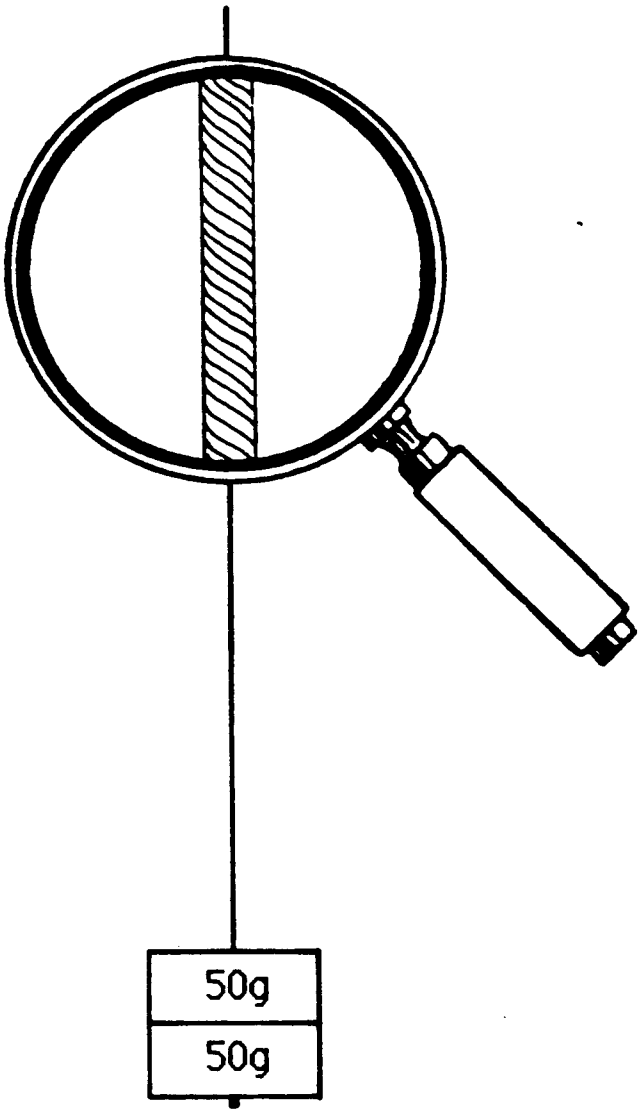
Why?

Now check your answers to 5 and 6. If all your answers are correct go on to the next exercise. If not, tell your teacher.

STRENGTH OF THREAD

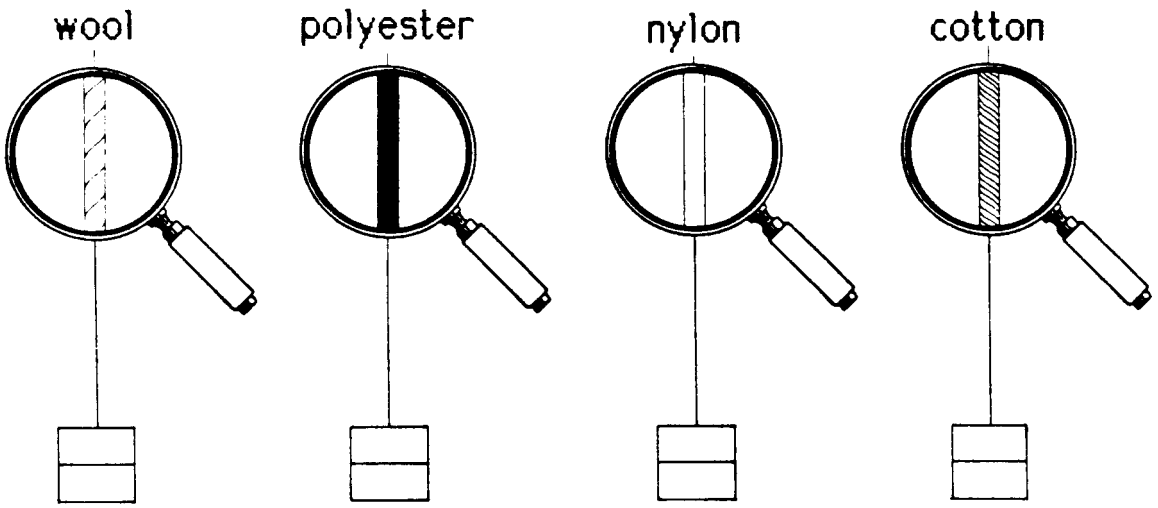
1. The picture below shows an experiment which is designed to test the strength of thread. weights are added to the thread until it breaks. The strongest thread will be the one which will hold the largest weight.

   Look at the picture then try to write down which things could be changed in the experiment (that it to say, we want to know what the possible variables are in the experiment).



Now check your answer to 1. If you are correct carry on with the next exercise. If not, tell your teacher.

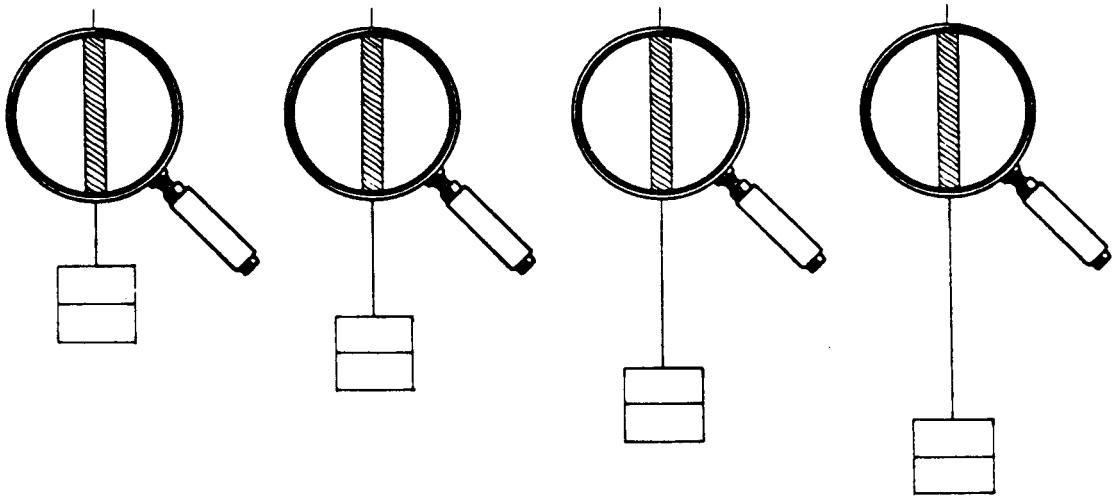
2. Look at these four pictures of experiments to test the strength of threads.



Write down which variable changes and which stay the same.

changes_____stays the same_____.

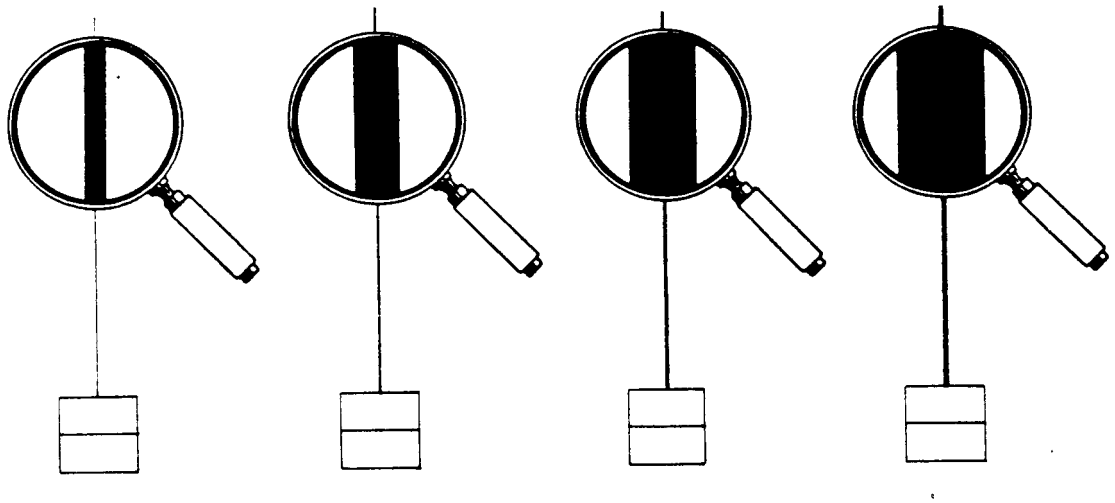
3. Look at these four pictures of experiments to test the strength of threads.



Write down which variable changes and which stay the same.

changes_____stays the same_____.

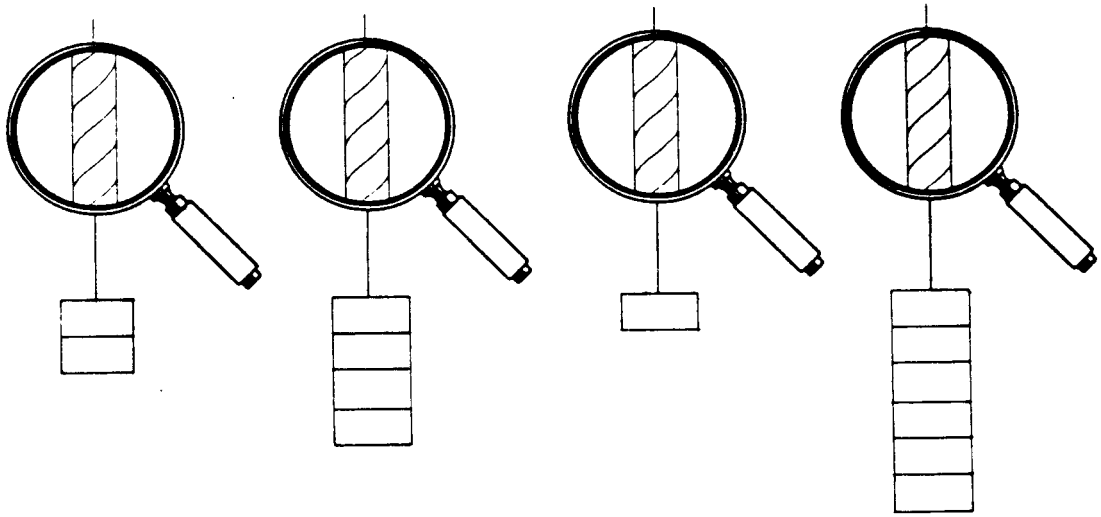
Look at these four pictures of experiments to test the strength of threads.



Write down which variable changes and which stay the same.

changes_____stays the same_____.

4. Look at these four pictures of experiments to test the strength of threads.

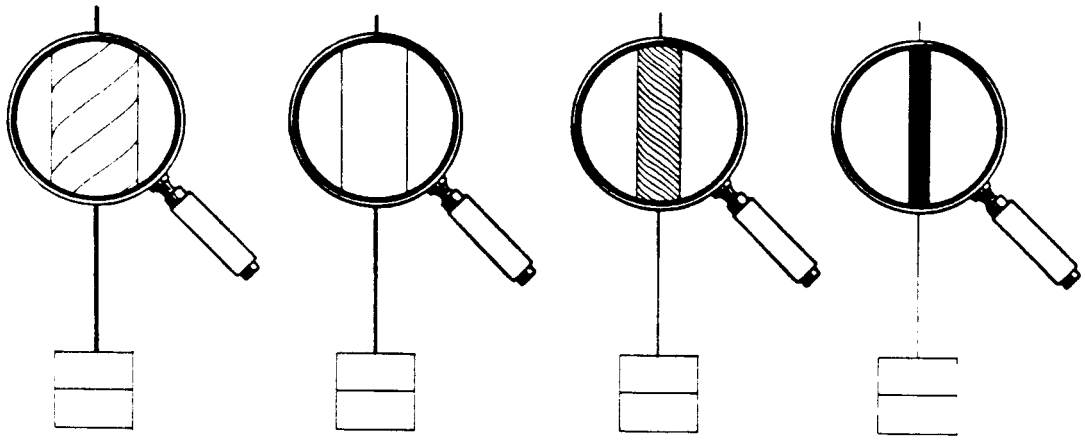


Write down which variable changes and which stay the same.

changes_____stays the same_____.

Now check your answers to 2, 3, 4 and 5. If all your answers are correct go on to the next exercise. If not, tell your teacher.

5. A pupil set up the following experiment to find out which type of material was strongest.



Is this a fair experiment?

Explain your answer.

_____.

6. If you were asked to carry out the same experiment as in 6, which experiment out of 2, 3, 4 or 5 would you use?

Why?

Now check your answers to 6 and 7.

Show all your work from this "Learning about Variables" pack to your teacher.

ANSWERS

Exercise 1: "Learning about variables".

	CHANGE	STAY THE SAME
A	shape	size, colour
B	size	shape, colour
C	colour	shape, size
D	size , colour	shape
E	shape, colour	size
F	shape, size	colour
G	shape, size, colour	-----

Exercise 2: "Heat loss".

1. Temperature, volume of water, material of beaker.

	CHANGE	STAY THE SAME
2	temperature	volume, material
3	volume	temperature, material
4	material	volume, temperature

5. No. The beakers are all made of different materials but the volume of water is different in each beaker too.

6. C. Only the variable which we are investigating changes (i.e. the material of the beaker).

Exercise 3: "Strength of thread".

1. Material of thread, length of thread, thickness of thread, weight added to the thread at the start of the experiment.

	CHANGE	STAY THE SAME
2	material	length, thickness, weight
3	length	material, thickness, weight
4	thickness	length, material, weight
5	weight	length, material, thickness

6. No. The threads are made of different materials but they are all different thicknesses too.

7. Only the variable which we are investigating changes (i.e. the material of the thread).

PLOTTING GRAPHS

First we need to collect our data.
There are different types of data that we can collect.

We can collect data with population samples
We can collect data against time
We can collect data about what we like.

The type of data we collect will usually tell us the best type of graph to draw.
If the information is about what people like/ dislike then we are likely to draw a bar chart.
If the information has two variables which are numbers then we usually plot a line graph.