1.4 Scientists keep a logbook and write formal reports

A science logbook is used to record the details of the work done in a science laboratory. It contains information that the scientist may otherwise forget and provides evidence of the planning, changes and results of an experiment.

Creating a logbook

There are some basic rules for creating and using a logbook.

1 Use a bound notebook or an electronic device that is backed up regularly. Loose papers become lost, and electronic devices can fail. Ensure that the style of records you use is reliable.

2 Label your logbook with your name, phone number, email address, school and teacher's name. Logbooks can become lost. Labelling the logbook with your contact details (and those of your school and teacher) ensures that it will find its way back to you.

3 The second page of the logbook should contain a table of contents. Each page should be numbered to help you find the relevant experiments.

UNIT/SUBJECT	EXPERIMENT TITLE	PAGE NUMBER

4 Always date every entry.

Check your learning 1.4

Remember and understand

1 What is the purpose of a laboratory logbook?

2 Why should an electronic logbook be backed up regularly?

3 A student made a mistake and ripped the page out of their logbook. Why would this be the wrong thing to do?

4 Why is it important to make sure the writing in your logbook is legible?

5 How is a logbook different to a formal science report?

6 Suggest one reason why it is important to include the date of the experiment in the logbook.

7 Why should you reflect on each experiment before starting the next experiment?

EXPERIMENT 1.4: MARSHMALLOW SLINGSHOTS
GO TO PAGE 159.

1 February 2016

Aim

To determine the relationship between the distance elastic is pulled back and the distance a marshmallow moves.

Method

Refer to page 159 of Oxford Science 8. Please note: 1 cm wide elastic was tied around the base of the chairs from Experiment 1.4.

Measurements

Distance marshmallow has moved

Distance elastic pulled back	Attempt 1	Attempt 2	Attempt 3	Average
1 cm	20 cm 3 mm	23.4 cm	19.9 cm	21.2 cm
2 cm				
3 cm				
4 cm				

20.3
23.4
+ 19.9
63.6
63.6 ÷ 3 = 21.2 cm

Observations

The elastic came undone after the third attempt so we had to do it up again.

We tried to make it the same tightness as before.

Conclusion

When the elastic was pulled back, more elastic gained more energy. This energy went into the marshmallow so that it could move further when released. We should have tested with the elastic pulled back ~~more~~ different distances.

Next time the same person should do the pulling back.

Aim and hypothesis of the experiment.

The method used or the page number of the method. Record any changes to the method.

Record any measurements you made to the maximum number of digits provided by the equipment. (You can round them off later. If you don't record them then you cannot get them back later.)

Always plot a graph using pencil for easy corrections to be made.

Show all calculations (even when adding simple numbers).

Include any ideas, explanations, diagrams, graphs, sketches or mistakes that happened. Write everything down even if it seems unimportant. You may not remember it weeks or even months later.

Do not rewrite any entries. Try to keep it as neat as you can but it is not a formal report. It is more important that you record your data and observations. If you make a mistake, put a single line through it. Do not white it out, as it may be useful again later.

Include a conclusion or reflection for each experiment to make sure you understood why you got the results you did.

You may need to write up a formal report for your experiment. If you have completed your logbook well, you will find all the details of the report easily available.

Glue or staple in any photocopies to prevent them falling out.

1.5 Tables and graphs are used to present scientific data

Graphs make the information (data) you gather in an experiment easier to analyse. Graphs show what happened. Patterns in the data can be seen and this enables predictions about what might happen if you continued the experiment.

Common features in graphs

There are four features all graphs have in common:

1. a descriptive title of what the graph shows
2. a grid that is used to plot the points or data
3. the independent variable on the horizontal axis
4. the dependent variable on the vertical axis.

Interpreting graphs

Line graphs are the most common graphs that are drawn in scientific reports. These graphs are used to show the relationship between the independent variable and the dependent variable. The shape of the graph gives a hint of how the two variables are related.

When the line slopes upwards, this

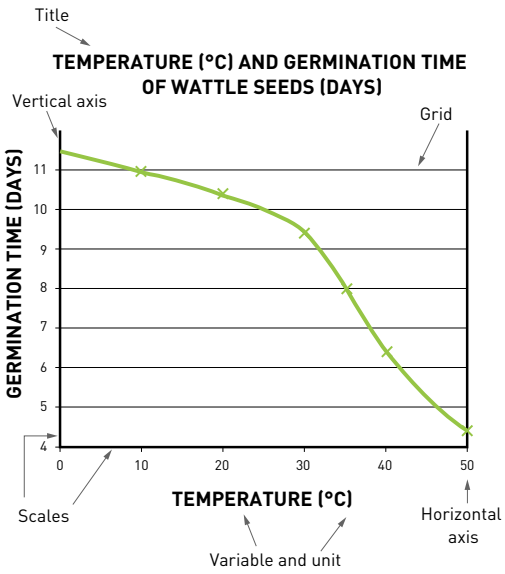
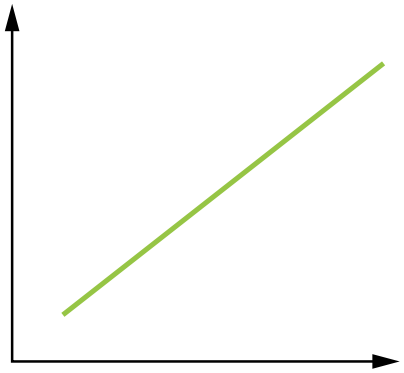


Figure 1.20 The independent variable (temperature) should be on the horizontal axis and the dependent variable (germination time) should be on the vertical axis.



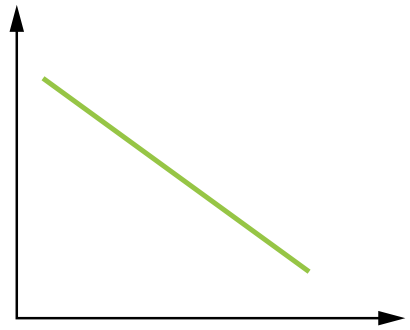
means the dependent variable increases as the independent variable increases. This is called a **directly proportional relationship**.

When the line is horizontal, it means

the dependent variable is not affected by the independent variable.

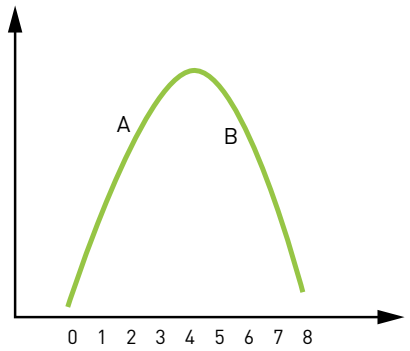
If the line is sloped down, then the dependent variable decreases as the independent variable increases. This is called an **inversely proportional relationship**.

Occasionally a graph is curved. These graphs



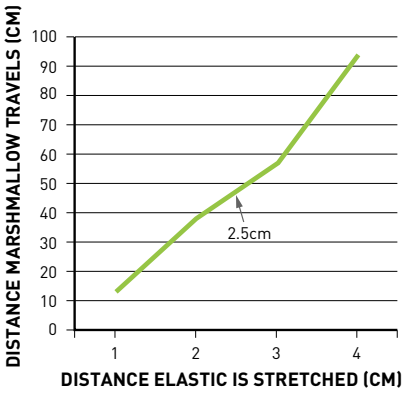
should be divided into sections. Section A (between 1 and 4) shows a directly proportional relationship. Section B (between 4 and 7) shows an inversely proportional relationship.

Sometimes you may have recorded

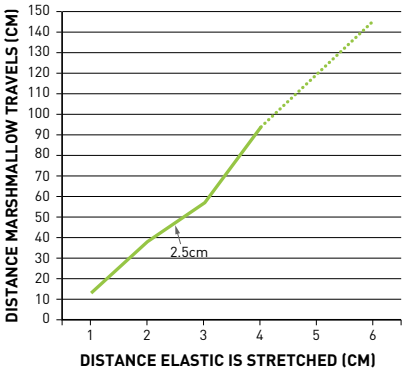


the results for a set of whole numbers. An example of this is pulling back the elastic and marshmallow in the previous experiment 1 cm, 2 cm, 3 cm and 4 cm. If you draw an accurate line graph of your data, then you may be able to use the graph to see what would happen if you pulled back the marshmallow 2.5 cm.

A graph can also be used to extrapolate



results. This means you can continue the shape of the graph to determine what would happen if you continued the experiment.



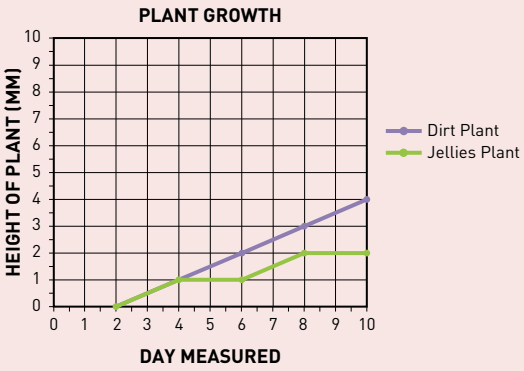
Check your learning 1.5

Remember and understand

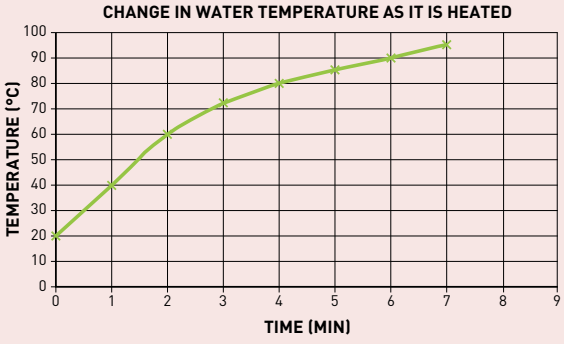
1 What features should all graphs have in common?

2 What does 'extrapolate results' mean?

3 Describe the relationship between the independent variable and dependent variable in the following graph.



4 Extrapolate the following graph to determine what would happen if the water was heated for 8 minutes.



Apply and analyse

5 Explain why graphs are often used in scientific reports.