Pages 78–79 Asking questions and making predictions

1 Key here is a sensible measurable question. The following are examples but are not the only correct answers.

a Does the amount of oxygen affect the length of time for which a candle will burn?

b In what conditions are the most woodlice found?

c Does the size of an object affect the speed at which it falls if dropped?

d Is more force needed to move an object on different surfaces?

e Do different foodstuffs contain different amounts of energy?

2 Again sensible answers which need to follow on from the questions above. It is OK if they are wrong as shown in the falling objects one here as the judgement is on the sense of the prediction and reason – it is of course better it they are right!

a I think that a candle will burn for longer in a bigger volume of air *(1)*
Because air contains oxygen which is needed for combustion *(1)*

b I think that most woodlice will be found in the darkest coolest place possible *(1)*
Because in the wild woodlice are usually found under stones and in other damp dark places *(1)*

c I think that bigger objects will fall faster *(1)*
Because gravity will have more effect on a bigger object *(1)*

d I think that more force will be needed to move an object on a rough surface *(1)*
Because rough surfaces have more friction *(1)*

e I think that different foodstuffs have different amounts of energy *(1)*
Because I know that eating some foods makes you fat more than eating others *(1)*

(1) = 1 mark

Pages 80–81 Variables and fair tests

1 a–c Answers will follow on from what went before but suitable examples are given here.

– Does the amount of oxygen affect the length of time for which a candle will burn?
Independent variable – the volume of air/oxygen *(1)*
Dependent variable – the length of time for which the candle burns *(1)*
To make sure it is a fair test – same size of candle/length of wick/ same shape of container *(1)*

– In what conditions are the most woodlice found?
Independent variable – conditions *(1)*
Dependent variable – number of woodlice *(1)*
To make sure it is a fair test – woodlice must have time to make choice/ do not interfere with choice/ same size compartment for each set of conditions *(1)*

– Does the size of an object affect the speed at which it falls if dropped?
Independent variable – size of object *(1)*
Dependent variable – time taken to fall to the ground *(1)*
To make sure it is a fair test – drop objects from same height/keep shape of object the same *(1)*

– Is more force needed to move an object on different surfaces?
Independent variable – surface *(1)*
Dependent variable – force needed to make object move *(1)*
To make sure it is a fair test – same object used on all surfaces/ Newton meter held at same angle *(1)*

– Do different foodstuffs contain different amounts of energy?
Independent variable – type of food *(1)*
Dependent variable – energy released measure by increase in temperature of water when food is burned *(1)*
To make sure it is a fair test – same volume of water, same mass of food, same experimental procedure e g food held at same distance from test tube of water *(1)*

(Total 9 marks for parts a, b and c)

2 a Continuous

b Continuous

c Discontinuous

3 When you want to carry out a scientific investigation you first need to decide on a question which enables you to see clearly what you are trying to find out. This will help you to choose the correct variables. The thing you are going to change is called the **independent** variable. The thing you measure is called the **dependent** variable. To make your investigation a fair test you must **only alter one variable**. The things you keep the same are called **control** variables. You should **have as many of these as possible**. When you have taken your results, it is a good idea to display them in a chart or graph. This is because **it makes it easy to see trends in your results**. If your independent variable was discontinuous then you should draw a **bar chart**. If your independent variable was continuous you should draw a **line of best fit**. Your independent variable should go along the **x-axis** of your graph. *(1 mark for each correct choice)*

4 Any sensible suggestion with the idea of factors involving living things

Pages 82–83 Presenting results and drawing graphs

1 a The temperature of the water

b The mass of salt

c Volume of water *(1)* Size of salt grain *(1)* Whether or not solution is stirred *(1)*

d

Temperature of water (°C)	Mass of salt dissolved (g)

(1 mark for correct headings and 1 for units)

e A line of best fit

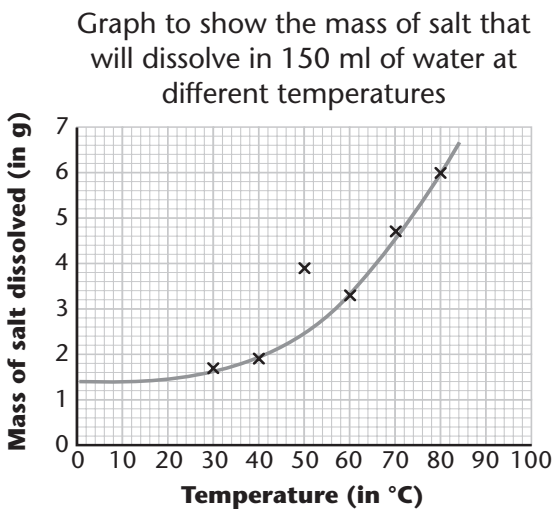
f Because the independent variable *(1)* is continuous *(1)*

g

Temperature of water (°C)	Mass of salt dissolved (g)
30	**1.7**
40	**1.9**
50	**3.9**
60	**3.3**
70	**4.7**
80	**6.0**

(2 marks if all in correct order, deduct 1 mark for any out of order to minimum of zero)

h



Suitable title *(1)* Axes labelled and suitable scales *(2)* Points plotted accurately *(3)*
Smooth curve drawn *(1)* ignoring anomalous result *(1)*
Bar chart – no marks!

Pages 84–85 Patterns and relationships

1 a Peter's

b They have taken more measurements *or* They have recorded their results more carefully/in more detail *or* They have put their results in a clear table
(Any 2 sensible comments, 1 mark each)

c No

d Most of Peter's results show the relationship of the higher the temperature *(1)* the faster the water evaporates *(1)*

e The last one *or* The one on the outside windowsill

f Outside there may have been wind as well *or* It may have been a very sunny place, etc.

g The volume of water at the start is always the same

h It is a good prediction because they have given a scientific reason

i No

j The same volume of water/ in different shaped containers/left in same place/ for same length of time and the volume of water measured at the end *(Any 3, 1 mark each)*

k As the diameter of the container increases, the amount of water that evaporates increases

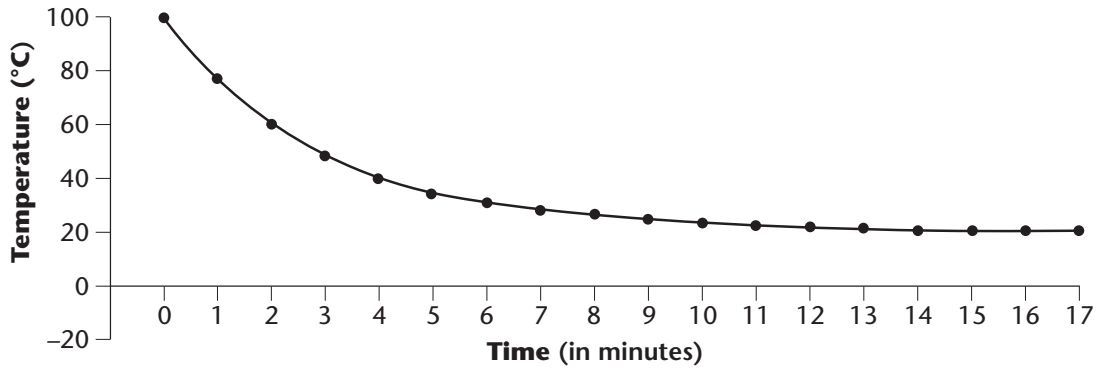
Pages 86–87 Interpreting results and reading graphs

1 a 3 minutes

b 8 minutes

c Around 11 or 12 minutes

d



Smooth curve falling quickly at first *(1)* then rate slowing *(1)* until levelling off at room temperature *(1)*

e Matching each of the points above, i.e. water will cool more quickly at first *(1)* then slow down *(1)* before levelling off at room temperature *(1)*

2 a Cheese
Crisps
Bread
Crispbread *(1 mark for each in correct order)*

b The food with the highest energy will cause the greatest rise in temperature of the water

c Because the independent variable is discontinuous

Pages 88–89 Evidence and conclusions

1 Anything sensible such as – an experiment done yourself *or* Results from an experiment someone else has done *or* Data collected by a reliable source and reported in a journal or book, etc.

2 a i No

ii The beans seem to grow fastest in mid temperature conditions *(1)* but just as slowly in very warm conditions as in the cold *(1)*

b i Yes

ii The beans kept at 20 °C grow much better *(1)* than at any other temperature *(1)*

c i No

ii There is no information given about the amount of water the beans received *(1)* To make it a fair test they should all have been given the same amount of water *(1)*

d i No

ii Because a line of best fit would give a smooth curve as near as possible to the majority of points NOT because a line of best fit is always a straight line!

3 Better equipment allows us to make better measurements and gain better evidence *(1)*

Pages 90–91 Evaluating experiments

1 Grow more than one bean shoot at each temperature *(1)* Ensure that apart from temperature the conditions for the bean shoots were exactly the same *(1) or* any sensible suggestion

2 a FAIR TEST

b NOT FAIR TEST

c NOT FAIR TEST

3 a Same type of drink/Same amount of drink/Test rest pulse rate and measure difference/ Measure pulse rate at same time interval after drinking *(Any 3, 1 mark each)*

b Sensible suggestion about difficulties of using humans as experimental subjects

4 How much maize did he get from the field with the new type of maize in compared with that field in previous years?

How much maize did he get from the sprayed field compared with previous years?

Was it generally a good or bad year in terms of weather and other conditions?

What was the relative cost of the new maize and the spraying? *(Any 3, 1 mark each)*

5 B