

Sc

KEY STAGE

3

TIER

3–6

Year 9 science test

Paper 1

First name _____

Last name _____

Class _____

Date _____

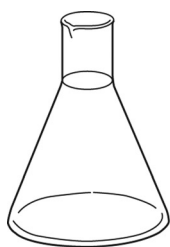
Please read this page, but do not open your booklet until your teacher tells you to start. Write your name, your class and the date in the spaces above.

Remember:

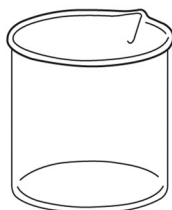
- The test is 1 hour long.
- You will need a pen, pencil, rubber and ruler. You may find a protractor and a calculator useful.
- The test starts with easier questions.
- Try to answer all of the questions.
- The number of marks available for each question is given below the mark boxes in the margin. You should not write in this margin.
- Show any rough working on this paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

TOTAL MARKS	
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1. The diagram below shows six pieces of equipment.



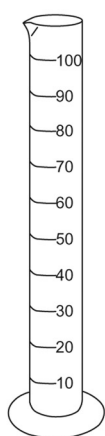
A



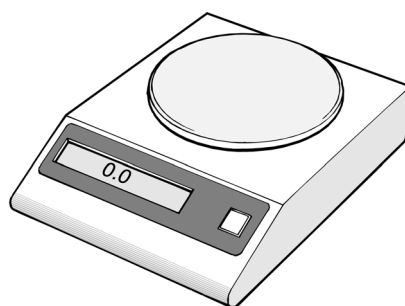
B



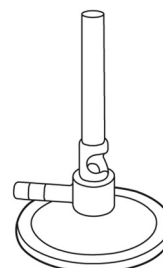
C



D



E



F

(a) Linda investigates how quickly sugar dissolves in water.

(i) Which piece of equipment does she use to weigh 5 g of sugar?
Tick the correct box.

A

B

C

D

E

F

☐☐☐☐☐☐

(ii) Which piece of equipment does she use to measure out 90 cm³ of water?
Tick the correct box.

A

B

C

D

E

F

☐☐☐☐☐☐☐

1ai

1 mark

☐

1aii

1 mark

(b) Linda heats the water in a beaker.

- (i) Which piece of equipment shown is a beaker?
Tick the correct box.

A	B	C	D	E	F
☐	☐	☐	☐	☐	☐

☐ 1bi
1 mark

- (ii) Which piece of equipment shown is used to heat water?
Tick the correct box.

A	B	C	D	E	F
☐	☐	☐	☐	☐	☐

☐ 1bii
1 mark

(c) Linda adds 5 g of sugar to the hot water.

- (i) She measures the time it takes for the sugar to dissolve.
The equipment used for timing is **not** shown in the diagram.

What piece of equipment is used to measure the time taken?

☐ 1ci
1 mark

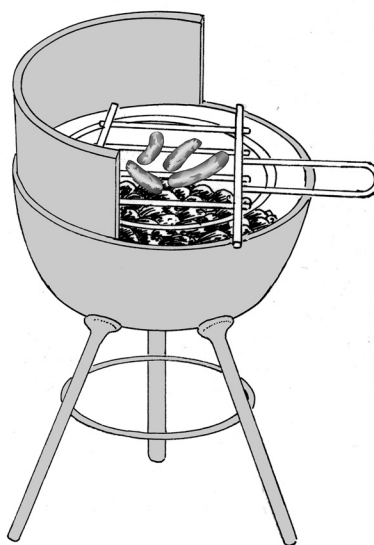
- (ii) The equipment used to measure the temperature of the water is **not** shown in the diagram.

What piece of equipment is used to measure temperature?

☐ 1cii
1 mark

maximum 6 marks

2. Susie cooked sausages on a barbecue.



- (a) Fat and water in the sausages changed state.

Draw **one** line from each statement to the correct change of state.
Draw only **two** lines.

statement

change of state

2a
1 mark

fat melted

liquid to gas

gas to liquid

liquid to solid

water evaporated

solid to liquid

solid to gas

2a
1 mark

(b) Susie uses charcoal as the fuel for the barbecue.

(i) Which statement is true about all fuels?
Tick the correct box.

All fuels are
sources of energy.

☐

All fuels are black.

☐

All fuels are made
from wood.

☐

All fuels are solid.

☐☐

1 mark

2bi

(ii) Which gas in the air is needed for fuels to burn?
Tick the correct box.

water vapour

☐

oxygen

☐

nitrogen

☐

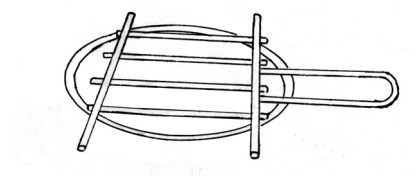
carbon dioxide

☐☐

1 mark

2bii

(c) The metal grill of the barbecue is made of steel.
Six properties of steel are given below.



Which properties are needed for the metal grill?
Tick **two** correct boxes.

It conducts electricity.

☐

It is rigid.

☐

It has a very high
melting point.

☐

It is magnetic.

☐

It is shiny.

☐

It rusts.

☐☐

1 mark

2c

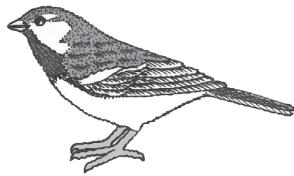
☐

1 mark

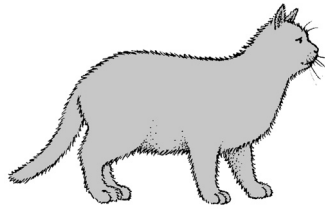
2c

maximum 6 marks

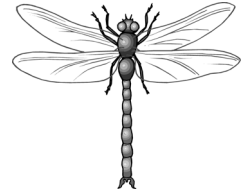
3. The drawings below show eight different animals.



sparrow



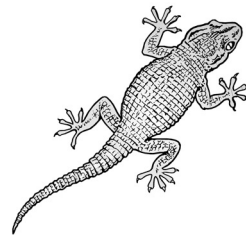
cat



dragonfly



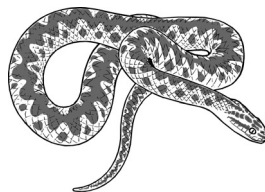
housefly



lizard



squirrel



snake



hawk

not to scale



3a

1 mark



3a

1 mark

(a) Put a **ring** around the **two** animals on the opposite page that do **not** have a backbone.

(b) What are the names of **two** mammals on the opposite page?

1. _____

2. _____

(c) (i) What are the names of **two** reptiles on the opposite page?

1. _____

2. _____

(ii) From the drawings, what is **one** feature that all reptiles have?



3b

1 mark



3ci

1 mark

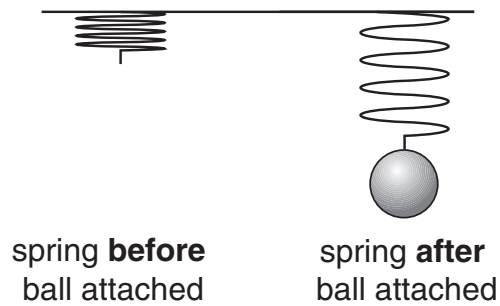


3cii

1 mark

maximum 5 marks

4. (a) John attaches a ball to a spring. The diagram below shows what happens.



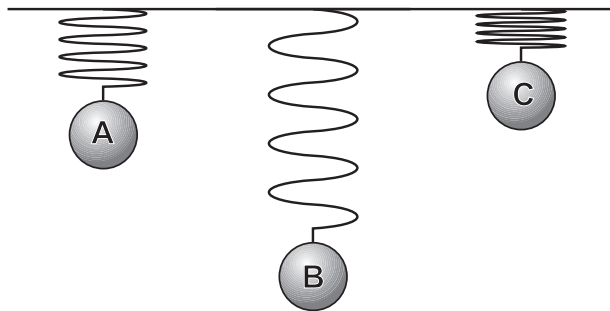
- (i) Which arrow shows the direction of the **force of the ball on the spring**?
Tick the correct box.



- (ii) Which arrow shows the direction of the **force of the spring on the ball**?
Tick the correct box.



- (b) The diagram below shows three metal balls attached to **identical** springs.

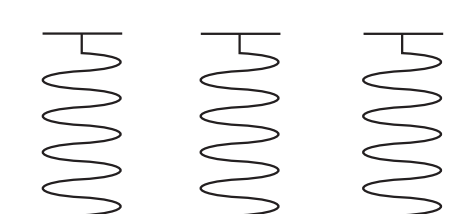


Which ball is the heaviest?
Write the letter.

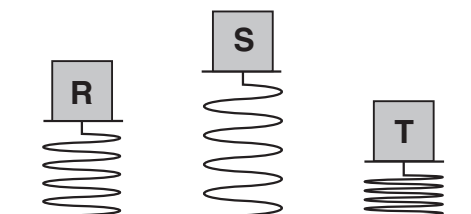
Explain your answer.

- (c) John has another three **identical** springs.
He puts a cube on each spring. Each cube has a different mass.

The diagrams below show the springs before and after John added the cubes.



springs **before** adding the cubes



springs **after** adding the cubes

Which cube is the heaviest?
Write the letter.

Explain your answer.

1 mark

1 mark

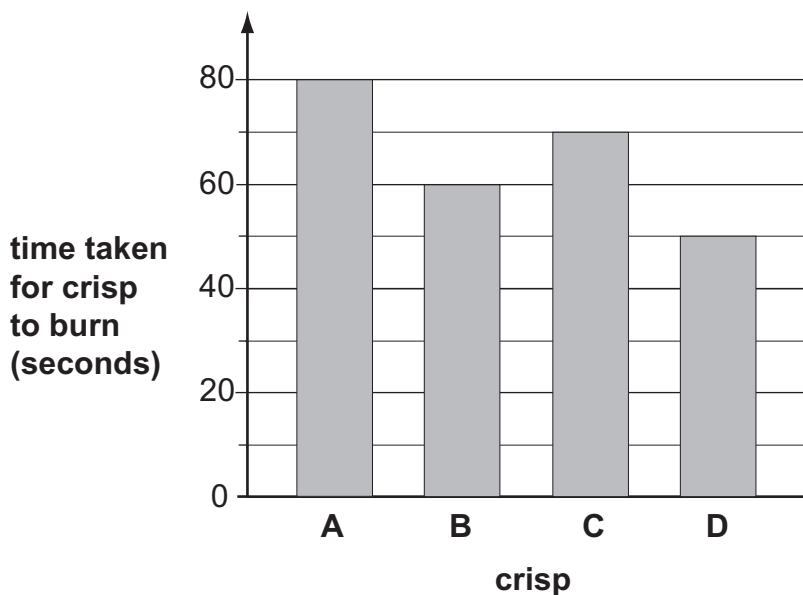
maximum 6 marks

5. Joanne burnt four different crisps.
She predicted that the bigger the crisp, the longer it will burn.



- (a) Look at the picture above. What did Joanne wear to protect herself?

- (b) Joanne measured the time taken for each crisp to burn completely.
The bar chart shows Joanne's results.



Look at the bar chart.
How much time did crisp D take to burn?

_____ seconds

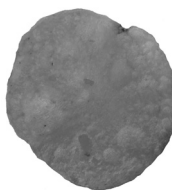
(c) The crisps Joanne used in her investigation are shown below.



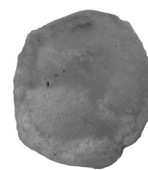
crisp A



crisp B



crisp C



crisp D

- (i) Joanne predicted that the bigger the crisp, the longer it will burn.
Do the results support Joanne's prediction?
Tick one box.

yes ☐

no ☐

Use Joanne's results to explain your answer.

- (ii) How can you tell that Joanne did **not** carry out a fair test?

- (d) Joanne wrote some conclusions for her investigation.

Decide whether each conclusion is **true**, **false**, or you **cannot tell**.
Tick the correct box for each conclusion.

conclusion	true	false	cannot tell
Two crisps took the same amount of time to burn.	☐	☐	☐
The smallest crisp burnt for the shortest time.	☐	☐	☐
Two of the crisps burnt with flames of the same size.	☐	☐	☐

☐ 5ci
1 mark

☐ 5cii
1 mark

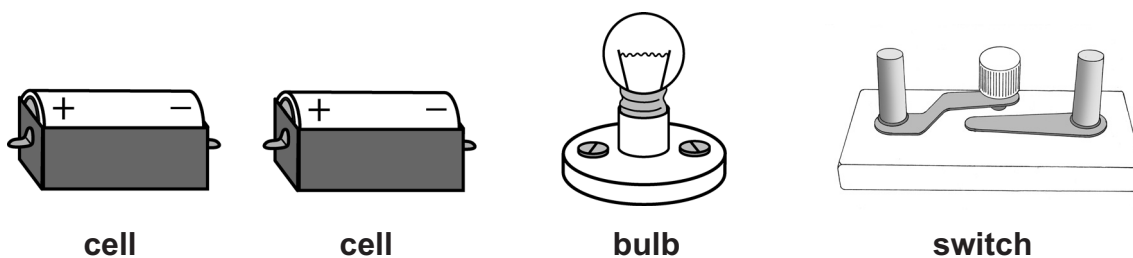
☐ 5d
1 mark

☐ 5d
1 mark

☐ 5d
1 mark

maximum 7 marks

6. Ben makes a series circuit using two identical cells, a bulb and a switch to turn the bulb on and off.



- (a) Draw a circuit diagram of Ben's circuit. Use the correct symbols.

The cells have been drawn for you.

6a

1 mark

6a

1 mark

6a

1 mark



(b) Which part of the circuit supplies the energy?

☐

6b

1 mark

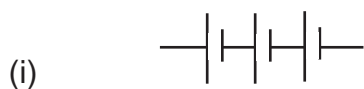
(c) Ben adds another identical bulb to the circuit in series.
How does the **brightness** of the first bulb change?

☐

6c

1 mark

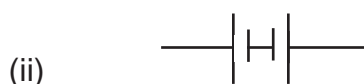
(d) How will the **brightness** of the bulbs change when the cells shown below are placed into Ben's circuit?



☐

6di

1 mark



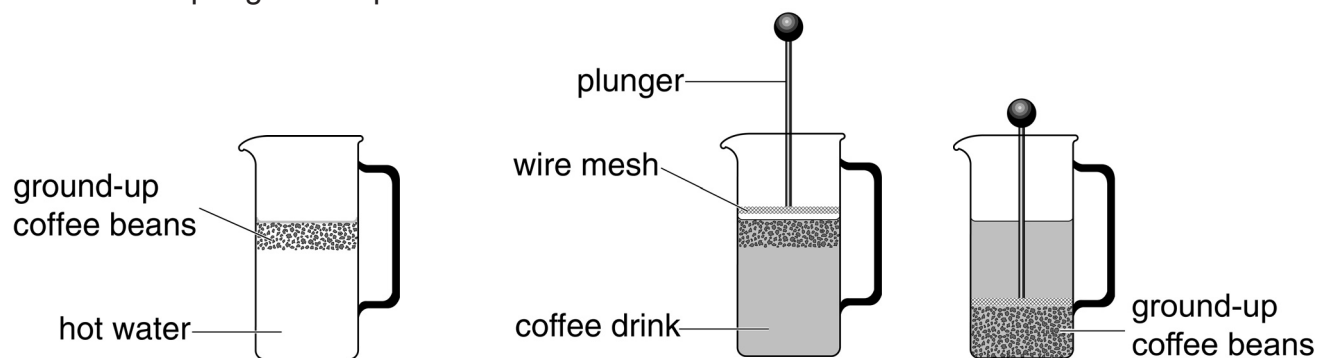
☐

6dii

1 mark

maximum 7 marks

7. Russell put ground-up coffee beans in a coffee maker and added hot water.



He pushed the plunger down.

This separated the coffee drink from the ground-up coffee beans.

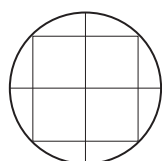
- (a) How could Russell see that some coffee had dissolved in the water?



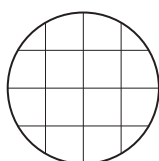
7a

1 mark

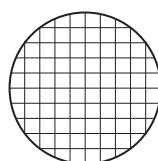
- (b) The end of the plunger is a circle of wire mesh.



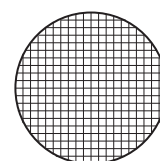
A



B



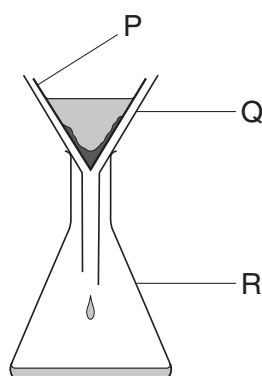
C



D

- (i) Which mesh would be best to separate the coffee drink from all the ground-up coffee beans? Write the letter.

- (ii) This method of making coffee uses a type of filter.
The apparatus used for filtration in a school laboratory is drawn below.



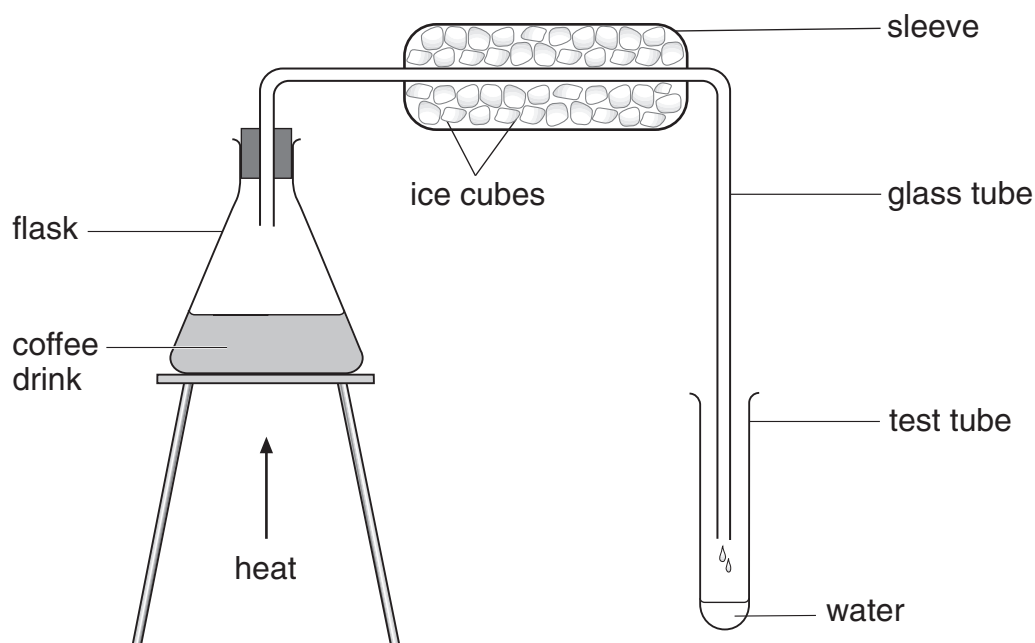
Which part of the apparatus above works in the same way as the wire mesh? Write the letter.



7bii

1 mark

- (c) Russell wanted to separate the water from the coffee drink. He set up the apparatus shown below.



- (i) Why did Russell put ice cubes around the glass tube?

- (ii) Choose words from the box below to fill the gaps in the following sentences.

an acid	a gas	a liquid	a solid
condensation	crystallisation	evaporation	filtration

Russell heats the water. Water in the drink changes from

_____ into _____.

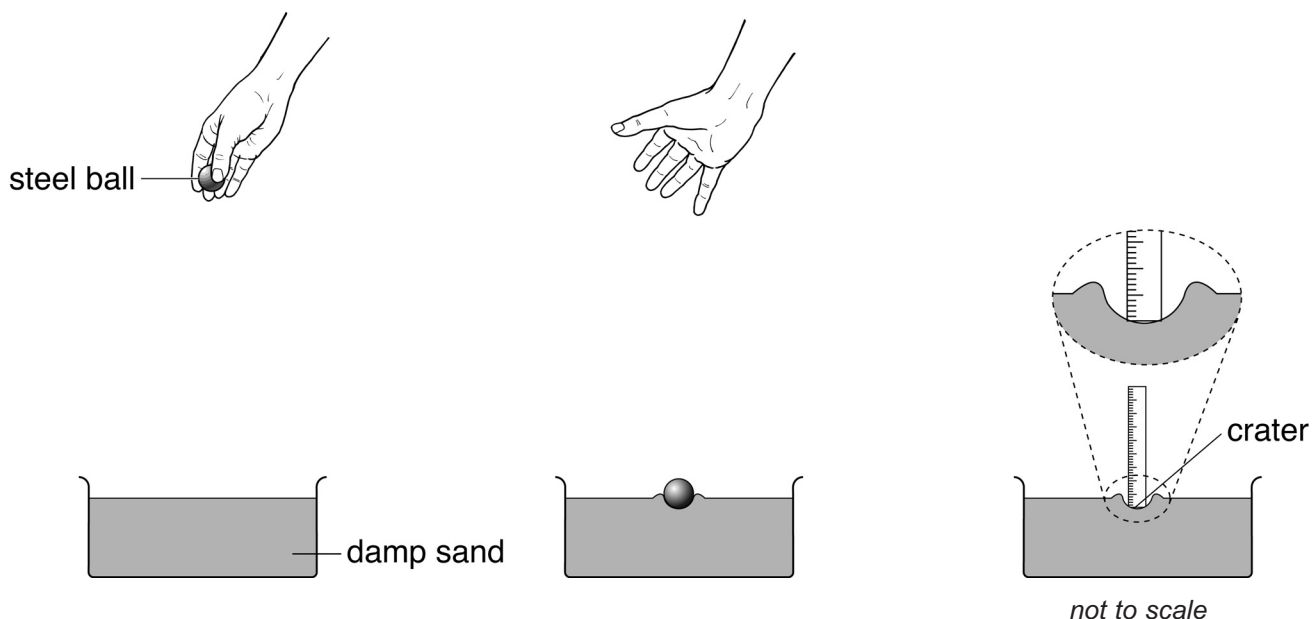
This change of state is called _____.

Water vapour changes into liquid. This change of state is called

_____.

maximum 8 marks

8. Jack and Aneesa dropped a steel ball into trays of damp sand. They measured the depth of the craters made by the steel ball.



Their results are shown in the table below.

height the ball was dropped from (cm)	depth of crater (cm)		
	Jack's results		Aneesa's results
10	1.1	1.2	0.8
20	1.4	1.5	1.4
30	1.6	1.6	1.5
40	1.8	1.7	1.8
50	2.0	2.1	2.1

(a) Use information in the table to answer the questions below.

- (i) What was the independent variable that Jack and Aneesa changed in their investigation?

8ai
1 mark

- (ii) Why was Jack's investigation better than Aneesa's?

8aii
1 mark

- (b) Look at the results in the table.
What is the relationship between the height the ball was dropped from and the depth of the crater?

8b
1 mark

- (c) Aneesa said that they made sure the investigation was fair.

Suggest **two** variables they must have kept the same to make their investigation fair.

1.

2.

8c
1 mark

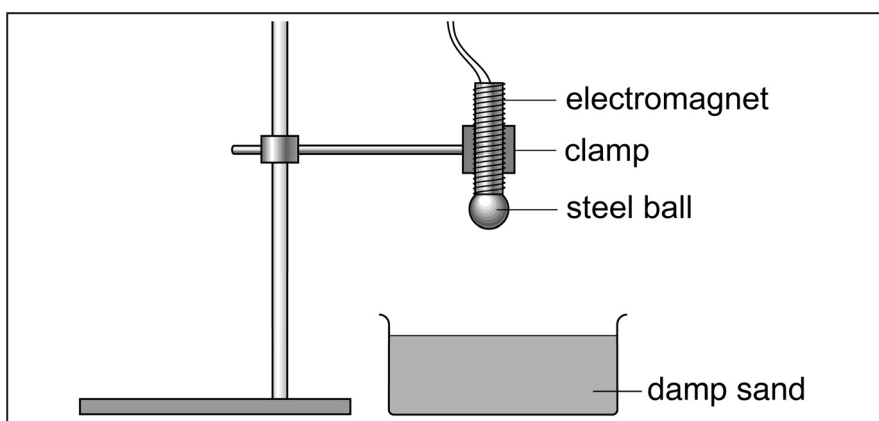
8c
1 mark

- (d) (i) Jack removed the steel ball using his fingers. Then he measured the depth of the crater.
Aneesa said he should use a magnet instead of his fingers.

Explain why using a magnet to remove the ball would improve the investigation.

8di
1 mark

- (ii) Jack said that the ball could be dropped using an electromagnet instead of dropping it by hand.



Explain why this would improve the investigation.

8dii
1 mark

maximum 7 marks

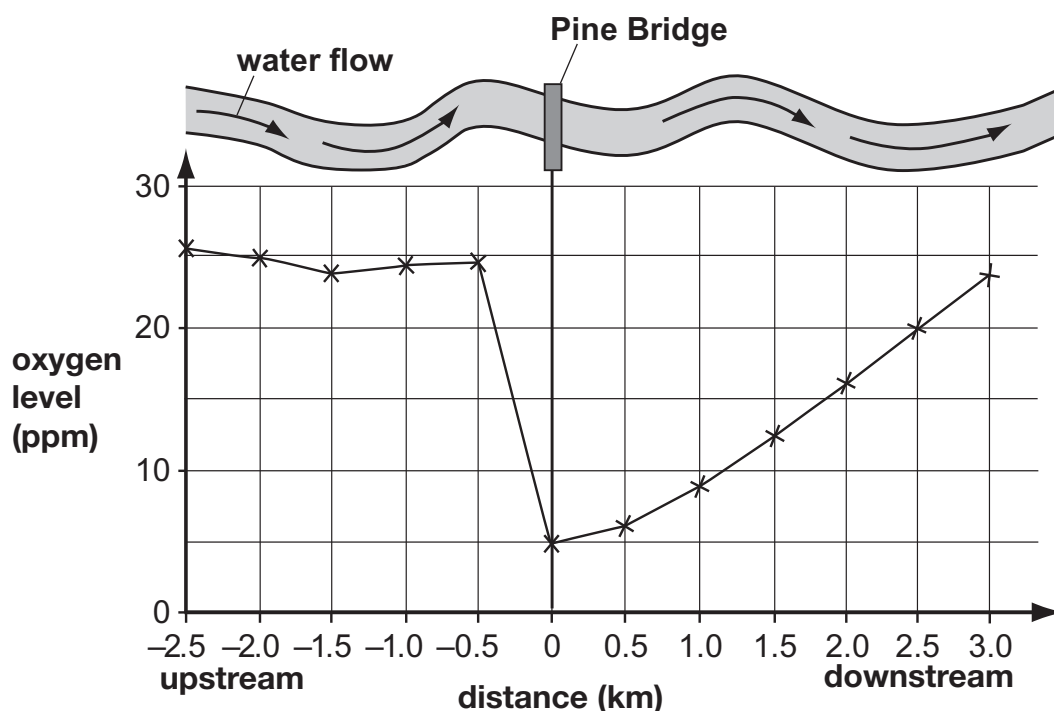
9. The information below comes from a newspaper report.

River Pollution

Scientists from the Environment Agency were called to investigate a river.

Local fishermen reported that they had not caught trout in the river at Pine Bridge for many months. There were more algae growing in the river and it had a bad smell.

Scientists measured the oxygen levels in the water upstream and downstream from Pine Bridge. The results are shown below.



- (a) (i) What was the oxygen level in the river at Pine Bridge?

_____ ppm

- (ii) Describe what happens to the oxygen level in the river as you travel **downstream** from Pine Bridge.

- (b) Trout only live in water with oxygen levels higher than 20 ppm. How far **downstream** from Pine Bridge would you be likely to find trout? Write the unit.



9ai

1 mark



9aii

1 mark



9b

1 mark

- (c) The scientists collected samples of the river animals found at different places.

animals collected	distance from Pine Bridge (km)								
	-2.0	-1.5	-1.0	-0.5	0	0.5	1.0	1.5	2.0
stonefly nymphs	✓	✓	✓	✓					
mayfly nymphs	✓	✓	✓	✓					
freshwater shrimps	✓	✓	✓	✓					✓
caddis fly larvae	✓	✓	✓	✓					
rat-tailed maggots					✓	✓			
sludge worms					✓	✓	✓		
water lice							✓	✓	✓
bloodworms							✓		

Trout only live in water with oxygen levels higher than 20 ppm.
Give the name of one **other** animal that **only** lives in oxygen levels above 20 ppm.
Use the table above and the information opposite to help you.

1 mark 9c

- (d) Use the information above and opposite.
Name **two** animals that are **only** found when the oxygen level is below 10 ppm.

1. _____ 2. _____

1 mark 9d

1 mark 9d

- (e) In the river, trout are predators. Near Pine Bridge, the number of trout decreased.

Suggest **one** reason why pollution may cause the trout population to decrease.

1 mark 9e

maximum 7 marks

10. A gannet is a type of sea bird.



- (a) When a gannet flies at a **constant height** above the sea, there is a downward force of 30N on the gannet.

What is the size of the upward force on the gannet?
Tick the correct box.

less than 30N

☐

exactly 30N

☐

more than 30N

☐

need more information

☐☐

10a

1 mark

- (b) To catch food, the gannet dives down into the sea.
What is the useful energy transfer when the gannet dives?
Choose words from the box below.

thermal

gravitational potential

sound

kinetic

light

When the gannet dives, _____ energy is
transferred to _____ energy.

☐

10b

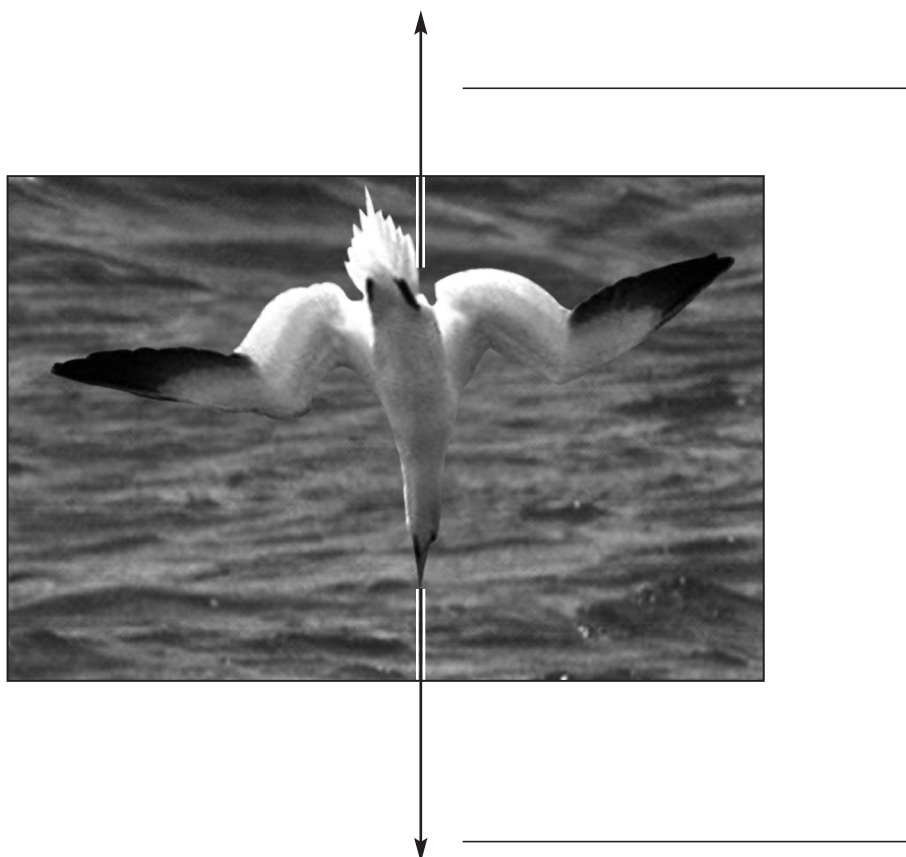
1 mark

☐

10b

1 mark

- (c) Label the arrows to show the **names** of the forces acting on the gannet as it dives.



10c
1 mark

- (d) Gannets have pockets of air between their muscles and their skin. Suggest how this is a good adaptation for gannets when they hit the water at fast speeds.

10c
1 mark

- (e) The gannet releases energy through respiration. An aeroplane also releases energy when fossil fuels burn.

Write **two** other ways that respiration and burning are similar.

1. _____

2. _____

10d
1 mark

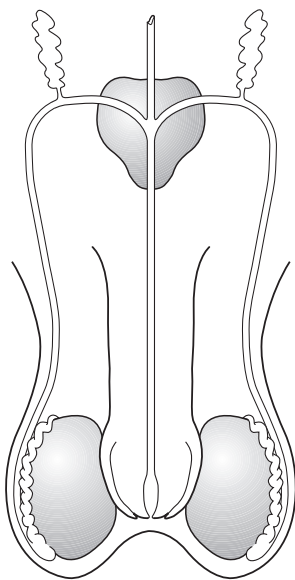
10e
1 mark

10e
1 mark

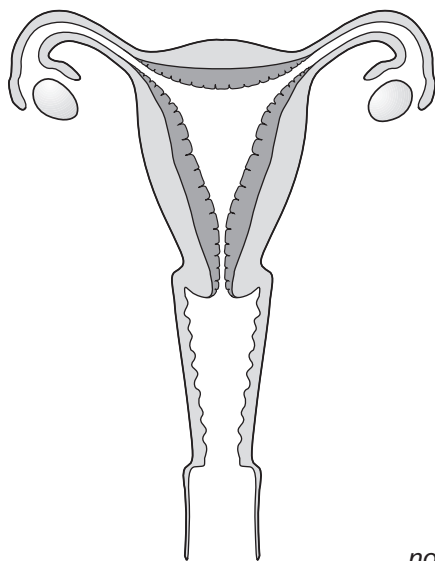
maximum 8 marks

11. The diagrams below show the male and female human reproductive systems.

male and female reproductive systems



male



not to scale

female

(a) The table below contains descriptions of parts of the human reproductive system. Complete the table to give the name of each part.

name of part	description
	the tube that carries an egg to the uterus
	the organ that produces sperm
	the organ that produces the egg

11a

1 mark

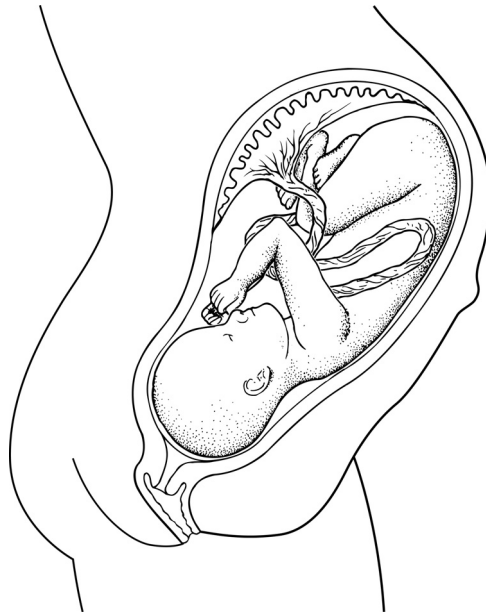
11a

1 mark

11a

1 mark

(b) The diagram below shows an unborn baby.



Complete the sentences below by filling in the gaps.

In humans, normal pregnancy lasts for _____ months.

When the foetus is ready to be born, muscles in the uterus wall start to _____.

After the baby is born, the _____ connecting the foetus to the mother is cut.

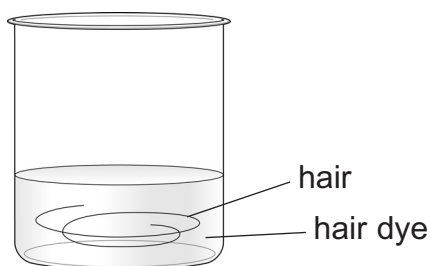
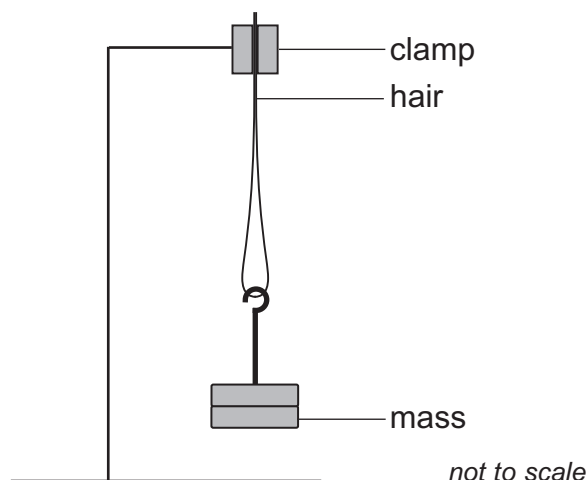
11b
1 mark

11b
1 mark

11b
1 mark

maximum 6 marks

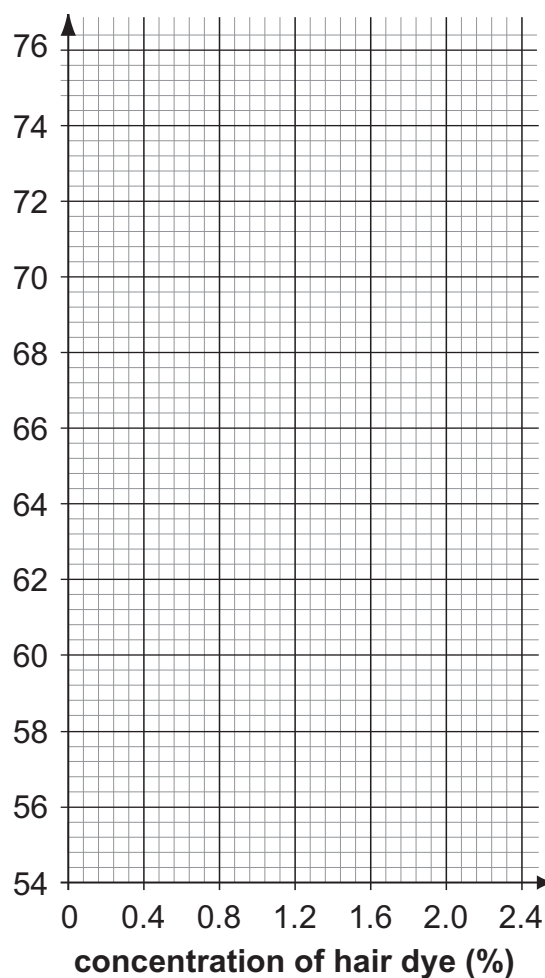
12. Jason wanted to find out if hair dye makes hair weaker. He used 5 hairs of equal length. He soaked each hair in a different concentration of hair dye for 15 minutes. He added masses to each hair until it broke.



- (a) The table below shows Jason's results.
- (i) Plot a graph of Jason's results **and** draw a line of best fit.

concentration of hair dye (%)	mass needed to break the hair (g)
0.4	71
0.8	67
1.2	64
1.6	61
2.0	58

mass needed to break the hair (g)



12ai
1 mark

12ai
1 mark

12ai
1 mark

- (ii) Use the graph to work out the mass needed to break hair soaked in water (0% hair dye).

_____ g

- (b) What was the independent variable that Jason **changed** in this experiment?

- (c) What was the dependent variable that Jason **measured** in this experiment?

- (d) What is the relationship between the concentration of hair dye and the mass needed to break the hair?

- (e) Jason wanted to investigate whether soaking hair in dye for different amounts of time affected the strength of the hair.
Jason drew a table for his results.
Add headings **and** units to the table below for Jason's investigation.

heading 1	heading 2
_____ ()	_____ ()

12aii

1 mark

12b

1 mark

12c

1 mark

12d

1 mark

12e

1 mark

12e

1 mark

12e

1 mark

12e

1 mark

maximum 11 marks

Total

11

13. Matthew measured the pH of different soils.

(a) Tick **one** box in each row to show if each soil is acidic, neutral **or** alkaline.

soil	pH of soil	acidic	neutral	alkaline
A	4.5			
B	5.5			
C	6.3			
D	7.0			
E	7.8			



13a

1 mark



13a

1 mark

(b) A hydrangea is a flowering plant. Matthew notices that the colour of hydrangea flowers is different for plants grown in different places.

He records the colour of the flowers on each plant.

His results are shown in the table below.



hydrangea flower

soil	pH of soil	colour of flowers			
		blue	violet	light pink	dark pink
A	4.5	✓			
B	5.5		✓		
C	6.3		✓		
D	7.0			✓	
E	7.8				✓

Look at Matthew's results.

Do his results support the statement that the colour of hydrangea flowers depends on pH?

yes

☐

no

☐

Explain your answer.

- (c) Matthew measured the pH of the soil near hydrangea plants found in different places.

Suggest one **other** variable Matthew could **not** control in his investigation.

- (d) Matthew wants to find out if the colour of blue hydrangea flowers depends on inherited factors **or** environmental factors.
The flowers were growing in soil of pH 4.5.
He plants them in soil of pH 6.3.

Complete the table below to show the colours of the new flowers in soil of **pH 6.3**

- (i) if the colour is due to inheritance
(ii) if the colour is due to the environment

Use the table on the opposite page to complete the table below.

	colour
starting colour of hydrangea flowers	blue
colour of new flowers if only due to inheritance	
colour of new flowers if only due to environment	

END OF TEST

maximum 6 marks

13b
1 mark

13c
1 mark

13d
1 mark

13d
1 mark

Total
6

