Sc

KEY STAGE 3

TIER 5–7

2006

Science test

Paper 1

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

First name _____

Last name _____

School _____

Remember

- The test is 1 hour long.
- You will need: pen, pencil, rubber, ruler, protractor and calculator.
- 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.
- If you are asked to plan an investigation, there will be space for you to write down your thoughts and ideas.
- Do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marker's use only

Total marks	

QCA/06/1938

1. Every year thousands of trees are cut down in forests.

(a) Mammals and birds are two groups of animals that live in forests.

Give **two** reasons why fewer mammals and birds can survive after trees have been cut down.

1. _____

_____

2. _____

_____

1a
1 mark

1a
1 mark

(b) Many small plants grow in the clearings left after trees are cut down.

Explain why small plants are able to grow well after the trees have been cut down.

_____

_____

_____

1b
1 mark

1b
1 mark

(c) In some forests, small branches are left on the ground.

Fungi and bacteria feed on these branches and release minerals, such as nitrates, back into the soil.

Why is it important that the minerals are released back into the soil?

_____

_____

1c

1 mark

(d) A label was printed on the back of a birthday card.

The paper for this card was made from wood taken from sustainable forests.

In sustainable forests, new trees are planted to replace trees that are cut down.

Give **two** reasons why it is important to replace forest trees that are cut down.

1. _____

_____

1d

1 mark

2. _____

_____

1d

1 mark

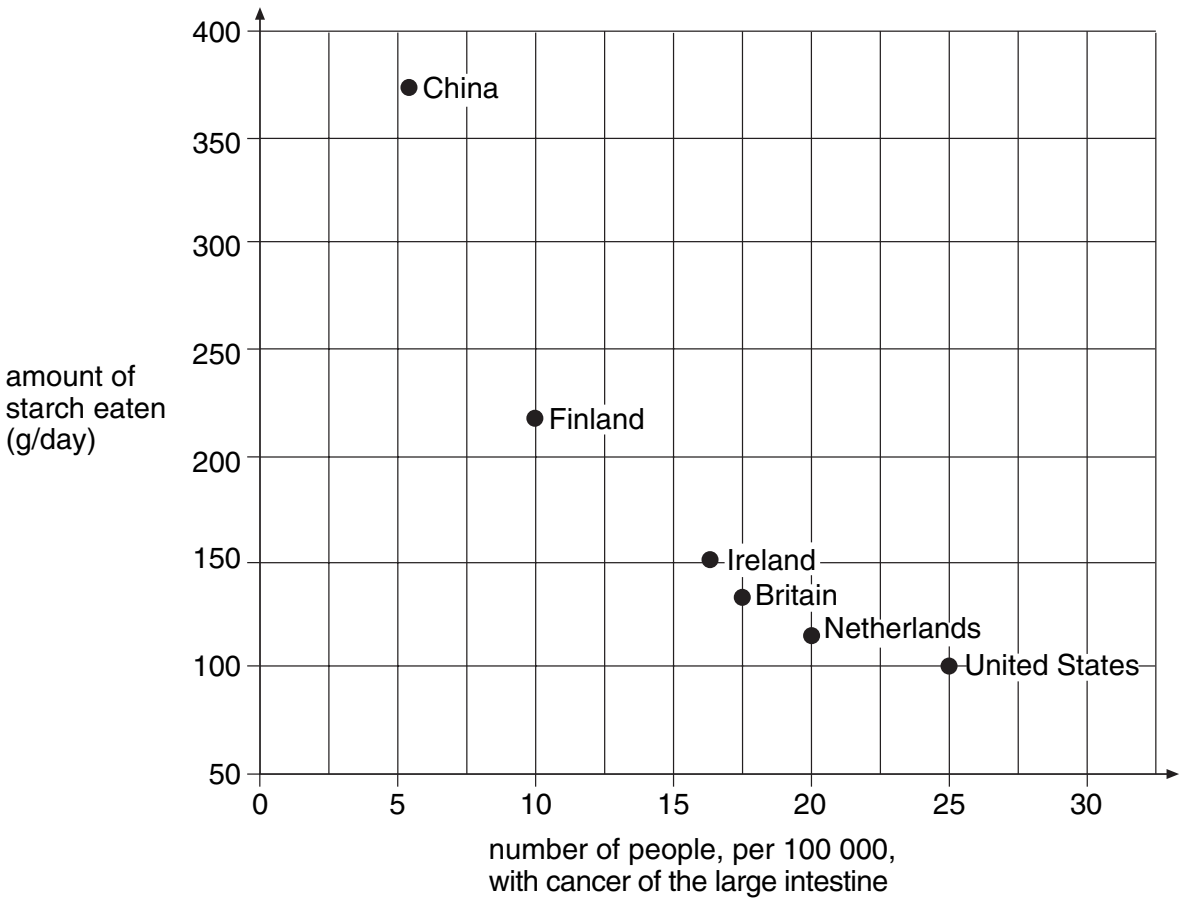
maximum 7 marks

Total

7

2. People in different countries eat different amounts of starch.
A scientist compared the amount of starch that people ate with the number of people with cancer of the large intestine.

The scatter graph below shows her results.



Look at the scatter graph.

(a) (i) Which country had the greatest proportion of people with cancer of the large intestine?

_____

2ai

1 mark

(ii) What conclusion could you come to about the effect of eating starch on getting cancer of the large intestine?

_____

_____

2aii

1 mark

(b) (i) Starch is a carbohydrate.

Which **two** of the following foods are good sources of starch?
Tick the **two** correct boxes.

bread	☐	cheese	☐
chicken	☐	tomatoes	☐
fish	☐	pasta	☐

☐ 2bi
1 mark

☐ 2bi
1 mark

(ii) What other type of nutrient, needed as part of a balanced diet, keeps the intestine working well and prevents constipation?
Tick the correct box.

fat	fibre	minerals	protein	vitamins
☐	☐	☐	☐	☐

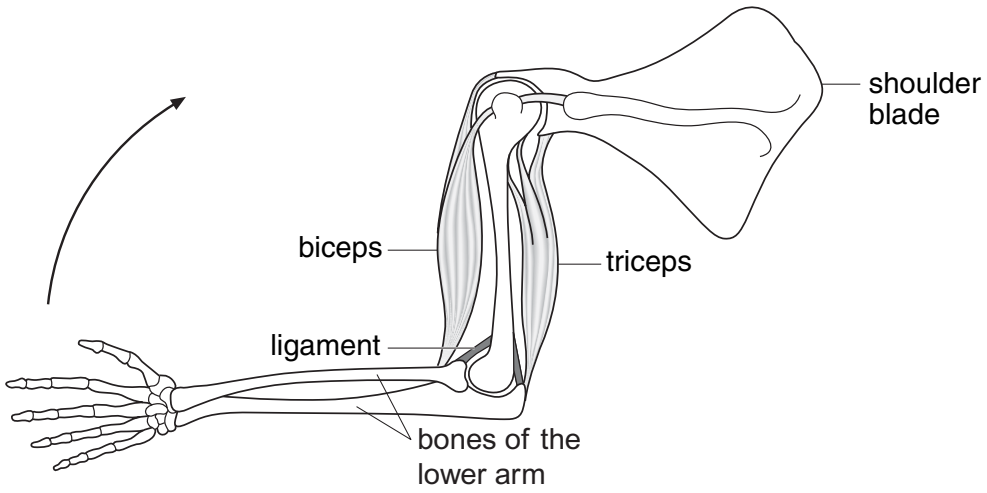
☐ 2bii
1 mark

maximum 5 marks

Total
☐
5

3. The diagram below shows bones and muscles of the human arm.

The biceps and triceps are muscles that contract to move the bones of the lower arm.



(a) What do the biceps and triceps do to move the arm in the direction shown by the arrow?
Tick the correct box.

The biceps and the triceps contract at the same time.	☐
The biceps contracts and the triceps relaxes.	☐
The biceps relaxes and the triceps contracts.	☐
The biceps and the triceps relax at the same time.	☐

☐ 3a
1 mark

(b) Ligaments hold bones together at a joint. Ligaments can stretch.

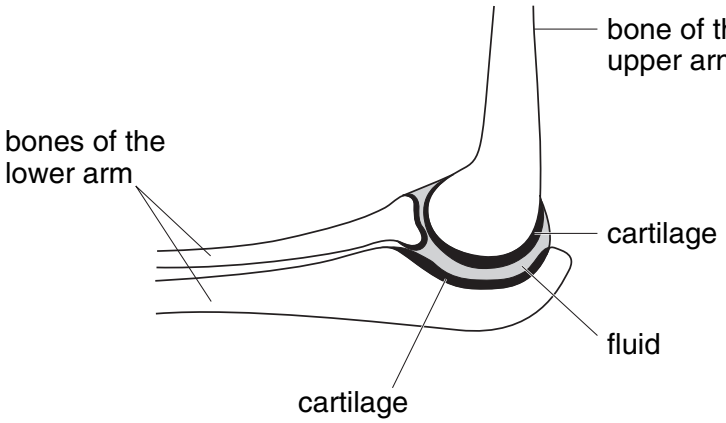
Why must ligaments be able to stretch?

_____

_____

☐ 3b
1 mark

(c) The diagram below shows an elbow joint.



(i) The ends of the bones at a joint are covered by a layer of smooth material called cartilage.
There is also a fluid in the joint.

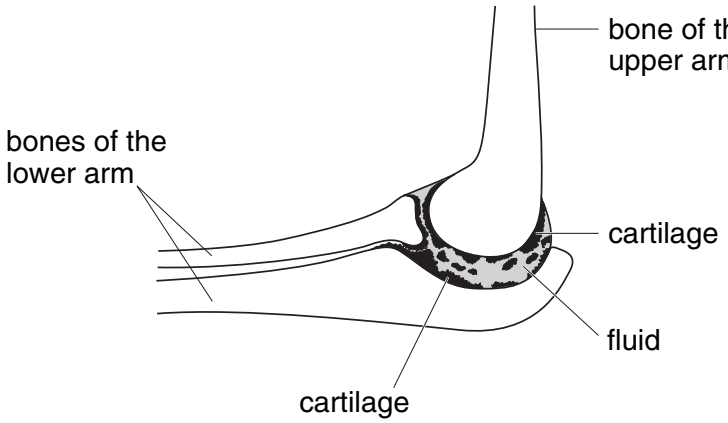
Why are cartilage and fluid needed in a joint?

_____

_____

3ci
1 mark

(ii) In the joint shown below, some of the cartilage has broken off.



Suggest **one** way this damage will affect the joint.

_____

_____

3cii
1 mark

maximum 4 marks

Total
4

4. An alloy is a mixture of elements.
The table shows the mass of each element present in 100 g of five different alloys, **bronze**, **solder**, **steel**, **stainless steel** and **brass**.

alloy	mass of each element in 100 g of alloy							
	lead (g)	tin (g)	copper (g)	zinc (g)	carbon (g)	iron (g)	chromium (g)	nickel (g)
bronze		4	95	1				
solder	62	38						
steel					1	99		
stainless steel						70	20	10
brass			67	33				

(a) Which **alloy** in the table above contains an element which is a non-metal?

_____

4a
1 mark

(b) Which **two alloys** in the table contain only **two metals**?

_____ and _____

4b
1 mark

(c) Another alloy called nichrome contains only the elements chromium and nickel.
100 g of nichrome contains 20 g of chromium.

How much nickel does it contain?

_____ g

4c
1 mark

(d) Before 1992, two-pence coins were made of bronze.
Steel rusts but bronze does **not** rust.

(i) Why does bronze **not** rust?
Use information in the table opposite to help you.

_____

_____

4di
1 mark

(ii) Rusting requires water and a gas from the air.
Give the name of this gas.

_____

4dii
1 mark

maximum 5 marks

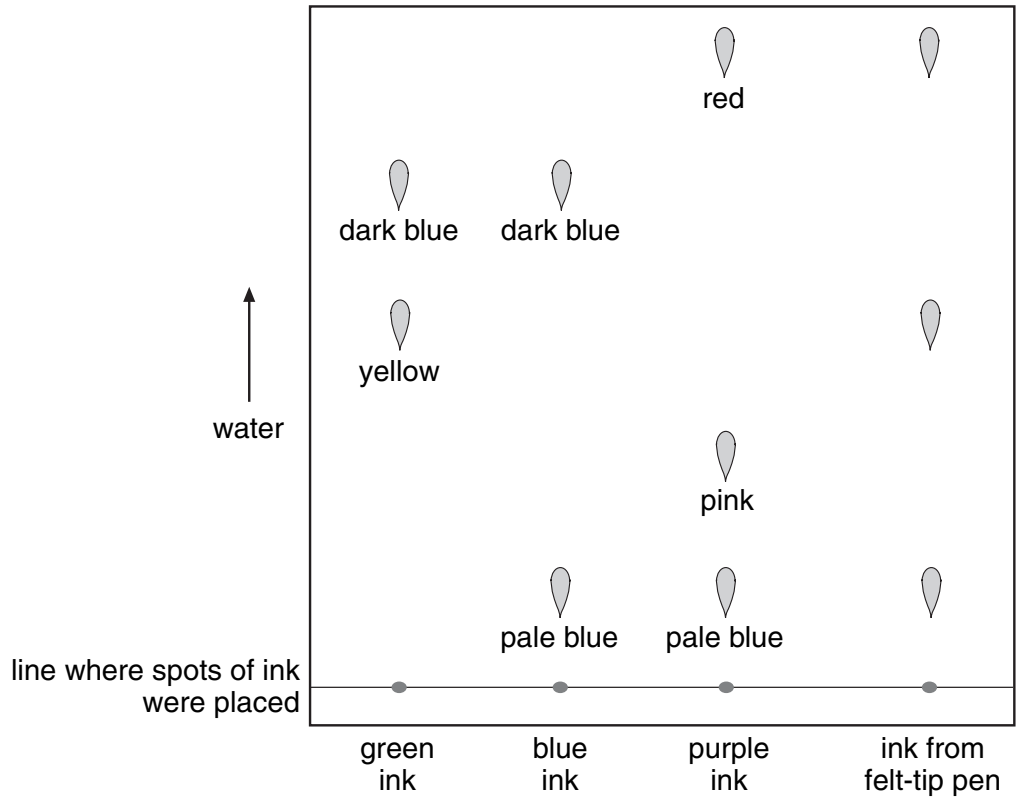
Total
5

5. Susie used chromatography to identify the coloured substances in the ink from a felt-tip pen.

She used:

- green ink
- blue ink
- purple ink
- ink from her felt-tip pen.

She used water as the solvent.



Look at the diagram above.

(a) (i) Which colours were present in the ink from the felt-tip pen?

5ai

1 mark

(ii) How many coloured substances were there in green ink?

_____

How can you tell?

_____

_____

5aii

1 mark

(iii) Susie placed the spots of ink on a line on the chromatography paper as shown in the diagram.
To draw the line, Susie had to choose a felt-tip pen or a pencil.

Which **one** should she use?

_____

Give the reason for your answer.

_____

_____

5aiii

1 mark

(b) Susie used water as the solvent in this experiment.
When she repeated the experiment with a different set of pens, it did **not** work.
She then used ethanol instead of water.

Suggest why the experiment worked with ethanol but **not** with water.

_____

_____

5b

1 mark

maximum 4 marks

Total

4

6. Two pupils were given a sample of 'biological' washing powder and a sample of 'non-biological' washing powder.
They investigated how the two powders compare in removing egg-stains from cloth.

Our Report

1. We put 'biological' powder into one bowl and 'non-biological' powder into the other bowl. We added water.

2. We put some egg-stained cloth into each bowl.

3. We left the bowls for 30 minutes. We dried out the cloth and saw what happened.

Look at their report.

(a) Give **one** way they made their investigation fair.

_____

_____

6a
1 mark

(b) Give **two** ways they could improve their investigation.

1. _____

2. _____

6b
1 mark

6b
1 mark

(c) What should they observe to compare the two types of washing powder?

_____

_____

6c
1 mark

maximum 4 marks

7. Each of the observations shown below has one explanation.

Draw a line from each observation to the correct explanation.

observation	explanation
A ship going out to sea goes out of sight.	The Earth spins on its axis.
We have day and night.	The Earth is a sphere.
We have summer and winter.	The Earth orbits the Sun and the Earth's axis is tilted.
One year on Earth is 365 days.	Gravity attracts objects towards the Earth.
	The Earth orbits the Sun.

7
1 mark

7
1 mark

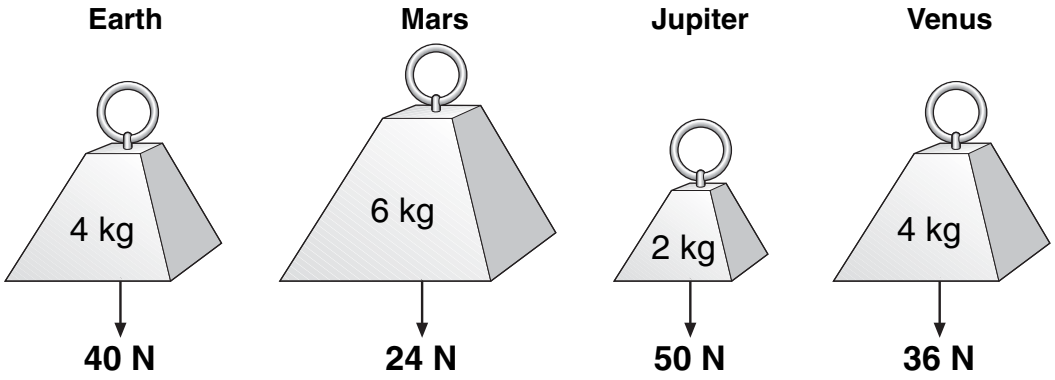
7
1 mark

7
1 mark

maximum 4 marks

Total
8

8. The drawings show the mass and weight of four objects on different planets.



(a) On which of the four planets is the object with the largest mass?

_____

8a

1 mark

(b) How can you tell, from the drawings, that gravity is greater on Earth than on Venus?

_____

_____

8b

1 mark

(c) Gravity is less on the Moon than on the Earth.

Complete the sentences below to compare the weight and mass of an astronaut on the Moon and on the Earth.

The **weight** of an astronaut on the Moon is _____ the

weight of the astronaut on the Earth.

8c

1 mark

The **mass** of an astronaut on the Moon is _____ the

mass of the astronaut on the Earth.

8c

1 mark

(d) The table below gives information about five planets.

planet	distance from the Sun (million km)	time for planet to orbit the Sun (Earth-years)
Venus	110	0.6
Earth	150	1.0
Mars	230	
Jupiter	780	12.0
Saturn	1400	30.0

(i) Look at the information in the table.

How does the time for a planet to orbit the Sun change with its distance from the Sun?

_____

_____

8di

1 mark

(ii) Use information in the table to estimate the time for Mars to orbit the Sun.

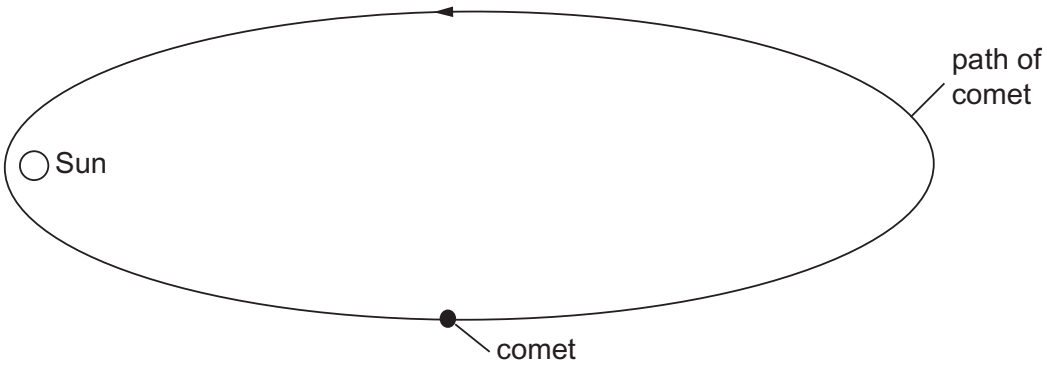
_____ Earth-years

8dii

1 mark

(e) The diagram below shows the path of a comet around the Sun.

On the path of the comet below, place a letter X to show the position where the comet is travelling the fastest.



not to scale

8e

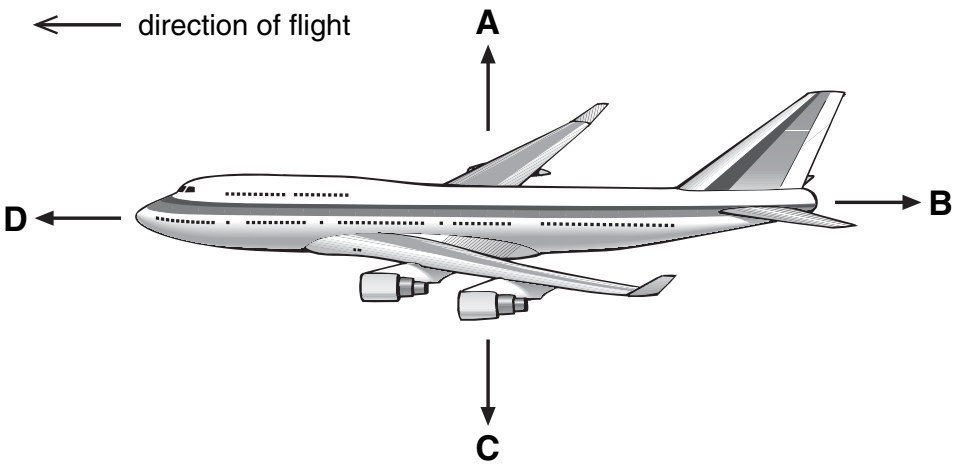
1 mark

maximum 7 marks

Total

7

9. The diagram shows four forces acting on a plane in flight.



(a) Which arrow represents air resistance?
Give the letter.

_____

9a
1 mark

(b) (i) When the plane is flying at a constant height, which **two** forces must be balanced?
Give the letters.

_____ and _____

9bi
1 mark

(ii) When the plane is flying at a constant speed in the direction shown, which **two** forces must be balanced?
Give the letters.

_____ and _____

9bii
1 mark

(c) (i) Just before take-off, the plane is speeding up along the ground.

Which statement is true?
Tick the correct box.

Force B is zero.	☐
Force B is greater than force D.	☐
Force D is equal to force B.	☐
Force D is greater than force B.	☐

☐ 9ci
1 mark

(ii) Which statement is true about the plane just as it leaves the ground?
Tick the correct box.

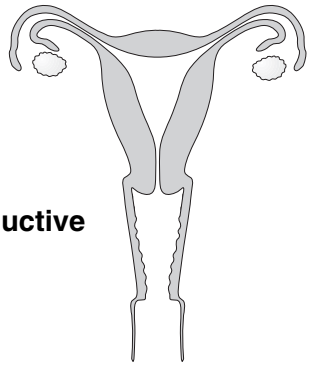
Force C is zero.	☐
Force C is greater than force A.	☐
Force A is equal to force C.	☐
Force A is greater than force C.	☐

☐ 9cii
1 mark

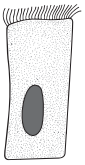
maximum 5 marks

Total
☐
5

10. (a) The diagram below shows the female reproductive system and a ciliated cell.



female reproductive system



ciliated cell

not to scale

Ciliated cells move an ovum along part of the reproductive system.

(i) In which part of the reproductive system are ciliated cells found?

_____

10ai

1 mark

(ii) Describe how ciliated cells move an ovum along.

_____

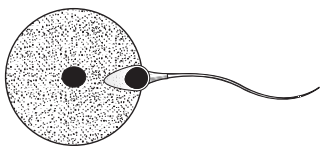
_____

10aii

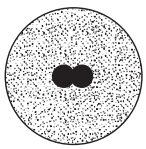
1 mark

(b) The diagrams below represent what happens at fertilisation and after fertilisation has taken place.

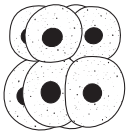
stage 1



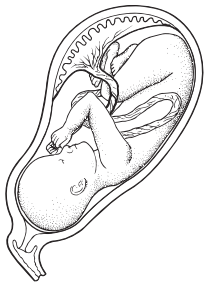
stage 2



stage 3



stage 4



not to scale

(i) Some women find it difficult to become pregnant. Doctors have developed a technique in which an ovum is fertilised in a test-tube. An embryo is then implanted into the woman's reproductive system.

Which stage opposite shows an embryo and which stage shows a foetus?

embryo _____

foetus _____

10bi
1 mark

(ii) Into which part of the woman's reproductive system is the embryo implanted?

_____

10bii
1 mark

(c) (i) Explain why a child can look like both parents but is **not** identical to either of the parents.

_____

_____

_____

_____

10ci
1 mark

10ci
1 mark

(ii) In the table below, tick **one** box by each human characteristic to show whether it is:

- inherited only
- inherited **and** affected by environmental conditions.

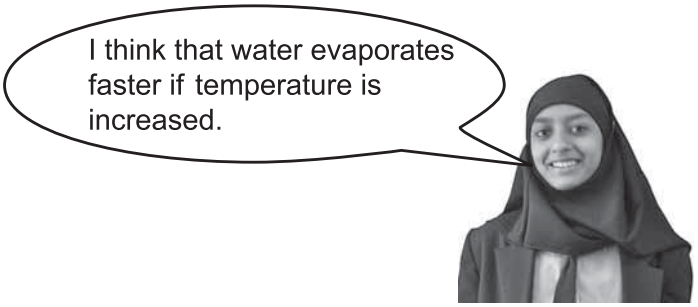
human characteristic	inherited only	inherited and affected by environmental conditions
eye colour		
skin colour		
weight		

10cii
1 mark

maximum 7 marks

Total
7

11. Amena described her idea about the evaporation of water.



Amena

(a) Write a plan for an investigation you could carry out in the school laboratory to test Amena's idea.
Assume you have access to all the usual laboratory equipment.

In your plan you must write:

- the one factor you would change as you carry out your investigation (the independent variable)
- the effect you would observe or measure as you carry out your investigation (the dependent variable)
- one factor you would keep the same to help make your test fair.

_____

_____

_____

_____

_____

_____

_____

_____

_____

□ 11a
1 mark

□ 11a
1 mark

□ 11a
1 mark

(b) In the box below, draw and label a table that you could use to record your results.

11b

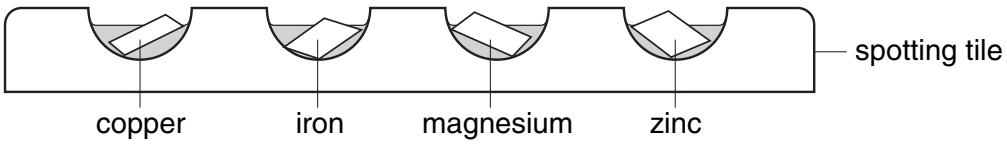
1 mark

maximum 4 marks

Total

4

12. (a) Sasha placed small samples of four different metals on a spotting tile. She added drops of calcium nitrate solution to each metal.



Sasha repeated the experiment with:

- fresh samples of the four metals and copper nitrate solution
- fresh samples of the four metals and iron nitrate solution.

Will a reaction take place when each of the metals is added to each of the solutions?
Use the reactivity series below to help you.

most reactive	calcium
	magnesium
	aluminium
	zinc
	iron
	lead
least reactive	copper

In the table below:

- place a tick, ✓, to show that a reaction took place
- place a cross, X, to show that **no** reaction took place.

Two have been done for you.

salt solution	**metal**			
	copper	**iron**	**magnesium**	**zinc**
calcium nitrate				
copper nitrate	X			
iron nitrate		X		

12a
1 mark

12a
1 mark

12a
1 mark

(b) Three pairs of chemicals are listed below.
A reaction only takes place with two of the pairs.

Draw a line from each reaction to the correct result.
Draw only **three** lines.

pair of chemicals	**result**
calcium carbonate + hydrochloric acid	no reaction
magnesium + hydrochloric acid	a chloride, carbon dioxide and water are formed
copper + hydrochloric acid	a chloride and hydrogen are formed

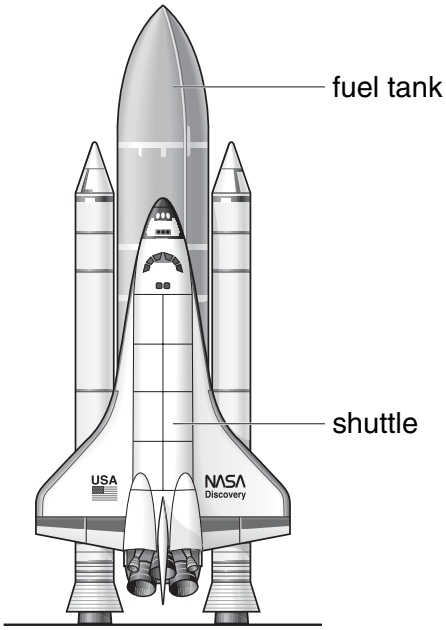
12b
1 mark

12b
1 mark

maximum 5 marks

Total
5

13. The shuttle is a spacecraft which is used to take satellites into space.
The drawing below shows the shuttle just about to take off.



(a) The shuttle has a separate fuel tank containing liquid hydrogen and liquid oxygen.

Explain why hydrogen and oxygen are transported as liquids rather than as gases.

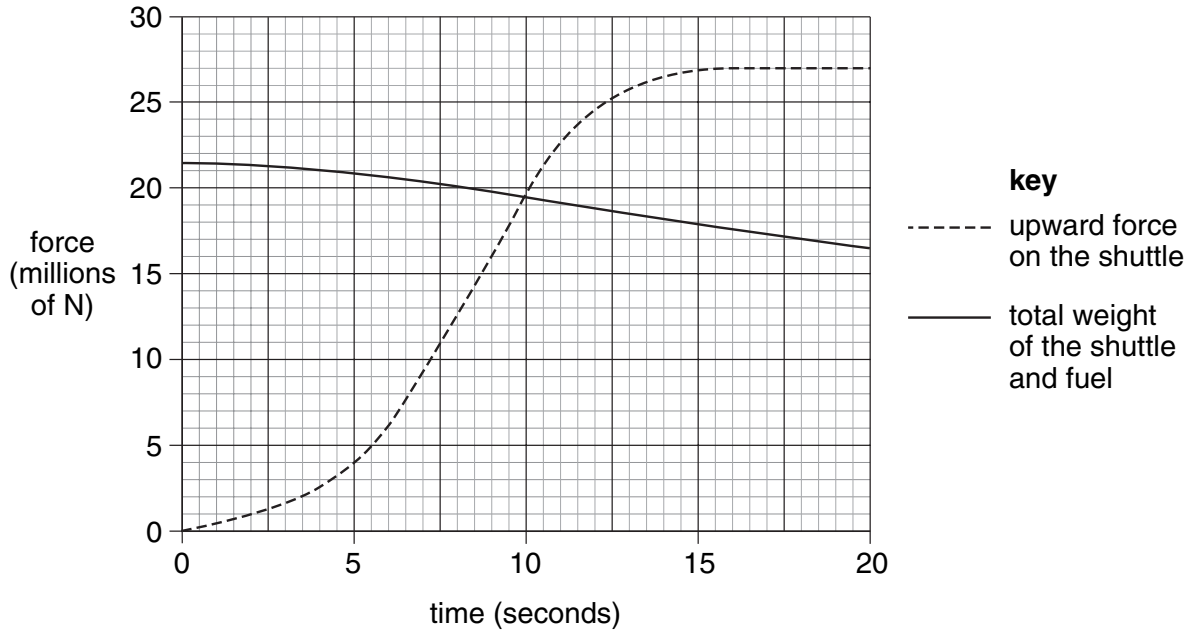
13a
1 mark

(b) Oxygen is needed to burn the fuel in the shuttle's engines.
Vehicles on Earth do **not** need a tank containing oxygen.

Why does the shuttle need to have a tank containing oxygen?

13b
1 mark

(c) The graph below shows how the upward force and the weight of the shuttle, including fuel, change during the first 20 seconds, after the fuel is ignited.



Why does the total weight of the shuttle **decrease** during the first 20 seconds?

_____

_____

13c
1 mark

(d) (i) Look at the graph. At 20 seconds, what is the value of:

the upward force on the shuttle?

_____ millions of N

the total weight of the shuttle and fuel?

_____ millions of N

13di
1 mark

(ii) At 20 seconds, what is the **resultant** force on the shuttle?

_____ millions of N

13dii
1 mark

(iii) Use the graph to explain why the shuttle **cannot** take off before 10 seconds.

_____

_____

13diii
1 mark

maximum 6 marks

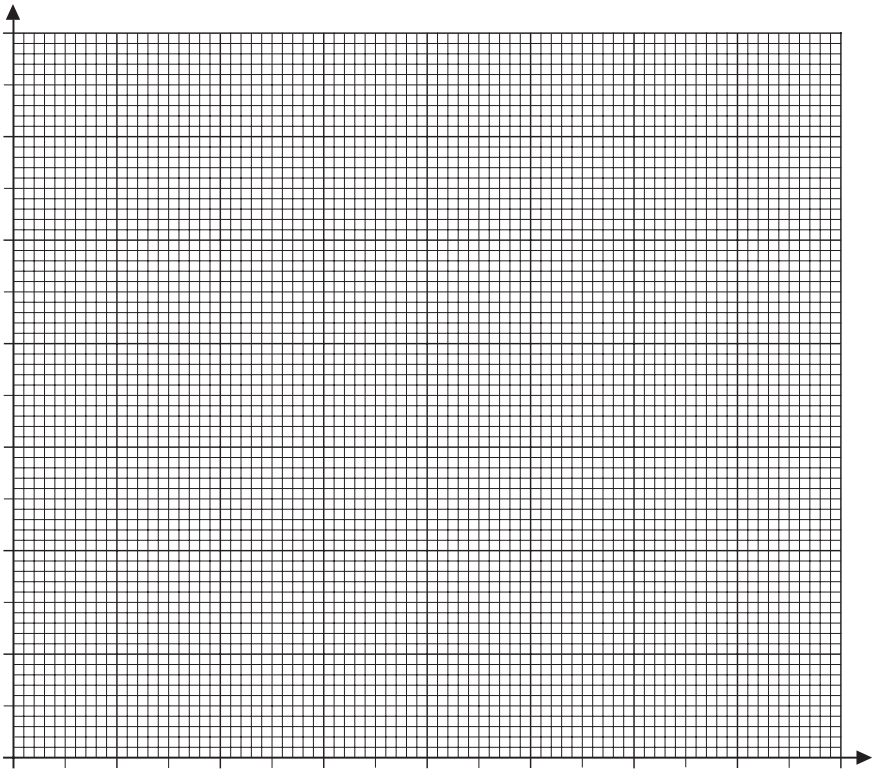
Total
6

14. Six groups of pupils burned magnesium in air. The magnesium reacted with oxygen to form magnesium oxide.
They recorded the mass of magnesium used and the mass of magnesium oxide formed. Their results are shown in the table.

group	mass of magnesium (g)	mass of magnesium oxide (g)
A	3.2	5.2
B	3.8	6.5
C	4.2	7.0
D	4.9	8.6
E	5.4	8.0
F	6.1	10.7

(a) Use their results to draw a graph below.

- Decide the scale for each axis.
- Label the axes.
- Plot the points.
- Draw a line of best fit.



14a 1 mark

14a 1 mark

14a 1 mark

14a 1 mark

(b) (i) Which group's results do **not** fit the general pattern?
Give the letter.

_____

14bi
1 mark

(ii) How should the class deal with this 'odd' result?

_____

_____

14bii
1 mark

(c) Use the graph to predict the mass of magnesium oxide that will be formed by burning 7.0 g of magnesium.

_____ g

14c
1 mark

(d) The results show the relationship between the mass of magnesium and the mass of magnesium oxide formed.

What conclusion could you draw about this relationship?

_____

_____

_____

_____

14d
1 mark

maximum 8 marks

Total
8

END OF TEST

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