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
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. ____________________________________________________________

(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.

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

![Image of mushrooms and branches](image)

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?

_________________________________________________________________

_________________________________________________________________

(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. ____________________________________________________________

   ____________________________________________________________

2. ____________________________________________________________

   ____________________________________________________________

   maximum 7 marks
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?

________________________________________

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

________________________________________

KS3/06/Sc/Tier 5–7/P1
(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

(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

*maximum 5 marks*
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. [ ]

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

Why must ligaments be able to stretch?

_________________________________________________________________

_________________________________________________________________

KS3/06/Sc/Tier 5–7/P1

6
(c) The diagram below shows an elbow joint.

Why are cartilage and fluid needed in a joint?

__________________________________________________________________________
__________________________________________________________________________

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

Suggest one way this damage will affect the joint.

__________________________________________________________________________
__________________________________________________________________________

maximum 4 marks
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.

<table>
<thead>
<tr>
<th>alloy</th>
<th>mass of each element in 100 g of alloy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>lead (g)</td>
</tr>
<tr>
<td>bronze</td>
<td>95</td>
</tr>
<tr>
<td>solder</td>
<td>62</td>
</tr>
<tr>
<td>steel</td>
<td></td>
</tr>
<tr>
<td>stainless steel</td>
<td></td>
</tr>
<tr>
<td>brass</td>
<td>67</td>
</tr>
</tbody>
</table>

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

________________________

1 mark

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

________________________ and __________________________

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

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.

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

maximum 5 marks
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?
(ii) How many coloured substances were there in green ink?

________

How can you tell?

__________________________________________________________________________
__________________________________________________________________________

(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.

__________________________________________________________________________
__________________________________________________________________________

(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.

__________________________________________________________________________
__________________________________________________________________________

maximum 4 marks
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.

_________________________________________________________________
_________________________________________________________________

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

1. ____________________________________________________________

2. ____________________________________________________________

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

_________________________________________________________________
_________________________________________________________________

maximum 4 marks
7. Each of the observations shown below has one explanation. Draw a line from each observation to the correct explanation.

<table>
<thead>
<tr>
<th>Observation</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A ship going out to sea goes out of sight.</td>
<td>The Earth spins on its axis.</td>
</tr>
<tr>
<td>We have day and night.</td>
<td>The Earth is a sphere.</td>
</tr>
<tr>
<td>We have summer and winter.</td>
<td>The Earth orbits the Sun and the Earth's axis is tilted.</td>
</tr>
<tr>
<td>One year on Earth is 365 days.</td>
<td>Gravity attracts objects towards the Earth.</td>
</tr>
<tr>
<td></td>
<td>The Earth orbits the Sun.</td>
</tr>
</tbody>
</table>

Maximum 4 marks
8. The drawings show the mass and weight of four objects on different planets.

Earth  Mars  Jupiter  Venus

4 kg  6 kg  2 kg  4 kg

40 N  24 N  50 N  36 N

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

______________________________

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

_________________________________________________________________
_________________________________________________________________

(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.

The mass of an astronaut on the Moon is ____________________ the mass of the astronaut on the Earth.
(d) The table below gives information about five planets.

<table>
<thead>
<tr>
<th>planet</th>
<th>distance from the Sun (million km)</th>
<th>time for planet to orbit the Sun (Earth-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Venus</td>
<td>110</td>
<td>0.6</td>
</tr>
<tr>
<td>Earth</td>
<td>150</td>
<td>1.0</td>
</tr>
<tr>
<td>Mars</td>
<td>230</td>
<td></td>
</tr>
<tr>
<td>Jupiter</td>
<td>780</td>
<td>12.0</td>
</tr>
<tr>
<td>Saturn</td>
<td>1400</td>
<td>30.0</td>
</tr>
</tbody>
</table>

(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?

__________________________________________________________________________
__________________________________________________________________________

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

_______ Earth-years

(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.

![Diagram of comet path]

not to scale

maximum 7 marks
9. The diagram shows four forces acting on a plane in flight.

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

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

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

(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.  

maximum 5 marks
10. (a) The diagram below shows the female reproductive system and a ciliated cell.

![Diagram of female reproductive system and ciliated cell]

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

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

_________________________________

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

__________________________________________________________________________
__________________________________________________________________________

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

![Stages of fertilisation and early development]

stage 1

stage 2

stage 3

stage 4
(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 ____________________________

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

_________________________________

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

__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

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

<table>
<thead>
<tr>
<th>human characteristic</th>
<th>inherited only</th>
<th>inherited and affected by environmental conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>eye colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>skin colour</td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*maximum 7 marks*
11. Amena described her idea about the evaporation of water.

I think that water evaporates faster if temperature is increased.

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:

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

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

<table>
<thead>
<tr>
<th>salt solution</th>
<th>copper</th>
<th>iron</th>
<th>magnesium</th>
<th>zinc</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium nitrate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>copper nitrate</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iron nitrate</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
(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.

<table>
<thead>
<tr>
<th>pair of chemicals</th>
<th>result</th>
</tr>
</thead>
<tbody>
<tr>
<td>calcium carbonate + hydrochloric acid</td>
<td>no reaction</td>
</tr>
<tr>
<td>magnesium + hydrochloric acid</td>
<td>a chloride, carbon dioxide and water are formed</td>
</tr>
<tr>
<td>copper + hydrochloric acid</td>
<td>a chloride and hydrogen are formed</td>
</tr>
</tbody>
</table>
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.

_________________________________________________________________
_________________________________________________________________

(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?

_________________________________________________________________
_________________________________________________________________
(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?

__________________________________________________________________________
__________________________________________________________________________

(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

(ii) At 20 seconds, what is the **resultant** force on the shuttle?
  —______ millions of N

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

__________________________________________________________________________

maximum 6 marks
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.

<table>
<thead>
<tr>
<th>group</th>
<th>mass of magnesium (g)</th>
<th>mass of magnesium oxide (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.2</td>
<td>5.2</td>
</tr>
<tr>
<td>B</td>
<td>3.8</td>
<td>6.5</td>
</tr>
<tr>
<td>C</td>
<td>4.2</td>
<td>7.0</td>
</tr>
<tr>
<td>D</td>
<td>4.9</td>
<td>8.6</td>
</tr>
<tr>
<td>E</td>
<td>5.4</td>
<td>8.0</td>
</tr>
<tr>
<td>F</td>
<td>6.1</td>
<td>10.7</td>
</tr>
</tbody>
</table>

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

- Decide the scale for each axis.
- Plot the points.
- Label the axes.
- Draw a line of best fit.
(b) (i) Which group's results do not fit the general pattern?
Give the letter.

_____

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

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

_____. g

(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?
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

maximum 8 marks

Total 8