Science test

Paper 2

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.
1. Sam made a model cat.

He mixed modelling powder with water.
He poured all of the mixture into a mould.
He covered the mould with plastic film so that water could **not** evaporate.

(a) (i) After 10 minutes, Sam removed the model cat from the mould.

![mould and plastic film](image)

Sam had mixed 40 g of modelling powder with 12 g of water. What was the mass of the model cat?

_______ g

(ii) Complete the sentence below using words from the list.

**gas**  **liquid**  **solid**  **vapour**

After 10 minutes, the mixture in the mould changed from a _________________ into a _________________.

1 mark
(b) Sam attached a small magnet to the model cat. The magnet was attracted to the fridge door.

What metal are magnets made from?

(c) Sam made another model, B. He attached a small magnet to model B.

(i) Sam placed model A next to model B. The magnets attracted each other.

Label the poles on the magnet on model B. Use the letters N and S.

(ii) Sam then turned the magnet on model A around. What would happen to model B?

*maximum 5 marks*
2. (a) Sita made a model of three parts of the solar system, the Sun, Earth and Moon. She used a marble, a torch and a tennis ball.

Draw a line from each part of the solar system to the object she used. Draw only three lines.

<table>
<thead>
<tr>
<th>part of the solar system</th>
<th>object</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>marble</td>
</tr>
<tr>
<td>Earth</td>
<td>torch</td>
</tr>
<tr>
<td>Moon</td>
<td>tennis ball</td>
</tr>
</tbody>
</table>
(b) The table below shows the order of some of the planets in our solar system.

Complete the table to show the positions of the Earth, Neptune and the Sun.

<table>
<thead>
<tr>
<th></th>
<th>Mercury</th>
<th>Venus</th>
<th>Mars</th>
<th>Jupiter</th>
<th>Saturn</th>
<th>Uranus</th>
</tr>
</thead>
</table>

(c) The diagram shows a satellite in orbit around the Earth.

(i) Give one use of a satellite.

(ii) Which force keeps the satellite in orbit around the Earth?
Tick the correct box.

- gravity
- friction
- air resistance
- magnetism

maximum 6 marks
3. Pupils investigate the time taken for different types of trainer to slide down a ramp.

(a) What would they use to measure the time for each trainer to slide down the ramp?

(b) Which unit of measurement should they use to record the time taken for the trainer to slide down the ramp? Tick the correct box.

(c) Which factor do they change as they carry out their investigation? Tick the correct box.

- the angle of the ramp
- the type of trainer
- the surface of the ramp
- the length of the ramp
- the person recording the results
- the distance each trainer moves down the ramp
(d) Which **three** factors should they keep the same in their investigation? Tick the **three** correct boxes.

- the angle of the ramp
- the length of the ramp
- the type of trainer
- the colour of each trainer
- the surface of the ramp
- the time the trainer takes to reach the bottom of the ramp

*maximum 5 marks*
4. Sally pulls a sledge in the snow.

(a) (i) Draw an arrow on the rope to show the direction of the force of the rope on the sledge.

Label the arrow \( \mathbf{R} \).

(ii) Draw an arrow on the diagram to show the direction of the force of gravity on the sledge.

Label the arrow \( \mathbf{G} \).

(b) Force \( \mathbf{F} \) is the friction between the sledge and the snow. Sally then pulled the sledge over a concrete path.

Friction is less on snow than on concrete. Give the reason for this.

\[ \text{maximum 3 marks} \]
5. (a) The drawings below show three objects made from copper. Draw a line from each object to the reason for using copper for that object. Draw only three lines.

<table>
<thead>
<tr>
<th>object made from copper</th>
<th>reason for using copper</th>
</tr>
</thead>
<tbody>
<tr>
<td>base of a saucepan</td>
<td>It does not rust.</td>
</tr>
<tr>
<td>coin</td>
<td>It is a good conductor of electricity.</td>
</tr>
<tr>
<td>wires in a cable</td>
<td>It is not magnetic.</td>
</tr>
</tbody>
</table>
(b) Brass is a mixture of copper and zinc. Some keys are made from brass.

Why is brass more suitable than copper for a key? Tick the two correct boxes.

- Brass does not bend as easily as copper.
- Brass is harder than copper.
- Brass is not such a good conductor of electricity as copper.
- Brass is not such a good conductor of heat as copper.
- Brass is a paler colour than copper.
- Brass is not as shiny as copper.

(c) Zinc melts at 420°C. Copper melts at 1085°C.

A scientist heated a mixture of pieces of zinc and pieces of copper to 600°C in a dish.

What would be in the dish at 600°C? Tick the correct box.

- Liquid zinc and liquid copper
- Liquid zinc and solid copper
- Solid zinc and liquid copper
- Solid zinc and solid copper

*maximum 6 marks*
6. Chris collected some sea water near a beach. The sea water had salt dissolved in it. It had sand mixed in it.

(a) Chris separated the sand from the salt water as shown below.

(i) What is this method of separation called?
   Tick the correct box.

   chromatography  distillation  filtration  magnetism

   

   1 mark

(ii) What is substance A?

   

   1 mark

(iii) What is the part labelled B?

   

   1 mark
(b) Chris poured some of the salt water from the flask into a dish. He put the dish on a balance and left it in a warm room for a week.

(i) Look at the two readings on the balance. Work out the decrease in mass.

_______ g

(ii) After one week there was a white solid but no liquid in the dish. What had happened to the water in the dish?

(iii) What was the white solid left in the dish?

maximum 6 marks

Total 6
7. The drawing below shows a barn owl. Barn owls hunt for small animals such as mice.

(a) (i) Look at the drawing of the barn owl.
Give two ways the barn owl is suited for catching small animals.

1. _____________________________
2. _____________________________

(ii) Draw a line from each animal below to the word that describes it. Draw only two lines.

<table>
<thead>
<tr>
<th>animal</th>
<th>word that describes the animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>mouse</td>
<td>predator</td>
</tr>
<tr>
<td>barn owl</td>
<td>prey</td>
</tr>
<tr>
<td></td>
<td>producer</td>
</tr>
</tbody>
</table>
(b) The photograph below shows two young barn owls. They are covered with soft feathers.

Why do the young barn owls need feathers?

(c) Barn owls build nests in farm buildings. Mice eat wheat seeds.

(i) Many old farm buildings have been knocked down so that houses can be built on the farmland.

Give one reason why this has caused the number of barn owls to decrease.

(ii) Suggest one reason why farmers like to have barn owls on their farms.

maximum 7 marks
8. Potatoes have just been planted in a field. The rows of potatoes are covered with clear plastic strips.

(a) (i) The potatoes were planted in winter. How will the plastic strips help the potatoes to start to grow?

(ii) Complete the sentences below with words from the list.

air          heat          light          water

The plastic strips covering the growing potato plants must be clear so the leaves will get enough ________________.

The potato plants grow well because the gaps between the plastic strips will let ________________ and ________________ get into the soil.

(b) The plastic strips break down naturally after a few weeks. Suggest why it is useful that the plastic strips break down naturally.
(c) Aphids are insects that feed on potato leaves. Aphids and potato plants are part of the food chain shown below.

![Food chain diagram](not to scale)

(i) Some farmers put ladybirds on their potato plants to get rid of aphids. How do ladybirds get rid of aphids?

(ii) What else could farmers use to get rid of aphids? Tick the correct box.

- fertiliser
- insecticide
- slug pellets
- weedkiller

*maximum 7 marks*
9. The drawings below show Caroline diving into a swimming pool. As she falls, gravitational potential energy is changed into kinetic energy.

(a) Why does Caroline have no kinetic energy at A?
(b) The table shows Caroline’s gravitational potential energy and kinetic energy at four stages of the dive.

<table>
<thead>
<tr>
<th>stage of the dive</th>
<th>total energy (kJ)</th>
<th>gravitational potential energy (kJ)</th>
<th>kinetic energy (kJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>8</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>8</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

(i) Write the missing kinetic energy value for stage D in the table.

(ii) As Caroline falls there is no loss of energy to the air.
How do the energy values for stages A, B, C and D show this?

__________________________________________________________________________
__________________________________________________________________________

(c) (i) Give the name of the force that causes Caroline to speed up as she falls.

__________________________________________________________________________

(ii) Caroline takes 0.5 s to fall from A to B and from B to C and from C to D.
How can you tell from the drawings opposite that she is speeding up as she falls?

__________________________________________________________________________
__________________________________________________________________________

(d) When Caroline enters the water she slows down.
Give the name of the force that slows her down.

maximum 6 marks
10. (a) Max built circuit 1 as shown below.

```
A  B  C  D  E
```

He closed the switch, S, and all the bulbs came on. One of the bulbs then broke and all the bulbs went off.

Which bulb must have broken? Give the letter.

(b) Max built circuit 2 as shown below.

He connected a plastic comb and a metal key in different parts of the circuit.
Look carefully at circuit 2.
Complete the table below to show which bulbs in circuit 2 will be on or off when different switches are open or closed. Write on or off in the boxes below.

<table>
<thead>
<tr>
<th>switch 1</th>
<th>switch 2</th>
<th>bulb P</th>
<th>bulb Q</th>
<th>bulb R</th>
</tr>
</thead>
<tbody>
<tr>
<td>open</td>
<td>open</td>
<td>off</td>
<td>off</td>
<td>off</td>
</tr>
<tr>
<td>open</td>
<td>closed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>closed</td>
<td>open</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Max built circuit 3 using a battery, two bulbs and three ammeters.

![Circuit 3 diagram]

The current reading on ammeter A_1 was 0.8 amps. What would be the reading on ammeters A_2 and A_3? Place one tick in the table by the correct pair of readings.

<table>
<thead>
<tr>
<th>reading on ammeter A_2 (amps)</th>
<th>reading on ammeter A_3 (amps)</th>
<th>correct pair of readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>0.4</td>
<td></td>
</tr>
</tbody>
</table>

*maximum 4 marks*
11. Some pupils made an electric cell using two different metals and a lemon. They put strips of copper and zinc into a lemon and connected them to the terminals of an electric clock.

(a) Look at the photograph.

What evidence is there that they have made an electric cell?

(b) The pupils had pieces of copper, zinc, iron and magnesium and some lemons. They wanted to find out which pair of metals made the cell with the biggest voltage.

What equipment should they use to measure the voltage of their cells?

(c) In their investigation they used different pairs of metals.

Give one factor that they should keep the same.
(d) The pupils measured the voltage produced by different pairs of metals. Their results are recorded below.

<table>
<thead>
<tr>
<th>Voltage produced by each pair of metals (volts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>magnesium</td>
</tr>
<tr>
<td>copper</td>
</tr>
<tr>
<td>iron</td>
</tr>
<tr>
<td>zinc</td>
</tr>
<tr>
<td>magnesium</td>
</tr>
</tbody>
</table>

Which pair of metals made the cell with the biggest voltage?

_________________________ and _______________________

(e) Look at the results in the table above.
Why should the pupils not use pairs of the same type of metal for the clock?

_________________________
12. The word equation for the reaction between magnesium carbonate and hydrochloric acid is shown below.

\[
\text{magnesium carbonate} + \text{hydrochloric acid} \rightarrow \text{magnesium chloride} + \text{carbon dioxide} + \text{water}
\]

(a) Sadiq added hydrochloric acid to magnesium carbonate in a flask.

(i) Suggest the pH of hydrochloric acid.

(ii) The carbon dioxide produced was bubbled through lime water. How would the lime water change?

(b) Sadiq repeated the experiment by adding sulphuric acid to magnesium carbonate.

Complete the word equation for the reaction that took place.

\[
\text{magnesium carbonate} + \text{sulphuric acid} \rightarrow \text{________________________} + \text{carbon dioxide} + \text{water}
\]
(c) Sadiq made a model volcano.
He put magnesium carbonate into the model.
He added vinegar and a drop of washing-up liquid.

The mixture fizzed, and froth poured out of the model volcano.

(i) The vinegar reacted with the magnesium carbonate.

Suggest the pH of vinegar.

(ii) The froth running down the side of the model represents part of a real volcano.
Give the name of this part.
13. Abi investigated how adding salt to water affects the way an object floats. She used the apparatus below.

![Diagram of apparatus]

She used a scale inside a test-tube to measure the length of the test-tube above the water level.

(a) What factor did Abi change as she carried out her investigation (the independent variable)?

(b) Abi plotted her results on a graph.
(i) **On the graph**, circle the result which does **not** fit the pattern.

(ii) Suggest **one** reason for this result.

__________________________________________________________________________
__________________________________________________________________________

(c) Abi said she should repeat the measurement that does **not** fit the pattern. Robert said there is **no** need to repeat this measurement.

Who do you agree with?
Tick **one** box.

Abi [ ] Robert [ ]

Explain your answer.
__________________________________________________________________________
__________________________________________________________________________
__________________________________________________________________________

(d) Abi and Robert wrote the conclusions listed below.

Look at the graph of their results and tick whether each conclusion is **true** or **false** or whether you **cannot tell**.

<table>
<thead>
<tr>
<th>conclusions</th>
<th>true</th>
<th>false</th>
<th>cannot tell</th>
</tr>
</thead>
<tbody>
<tr>
<td>The more salt added, the higher the test-tube floats in the water.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>The length of the test-tube is 8 cm.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>When 10 g of salt is added, the length of the test-tube above the water will be 34 mm.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
<tr>
<td>Doubling the amount of salt doubles the length of the test-tube above the water.</td>
<td>[ ]</td>
<td>[ ]</td>
<td>[ ]</td>
</tr>
</tbody>
</table>

*maximum 6 marks*
14. A teacher mixed iron filings with sulphur on a metal tray. She heated the mixture in a fume cupboard. Sulphur is yellow. Iron filings are grey.

The mixture glowed very brightly. The teacher turned off the bunsen burner. The glow spread through the mixture. When the mixture cooled, a black solid called iron sulphide was left.

(a) From this information, give one way you can tell that a chemical reaction took place.

__________________________________________________________________________
__________________________________________________________________________

(b) What type of substance is each of the chemicals involved in this reaction? Choose from:

- metallic element
- mixture
- non-metallic element
- compound

iron _______________________________
sulphur ___________________________
iron sulphide _______________________
(c) Raj held a magnet near to each of the three chemicals.

By each chemical in the table, write yes or no to show if the chemical was magnetic.

One has been done for you.

<table>
<thead>
<tr>
<th>chemical</th>
<th>Was the chemical magnetic?</th>
</tr>
</thead>
<tbody>
<tr>
<td>sulphur</td>
<td>no</td>
</tr>
<tr>
<td>iron</td>
<td>no</td>
</tr>
<tr>
<td>iron sulphide</td>
<td>no</td>
</tr>
</tbody>
</table>

(d) (i) When iron is heated with sulphur, iron sulphide is formed.

Give the name of the solid formed when zinc is heated with sulphur.

(ii) Some fossil fuels contain sulphur.

When fuels burn, sulphur reacts with oxygen.

Complete the word equation for this reaction.

\[
\text{sulphur + oxygen} \rightarrow \text{__________________________}
\]

maximum 6 marks
15. **Table 1** gives information about 100 g of five different foods.

<table>
<thead>
<tr>
<th>food</th>
<th>energy per 100 g of food (kJ)</th>
<th>nutrients per 100 g of each food</th>
<th>protein (g)</th>
<th>fat (g)</th>
<th>carbohydrate (g)</th>
<th>calcium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>banana</td>
<td>403</td>
<td></td>
<td>1.2</td>
<td>0.3</td>
<td>23.2</td>
<td>6</td>
</tr>
<tr>
<td>wholemeal bread</td>
<td>914</td>
<td></td>
<td>9.2</td>
<td>2.5</td>
<td>41.6</td>
<td>54</td>
</tr>
<tr>
<td>butter</td>
<td>3031</td>
<td></td>
<td>0.5</td>
<td>81.7</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>cheese</td>
<td>1708</td>
<td></td>
<td>22.5</td>
<td>34.4</td>
<td>0.1</td>
<td>720</td>
</tr>
<tr>
<td>milk</td>
<td>275</td>
<td></td>
<td>3.2</td>
<td>3.9</td>
<td>4.8</td>
<td>115</td>
</tr>
</tbody>
</table>

**table 1**

(a) Look at **table 1**.

(i) Which of the four **nutrients**, protein, fat, carbohydrate or calcium, provides most of the energy in the cheese?

(ii) Which of the four **nutrients** provides most of the energy in the wholemeal bread?

(iii) Which of the four **nutrients** is needed for growth and repair?

(b) The recommended daily amount of protein for a woman is 45 g. Look at **table 1**.

How many grams of cheese would provide 45 g of protein?

Tick the correct box.

50 g [ ] 100 g [ ] 150 g [ ] 200 g [ ]
(c) **Not** all the types of nutrients needed for a balanced diet are shown in **table 1**.

Give the name of **one** of the missing types of nutrient.


(d) **Table 2** shows the recommended daily amount of calcium for a person in four stages of the human life cycle.

We need calcium for healthy teeth and bones.

<table>
<thead>
<tr>
<th>person</th>
<th>recommended daily amount of calcium (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a baby aged 6 months</td>
<td>600</td>
</tr>
<tr>
<td>a woman before she is pregnant</td>
<td>500</td>
</tr>
<tr>
<td>a pregnant woman</td>
<td>1200</td>
</tr>
<tr>
<td>a breast-feeding woman</td>
<td></td>
</tr>
</tbody>
</table>

**table 2**

(i) Use information in **table 2** to estimate how much calcium a breast-feeding woman should have each day.

______ mg

(ii) Explain why she would need this amount of calcium.


1 mark

1 mark

**maximum 7 marks**
16. The diagram shows a plant cell.

(a) Give the name of part A.

______________________________

Give the function of part A.

______________________________

(b) Give the name of part E.

______________________________

Give the function of part E.

______________________________
(c) Give the letters of two parts that are present in plant cells but not in animal cells.

_______ and _______

(d) How can you tell that the cell on the opposite page is from a leaf and not from a root?

END OF TEST

maximum 6 marks