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.
- Do not use any rough paper.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.
1. (a) Peter used the equipment below to investigate growth of plants.

<table>
<thead>
<tr>
<th>equipment</th>
<th>measurement</th>
<th>unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermometer</td>
<td>measures the <strong>time</strong> for the experiment</td>
<td>cm</td>
</tr>
<tr>
<td>Timer</td>
<td>measures the <strong>temperature</strong> of the air</td>
<td>°C</td>
</tr>
<tr>
<td>Measuring tape 2</td>
<td>measures the <strong>length</strong> of a plant</td>
<td>days</td>
</tr>
<tr>
<td>Balance scale</td>
<td>measures the <strong>mass</strong> of a plant</td>
<td>grams</td>
</tr>
</tbody>
</table>

(i) Draw one line from each piece of equipment to the measurement Peter made.

(ii) Then draw one line from each measurement to the correct unit.
(b) The diagrams below show four measuring containers.

Which is the best container to use to measure 15 cm³ of water?
Write the letter.

______

Why did you choose this container?

________________________________________

________________________________________

maximum 6 marks
2. Anna has a can of deodorant that she uses once each day. Before she uses the deodorant she measures the mass of the can.

(a) Her results are shown in the graph below.

(i) What was the mass of the can of deodorant on day 1?

\[ \text{g} \]

(ii) How did the mass change as Anna used the deodorant?

(iii) Anna did not use the deodorant on day 6. How can you tell this from the graph?
(b) The deodorant can has a warning sign on it.

What does this warning sign mean?

(c) A deodorant contains a solution of perfume and alcohol.

What happens to the perfume when it is mixed with the alcohol? Tick the correct box.

- It boils. [ ]
- It dissolves. [ ]
- It freezes. [ ]
- It melts. [ ]

(d) Anna sprayed the liquid deodorant under her arms. After a few minutes, her skin had dried.

What happened to the liquid? Tick the correct box.

- It evaporated. [ ]
- It dissolved. [ ]
- It boiled. [ ]
- It condensed. [ ]

*maximum 6 marks*
3. The picture below shows a mammal called an otter.

(a) Give one feature that only mammals have.

(b) Otters live by rivers.

Give one way the otter is suited for swimming.
Use the picture above to help you.

(c) Otter cubs are born in a burrow under the ground.

(i) How does this help the otter cubs survive?

(ii) Why must the burrow be above the level of the water in the river?

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(d) Otters catch fish and birds for food.

Which word below describes an otter? Tick the correct box.

- herbivore
- predator
- prey
- producer

(e) The information below describes what some animals eat.

- Insects eat plants.
- Birds and fish eat insects.
- Otters eat fish and birds.

Complete the food web using this information. One box has been done for you.

(f) In the 1960s, the number of otters in England decreased. To increase otter numbers, scientists released otters in pairs (one male and one female).

Why were the otters released in pairs?

maximum 8 marks
4. (a) The diagrams below show how much heat is lost from different parts of a house every second.

Through which part of the house above is most heat lost?

(b) Part of the house is insulated to reduce the loss of heat. This is shown below.

(i) Which part of the house has been insulated?

(ii) Explain your answer.
(c) The table below gives information about three fossil fuels that can be used to heat a house.

<table>
<thead>
<tr>
<th>fuel</th>
<th>physical state</th>
<th>energy released when 1g is burned (J)</th>
<th>Does the fuel produce these substances when burned?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>water</td>
</tr>
<tr>
<td>coal</td>
<td>solid</td>
<td>25 000</td>
<td>yes</td>
</tr>
<tr>
<td>oil</td>
<td>liquid</td>
<td>42 000</td>
<td>yes</td>
</tr>
<tr>
<td>methane</td>
<td>gas</td>
<td>55 000</td>
<td>yes</td>
</tr>
</tbody>
</table>

(i) Which fuel in the table releases the **least** energy when 1 g is burned?

(ii) Methane **can** be compressed.

Which information in the table shows that methane can be compressed?

(iii) Sulphur dioxide causes acid rain.

Use the table to explain why burning methane does **not** produce acid rain.

 maximum 6 marks
5. (a) Green beans contain vitamin C.

Which other food is a good source of vitamin C? Tick the correct box.

- cheese
- chicken
- eggs
- oranges

(b) The amount of vitamin C changes in the beans and in the water as the beans are cooked. The shading shows how it changes.

Use the diagram. How does the amount of vitamin C in the beans and in the water change as the beans are cooked? Tick one box in each row.

<table>
<thead>
<tr>
<th>amount of vitamin C</th>
<th>increases</th>
<th>decreases</th>
<th>stays the same</th>
</tr>
</thead>
<tbody>
<tr>
<td>in the beans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in the water</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(c) Cheese is a source of calcium.

Why do we need calcium?

(d) Draw a line from each nutrient to a good source of that nutrient in our diet.

<table>
<thead>
<tr>
<th>nutrient</th>
<th>source of nutrient</th>
</tr>
</thead>
<tbody>
<tr>
<td>starch</td>
<td>lean chicken meat</td>
</tr>
<tr>
<td>fat</td>
<td>jam</td>
</tr>
<tr>
<td>protein</td>
<td>pasta</td>
</tr>
<tr>
<td>sugar</td>
<td>margarine</td>
</tr>
</tbody>
</table>

(e) The diagram shows part of the human digestive system.

(i) Write the letter which labels the small intestine.

_______

(ii) Write the letter which labels the stomach.

_______

Maximum 7 marks
6. Tom is doing a bungee jump from a bridge.

He is attached to one end of an elastic rope. The other end of the rope is attached to the bridge. Tom jumps from the bridge.

(a) (i) What force makes Tom fall towards the ground?

(ii) Tom does not hit the river below the bridge. What makes Tom stop falling before he hits the river?

(b) The next person to do a bungee jump is Jill.

Jill weighs less than Tom. Complete the sentence below using words from the box.

| more than | less than | the same as |

When Jill jumps, the rope will stretch ____________________________

it did when Tom jumped.
(c) Jill's dad watches her doing the bungee jump. He is standing a long way from the bridge. Jill shouts 'bungee' at the same time as she jumps off the bridge. Jill's dad sees her jump before he hears her shout.

(i) Why does Jill's dad see her jump before he hears her shout?

(ii) Tom is near Jill when she shouts. Her dad is far away.

Complete the sentence to describe how the shout will sound to Tom compared with Jill's dad. Use one word from the box.

The shout will sound ______________________ to Tom.

(iii) What part of Tom's ear vibrates when he hears Jill shout?
7. (a) Draw a line from each circuit symbol below to the correct name. Draw only four lines.

<table>
<thead>
<tr>
<th>circuit symbol</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ammeter</td>
</tr>
<tr>
<td></td>
<td>switch</td>
</tr>
<tr>
<td></td>
<td>motor</td>
</tr>
<tr>
<td></td>
<td>battery</td>
</tr>
<tr>
<td></td>
<td>bulb</td>
</tr>
</tbody>
</table>

(b) Fred made circuit 1 as shown below.

![Circuit 1 Diagram]

Give the name of the part that is the energy source for the circuit.

________________________
(c) Fred then made **circuit 2** as shown below.

![Circuit Diagram]

In the table below, tick a box to show whether **circuit 1** and **circuit 2** are series or parallel circuits. Tick only **two** boxes.

<table>
<thead>
<tr>
<th>series</th>
<th>parallel</th>
</tr>
</thead>
<tbody>
<tr>
<td>circuit 1</td>
<td></td>
</tr>
<tr>
<td>circuit 2</td>
<td></td>
</tr>
</tbody>
</table>

(d) What metal is usually used for wires in electric circuits?

maximum 6 marks
8. Nancy is a dancer.

(a) When Nancy dances her arms and legs are moved by pairs of antagonistic muscles.

How do antagonistic muscle pairs work? Tick the correct box.

- Both muscles contract at the same time. [ ]
- One muscle is big and the other is small. [ ]
- As one muscle contracts, the other relaxes. [ ]
- One muscle is strong and the other is weak. [ ]
- Both muscles relax at the same time. [ ]
(b) As Nancy dances her breathing changes because she needs more oxygen. The graph below shows how the volume of air in her lungs changes when she dances.

From the graph, give two ways her breathing changes when she dances.

1. ______________________________________________________
2. ______________________________________________________

(c) Nancy’s muscle cells produce carbon dioxide as she dances.

Which of the following shows how the carbon dioxide is removed from Nancy’s body?
Tick the correct box.

- muscle cells → bloodstream → windpipe → lungs → nose
- muscle cells → windpipe → lungs → bloodstream → nose
- muscle cells → bloodstream → lungs → windpipe → nose
- muscle cells → windpipe → bloodstream → lungs → nose

*maximum 4 marks*
9. (a) The table below shows the pH of four acidic liquids.

<table>
<thead>
<tr>
<th>Acidic liquid</th>
<th>pH</th>
</tr>
</thead>
<tbody>
<tr>
<td>grapefruit juice</td>
<td>3.1</td>
</tr>
<tr>
<td>ethanoic acid</td>
<td>3.0</td>
</tr>
<tr>
<td>lemonade</td>
<td>4.4</td>
</tr>
<tr>
<td>dilute hydrochloric acid</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Which of these liquids is the **least** acidic?

(b) Emilio cooked an egg until it was hard-boiled. He put the egg in a beaker of dilute hydrochloric acid as shown.

(i) The egg shell reacted completely with the acid. After two days the pH of the liquid in the beaker was 2.5.

How did the **acidity** of the liquid in the beaker change? Use the table above to help you.
(ii) Emilio put another hard-boiled egg in some ethanoic acid. It took longer for the shell to react completely.

Use the table opposite to suggest a reason for this.


(c) The chemical formulae for four acids are shown in the table below.

<table>
<thead>
<tr>
<th>sulphuric acid</th>
<th>hydrochloric acid</th>
<th>nitric acid</th>
<th>ethanoic acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>H₂SO₄</td>
<td>HCl</td>
<td>HNO₃</td>
<td>CH₃COOH</td>
</tr>
</tbody>
</table>

(i) Give the name of the element that is present in all four acids.

__________________________

(ii) Give the names of the two other elements present in sulphuric acid.

1. _______________________
2. _______________________

(iii) How many atoms are there in the formula HNO₃ (nitric acid)?

_______

maximum 7 marks
10. The photograph below shows some water lilies in early summer.

![Water lilies photo]

This diagram shows a water lily plant.

(a) **Water lilies do not** grow well in moving water. 
Suggest a reason for this.

(b) **During the winter, many water lily plants do not** grow new leaves.
Suggest one reason why the plants do not grow new leaves in the winter.
(c) (i) Give one way water lily plants are adapted to live in water.

(ii) Explain how this adaptation helps the water lily to grow in water.

(d) In the summer, water lilies produce large yellow flowers. The flowers float on the surface of the pond.

Suggest one way these colourful floating flowers help the water lily to reproduce.

(e) When water lilies cover the pond surface with leaves, the pond does not get as hot during the day.

Explain why the pond does not get as hot.

*maximum 6 marks*
11. Sara investigated making bread. She described what she did below.

I mixed flour, water, sugar and yeast to make bread dough.

I put 50 cm³ of dough into a measuring cylinder.

I put the measuring cylinder into a water bath at 30°C.

I measured the volume of the dough after 30 minutes.

Sara repeated the experiment with the water bath at different temperatures. Her results are shown below.

<table>
<thead>
<tr>
<th>temperature of water bath (°C)</th>
<th>volume of dough (cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at the start</td>
</tr>
<tr>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>45</td>
<td>50</td>
</tr>
<tr>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>90</td>
<td>50</td>
</tr>
</tbody>
</table>

(a) Use the table of results. What question did Sara investigate?
(b) At each temperature Sara used dough from the same mixture.

(i) Give one other way Sara made her experiment fair.

(ii) Why would using dough from a different mixture make Sara's experiment unfair?

(c) Sara plotted her results on the graph below.

Describe the relationship between the variables on the graph from 30°C to 90°C.

(d) Sara made a prediction.

The volume of the dough will increase because of the yeast.

What could she do to test her prediction?

maximum 6 marks
12. Hannah has three rods (A, B and C) made from different metals. One rod is a magnet; one is made of copper; and one is made of iron. She does not know which rod is which.

Each rod has a dot at one end.

(a) Hannah uses only a bar magnet to identify each rod. She puts each pole of the bar magnet next to the dotted end of each rod.

Complete Hannah’s observations in the table below. Write if each rod is copper, iron or a magnet.

<table>
<thead>
<tr>
<th>test</th>
<th>observations</th>
<th>type of rod</th>
</tr>
</thead>
<tbody>
<tr>
<td>rod A</td>
<td>attract</td>
<td>Rod A is</td>
</tr>
<tr>
<td></td>
<td>attract</td>
<td></td>
</tr>
<tr>
<td>rod B</td>
<td>nothing</td>
<td>Rod B is</td>
</tr>
<tr>
<td></td>
<td>happens</td>
<td></td>
</tr>
<tr>
<td>rod C</td>
<td>attract</td>
<td>Rod C is</td>
</tr>
</tbody>
</table>

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(b) Hannah uses the iron rod to make an electromagnet.

When the switch is closed the iron rod becomes an electromagnet. Give two ways Hannah could make the electromagnet stronger.

1. 

2. 

maximum 5 marks
13. Joanne added iron filings to copper sulphate solution. She observed the reaction after one week.

(a) What evidence in the diagrams shows that a chemical reaction has taken place?

(b) The reaction between iron and copper sulphate is a **displacement** reaction.

(i) Give the name of the orange metal visible after one week.

(ii) What is the name of the compound formed in this reaction?

(iii) Joanne poured the green solution into another test tube. She added some copper pieces to the solution. Will a displacement reaction occur?

   yes [ ]  no [ ]

   Explain your answer.

   ____________________________________________

   ____________________________________________
(c) Part of the reactivity series of metals is shown below.

Use the information above.
Which **two** metals would react with aluminium nitrate in a displacement reaction?

Tick the **two** correct boxes.

- calcium
- potassium
- zinc
- lead

**maximum 5 marks**
14. Pluto was discovered in 1930. It was classified as a planet. In 2006, scientists agreed that Pluto is **not** a planet.

(a) The diagram below shows our solar system.

(i) **From the diagram, what supports the idea that Pluto is a planet?**

(ii) **From the diagram, what supports the idea that Pluto is **not** a planet?**

(b) The table below shows information about planets in our solar system.

<table>
<thead>
<tr>
<th>planet</th>
<th>diameter (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>4800</td>
</tr>
<tr>
<td>Venus</td>
<td>12200</td>
</tr>
<tr>
<td>Earth</td>
<td>12800</td>
</tr>
<tr>
<td>Mars</td>
<td>6800</td>
</tr>
<tr>
<td>Jupiter</td>
<td>142600</td>
</tr>
<tr>
<td>Saturn</td>
<td>120200</td>
</tr>
<tr>
<td>Uranus</td>
<td>49000</td>
</tr>
<tr>
<td>Neptune</td>
<td>50000</td>
</tr>
</tbody>
</table>

Pluto has a diameter of 2300 km. How does this information suggest to scientists that Pluto is **not** a planet?
(c) An object called Charon orbits Pluto.

How does the presence of Charon support the idea that Pluto is a planet?

(d) The table below shows the composition of the atmosphere of some of the objects in our solar system.

<table>
<thead>
<tr>
<th>object</th>
<th>atmosphere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>none</td>
</tr>
<tr>
<td>Venus</td>
<td>mainly carbon dioxide</td>
</tr>
<tr>
<td>Earth</td>
<td>mainly nitrogen and oxygen</td>
</tr>
<tr>
<td>Neptune</td>
<td>hydrogen, helium and methane</td>
</tr>
<tr>
<td>Earth’s moon</td>
<td>none</td>
</tr>
<tr>
<td>Titan (a moon)</td>
<td>nitrogen and methane</td>
</tr>
<tr>
<td>Pluto</td>
<td>nitrogen and methane</td>
</tr>
</tbody>
</table>

Atmosphere is **not** used to classify objects as moons or planets. Use the information above to suggest a reason for this.

(e) Why do you think scientists found it difficult to decide how Pluto should be classified?

maximum 6 marks
15. Every autumn the BBC asks people all over the UK to record when and where they see the first ripe conkers. The results are shown on a website.

Conkers only ripen in the autumn.

![Conker image]

<table>
<thead>
<tr>
<th>number of observations in 2005: 4209</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>number of sightings</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>0 1 2 3 4 5 6 7 8 9</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>week</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>start of August</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>start of September</td>
</tr>
</tbody>
</table>

(a) Some pupils discussed these results and made some conclusions.

Tick a box in each row to say whether the conclusion is true or false or whether you cannot tell based on the results.

<table>
<thead>
<tr>
<th>true</th>
<th>false</th>
<th>cannot tell</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

There are more conkers in 2005 than there have been in other years.

There are only 248 conker trees in the UK.

The most common time for the first ripe conkers was in September.

The number of sightings decreased between August and September.
(b) The map shows where members of the public saw ripe conkers in the UK.

(i) Suggest one reason why it is a good idea to collect data by asking the public to observe when conkers ripen.

(ii) Suggest one reason why it is not a good idea to collect data by asking the public to observe when conkers ripen.

(c) The data was collected in one year.

What data would the BBC need to collect to find out if the time of year in which conkers ripen is changing?

(d) Conkers ripen earlier in the south of the country than in the north.

Suggest why conkers ripen earlier in the south.

END OF TEST