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. (a) Draw a line from each electrical circuit to the correct circuit diagram. Draw only four lines.
(b) In each circuit below, bulb 1 breaks and goes off.

Under each circuit diagram below, tick the correct boxes to show if bulb 2 and bulb 3 are on or off.

![Circuit A](image1)

![Circuit B](image2)

<table>
<thead>
<tr>
<th></th>
<th>on</th>
<th>off</th>
</tr>
</thead>
<tbody>
<tr>
<td>bulb 1 breaks</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>bulb 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bulb 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>on</th>
<th>off</th>
</tr>
</thead>
<tbody>
<tr>
<td>bulb 1 breaks</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>bulb 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bulb 3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(c) Give the name of the part that provides energy for each circuit.

(d) Why is copper used for wires in a circuit?
Tick the correct box.

- Copper does not stick to a magnet.
- Copper is a brown metal.
- Copper is a good conductor of electricity.
- Copper is a good conductor of heat.

*maximum 6 marks*
2. The diagram below shows the Hubble telescope in orbit around the Earth.

(a) Which force keeps the telescope in orbit around the Earth?  
Tick the correct box.

- air resistance  
- friction  
- gravity  
- magnetism

(b) The Hubble telescope is a satellite used for looking at planets and stars.  
Give one other use of satellites.

(c) Fill each of the gaps in the following sentences with a different word from the box below.

<table>
<thead>
<tr>
<th>absorbs</th>
<th>produces</th>
<th>reflects</th>
</tr>
</thead>
</table>

You can see the Sun because it ____________________ light.

You can see a satellite because it ____________________ light.
(d) The bar chart shows the size of five planets compared to the size of Earth.

The planet Uranus is four times the size of Earth. **On the chart above**, draw a bar for the planet Uranus.

(e) (i) Arrange the following in order of size, starting with the smallest.

<table>
<thead>
<tr>
<th>Sun</th>
<th>Hubble telescope</th>
<th>Earth</th>
</tr>
</thead>
</table>

smallest.......................................................................................................................... largest

(ii) Some stars are bigger than the Sun but they look smaller. Why do they look smaller than the Sun? Tick the correct box.

- They are brighter than the Sun.  
- They are the same colour as the Sun.  
- They are further away than the Sun.  
- They are nearer than the Sun.

*maximum 6 marks*
3. Raj put a piece of chalk in one container and a piece of granite in another container. He shook both containers for two minutes. The photographs below show what happened.

(a) (i) Give two ways the chalk had changed.
1. 
2. 

(ii) Suggest why the granite did not change.

(b) A map of a coastline is drawn below. Waves crash against the rocks.

Which rock is chalk and which rock is granite?
Give the letters from the map.

chalk ______ granite ______
(c) The photograph below shows the remains of an animal found in chalk rock.

![Photograph of an animal remains in chalk rock]

(i) What are the remains of living things found in rock called?

____________________________

(ii) Look carefully at the animal remains in the photograph. Which animal could it be related to? Tick the correct box.

- snail
- starfish
- ladybird
- slug

Give a reason for your answer.

____________________________

(d) Granite is formed underground from very hot melted rock.

(i) Animal remains are not found in granite. Give the reason for this.

____________________________

____________________________

(ii) What is hot melted rock called when it is underground? Tick the correct box.

- sand
- magma
- lava
- mud

maximum 8 marks

KS3/08/Sc/Tier 3–6/P2 7 Photograph © Sedgwick Museum of Earth Sciences, University of Cambridge
4. (a) Draw a line from each change of state to the correct name. Draw only **four** lines.

<table>
<thead>
<tr>
<th>change of state</th>
<th>name</th>
</tr>
</thead>
<tbody>
<tr>
<td>solid to liquid</td>
<td>evaporating</td>
</tr>
<tr>
<td>liquid to gas</td>
<td>melting</td>
</tr>
<tr>
<td>gas to liquid</td>
<td>condensing</td>
</tr>
<tr>
<td>liquid to solid</td>
<td>freezing</td>
</tr>
</tbody>
</table>

(b) Kate made some ice cubes from pure water. She used a sensor to measure the temperature of the ice.

What temperature will the sensor show when the ice is melting?

_______ °C
(c) Kate made some more ice cubes from salt solutions. She used a different amount of salt in each ice cube.

The table shows the temperature at which the ice cubes melted.

<table>
<thead>
<tr>
<th>mass of salt in each ice cube (g)</th>
<th>temperature ice cube melted (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>–4</td>
</tr>
<tr>
<td>10</td>
<td>–8</td>
</tr>
<tr>
<td>15</td>
<td>–11</td>
</tr>
<tr>
<td>20</td>
<td>–15</td>
</tr>
</tbody>
</table>

Look at the table above.
As the mass of salt increased, what happened to the temperature at which the ice cube melted?

(d) In very cold weather a mixture of salt and sand is spread on roads.

Why are salt and sand used?
Tick the two correct boxes.

- Salt makes the roads white.
- Sand dissolves in water.
- Salt makes water freeze.
- Sand increases friction between car tyres and the road.
- Salt makes ice melt.
- Sand makes water freeze.

maximum 7 marks
5. Sharon is riding her horse. She is wearing a riding hat.

(a) Give the name of one organ the riding hat protects.

(b) The horse is a mammal. Give one fact about horses that shows they are mammals.

(c) When the horse is running, some of its organs do more work.

<table>
<thead>
<tr>
<th>organ</th>
<th>what the organ does</th>
</tr>
</thead>
<tbody>
<tr>
<td>heart</td>
<td>It takes in oxygen faster.</td>
</tr>
<tr>
<td></td>
<td>It moves the bones faster.</td>
</tr>
<tr>
<td>lung</td>
<td>It digests food faster.</td>
</tr>
<tr>
<td></td>
<td>It pumps blood faster.</td>
</tr>
</tbody>
</table>
(d) The drawing shows a horsefly.

(i) The horsefly is an insect.
Which of the following features do insects have?
Tick the three correct boxes.

- They have a backbone. [ ]
- They have a segmented body. [ ]
- They have six legs. [ ]
- They have hair. [ ]
- They have scales. [ ]
- They have two pairs of wings. [ ]

(ii) Female horseflies bite horses and feed on their blood.
Male horseflies feed on plants.

Draw a line from each horsefly below to the word that describes the way it feeds.
Draw only two lines.

<table>
<thead>
<tr>
<th>horsefly</th>
<th>describing word</th>
</tr>
</thead>
<tbody>
<tr>
<td>female horsefly</td>
<td>herbivore</td>
</tr>
<tr>
<td>male horsefly</td>
<td>carnivore</td>
</tr>
<tr>
<td></td>
<td>producer</td>
</tr>
<tr>
<td></td>
<td>prey</td>
</tr>
</tbody>
</table>

*maximum 6 marks*
6. Abdul put cress seeds on wet filter paper in dishes. He put 20 seeds in each dish. Every day he added 5 cm$^3$ of water to each dish. He kept each dish at a different temperature.

The bar chart below shows how many seeds had germinated after two days.
Use the bar chart to answer the following questions.

(a) (i) How many different temperatures did Abdul use?

(ii) What was the lowest temperature Abdul used?

(iii) How many seeds had germinated at 21°C?

(iv) Abdul said 23°C was better than 21°C for seeds to germinate. Was he correct?

Tick the correct box.

  yes  no

Use the bar chart to help you give a reason for your choice.

(v) How does the bar chart show that 22°C is the best temperature for seeds to germinate?

(b) Give one way Abdul made sure his investigation was a fair test.

maximum 6 marks
7. The drawing below shows a mole. Moles dig tunnels through soil.

(a) Give one way a mole is suited for digging through soil.

(b) Moles are part of the food chain shown below.

(i) Which living thing in this food chain do moles eat?

(ii) Which living thing in this food chain is a predator of moles?
(c) Some people use mole-scarers to get rid of moles from their gardens.

Two different mole-scarers are shown below. They both produce sounds that scare moles away.

(i) Where does the energy come from for the solar-powered mole-scarer?

(ii) Suggest one reason for using a solar-powered mole-scarer instead of a battery-powered mole-scarer.

(iii) Some gardeners use poison to kill moles.

Suggest one reason for using a mole-scarer rather than poison to get rid of moles.

maximum 6 marks
8. (a) The diagrams below show the patterns produced on an oscilloscope by three different sound waves.

(i) Which two waves have the same loudness? Write the letters.

______ and ______

How do the diagrams show this?

(ii) Which two waves have the same pitch? Write the letters.

______ and ______

How do the diagrams show this?

(iii) Shuli is listening to a sound that produces the pattern below.

Describe how the sound that Shuli hears changes between X and Y.
(b) The table below shows the maximum time a person can listen to music at different sound levels without damage to the ear.

<table>
<thead>
<tr>
<th>sound level (decibels)</th>
<th>maximum time (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>8</td>
</tr>
<tr>
<td>88</td>
<td>4</td>
</tr>
<tr>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>92</td>
<td>1</td>
</tr>
<tr>
<td>94</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Estimate the maximum time a person could listen to a sound of 87 decibels.

______ hours

(c) The diagram below shows part of the human ear.

What happens to the ear drum as a sound gets louder?

maximum 5 marks
9. Jenny put a spring over a wooden rod. She pressed the spring down 2 cm. She let go of the spring and measured the height it reached.

Jenny repeated her experiment. She pressed the spring down more each time. Her results are shown in the graph below.
(a) Use Jenny’s graph to complete the table below.

<table>
<thead>
<tr>
<th>distance the spring was pressed down (cm)</th>
<th>height the spring reached (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

(b) Jenny said, ‘If I double the distance I press the spring down, the height it reaches will also double’.

How do the results show she was wrong?

(c) This diagram shows the moving spring in three different positions.

Complete the sentences below by choosing words from the box. You can use each word more than once.

most some least

(i) When the spring is moving at B it has ____________ kinetic energy and ____________ gravitational potential energy.

(ii) When the spring reaches C it has ____________ gravitational potential energy and ____________ kinetic energy.

(iii) When the spring stops at A it has ____________ kinetic energy and ____________ gravitational potential energy.

maximum 5 marks
10. (a) The diagram below shows a fish tank.

The surface of the water acts like a mirror. The fish can see the snail reflected in the surface of the water.

Draw a ray of light which passes from the snail, and reflects from the surface, to show how the fish can see the snail. Use a ruler.

Put arrows on the ray of light.
(b) Andrew is looking at the snail.

When a ray of light passes from water to air it changes direction.

(i) Draw a ray of light from the snail to Andrew to show how Andrew can see the snail. Use a ruler. 

Put arrows on the ray of light.

(ii) What is the name given to this change in the direction of a ray of light?

maximum 6 marks
11. Paul had four substances:

- citric acid
- copper sulphate
- indigestion tablet
- sugar

He dissolved 1 g of each substance in 20 cm³ of distilled water. He used universal indicator to find the pH of each solution.

(a) (i) Sugar solution does **not** change the colour of green universal indicator. What does this tell you about sugar solution? Tick the correct box.

- It is an acid. [ ]
- It is an alkali. [ ]
- It is neutral. [ ]
- It is sweet. [ ]

1 mark

(ii) Suggest the pH of citric acid.

---

(iii) Indigestion tablets neutralise acid in the stomach. What does this tell you about indigestion tablets?

---
(b) Complete the flow chart below with the names of the substances in the boxes.

- citric acid
- copper sulphate
- indigestion tablet
- sugar

Does the substance dissolve in water to form a blue solution?

- yes
- no

Does it turn universal indicator red?

- yes
- no

Does it turn universal indicator blue?

- yes
- no

maximum 6 marks
12. The drawing below shows a gemstone set in a gold ring.

Crystals of gemstones are found in different rocks.

(a) There are three groups of rocks:

| igneous | metamorphic | sedimentary |

(i) Crystals can be found in rocks that have been changed into different rocks by high temperature and high pressure.

Which group of rocks is formed in this way?

__________________________

(ii) Crystals can be found in rocks formed by the cooling of hot magma.

Which group of rocks is formed in this way?

__________________________

(b) How does the rate at which magma cools affect the size of the crystals formed?

__________________________

__________________________
(c) Gemstones called rubies are made from an aluminium compound with the formula Al₂O₃.

The chemical symbol for aluminium is Al.

(i) Give the name of the element that is combined with aluminium in this compound.

(ii) Suggest the name of the compound with the formula Al₂O₃.

(iii) How many atoms are there in the formula Al₂O₃?

(d) (i) The gemstone in the drawing is set into a gold ring. Gold is an element that is found in rocks. Gold is never found combined with other elements.

Part of the reactivity series of metals is shown below.

more reactive aluminium
zinc
lead
less reactive copper

Where should gold be placed in this reactivity series?

(ii) The more reactive metals react with acids.

Complete the word equation for the reaction of zinc with hydrochloric acid.

zinc + hydrochloric acid $\rightarrow$ __________ + __________

*maximum 9 marks*
13. The table below shows the mass of six nutrients in 100 cm$^3$ of three types of milk.

<table>
<thead>
<tr>
<th>nutrient</th>
<th>100 cm$^3$ of human milk</th>
<th>100 cm$^3$ of cows' milk</th>
<th>100 cm$^3$ of milk made from baby-milk powder</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbohydrate (g)</td>
<td>7.4</td>
<td>5.0</td>
<td>7.2</td>
</tr>
<tr>
<td>fat (g)</td>
<td>4.2</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>protein (g)</td>
<td>1.1</td>
<td>3.5</td>
<td>1.5</td>
</tr>
<tr>
<td>calcium (mg)</td>
<td>35.0</td>
<td>120.0</td>
<td>49.0</td>
</tr>
<tr>
<td>iron (mg)</td>
<td>0.075</td>
<td>0.05</td>
<td>0.9</td>
</tr>
<tr>
<td>vitamin C (mg)</td>
<td>3.8</td>
<td>1.5</td>
<td>6.9</td>
</tr>
</tbody>
</table>

(a) A scientist compared the three types of milk.

Why was it a fair comparison?

__________________________________________

(b) Both human milk and milk made from baby-milk powder contain more sugar than cows’ milk.

Which data in the table supports this?

__________________________________________
(c) Why do we need calcium in our diet?

(d) (i) Baby-milk powder is made from cows’ milk.

What evidence is there in the table that iron is added when making baby-milk powder?

(ii) Why do we need iron in our diet?

(e) A pupil said, ‘There is more vitamin C than protein in human milk’.

How can you tell from the table that the pupil was wrong?
14. The diagram below shows a plant cell.

(a) In which part of a plant would you find this type of cell?

(b) (i) Give the function of the nucleus.

(ii) Give the function of the chloroplasts.

(iii) Give the function of the cell wall.

(c) Give the names of two labelled parts that are not present in animal cells.

1. 

2. 

KS3/08/Sc/Tier 3–6/P2
(d) Tick one box in each row to show whether the statement is true for photosynthesis or for respiration.

<table>
<thead>
<tr>
<th>statement</th>
<th>photosynthesis</th>
<th>respiration</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbon dioxide is produced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>light is needed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>it occurs in plants and animals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oxygen is produced</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

END OF TEST

*maximum 8 marks*