Secondary 1 Science Revision Booklet Past Exam Paper Questions

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Or scan below
Syllabus details (CIE Secondary 1 Science) - Chemistry (C)

### C7s States of matter (UK KS3: 7G),

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>C7s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Textbook:</td>
<td>Pages 8-25 &amp; p80-93</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 24,25 &amp; 92,93</td>
</tr>
<tr>
<td>End of Topic Test score</td>
<td>%</td>
</tr>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

- **7Cs1** Show in outline how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state.
- **8Cs1** Show how the particle theory of matter can be used to explain the properties of solids, liquids and gases, including changes of state, gas pressure and diffusion.

### C7e The Earth (UK KS3: 8G and 8H)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>C7e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Textbook:</td>
<td>Pages 52-79</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 78,79</td>
</tr>
<tr>
<td>End of Topic Test score</td>
<td>%</td>
</tr>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

- **7Ce1** Observe and classify different types of rocks and soils.
- **7Ce2** Research simple models of the internal structure of the Earth.
- **7Ce3** Examine fossils and research the fossil record.
- **7Ce4** Discuss the fossil record as a guide to estimating the age of the Earth.
- **7Ce5** Learn about most recent estimates of the age of the Earth.

### C7c Material changes (UK KS3: 7E, 7F)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>C7c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Textbook:</td>
<td>Pages 42-51 &amp; 132-145</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 50,51 &amp; 144,145</td>
</tr>
<tr>
<td>End of Topic Test score</td>
<td>%</td>
</tr>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

- **7Cc1** Use a pH scale.
- **7Cc2** Understand neutralisation and some of its applications.
- **7Cc3** Use indicators to distinguish acid and alkaline solutions.
- **8Cc1** Use a word equation to describe a common reaction. Secondary sources can be used.
• **8Cc2** Describe chemical reactions which are not useful, e.g. rusting.

### C7p Material properties (UK KS3: 8E, 8F)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>C7p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry Textbook:</td>
<td>Pages 26-41 &amp; 94-133</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 40,41 &amp; 132,133</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>End of Topic Test score</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

### Syllabus details (CIE Secondary 1 Science) - Physics (P)

### P7b The Earth and beyond (UK KS3: 7L and 9J)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>P7b</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics Textbook:</td>
<td>Pages 52-79</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 78,79</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>End of Topic Test score</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

• **7Pb1** Describe how the movement of the Earth causes the apparent daily and annual movement of the sun and the stars.

• **7Pb2** Describe the relative position and movement of the planets and the sun in the solar system.

• **7Pb3** Discuss the impact of the ideas and discoveries of Copernicus, Galileo and more recent scientists.

• **7Pb4** Understand that the sun and other stars are sources of light and that planets and other bodies are seen by reflected light.
P7e Energy (UK KS3: 7i)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>P7e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics Textbook:</td>
<td>Pages 30-51 &amp; 214-225</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 50,51</td>
</tr>
<tr>
<td>End of Topic Test score</td>
<td>%</td>
</tr>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

- **7Pe1** Understand that energy cannot be created or destroyed and that energy is always conserved.
- **7Pe2** Recognise different energy types and energy transfers.
- **9Pe1** Use knowledge of energy sources including fossil fuels and renewable energy resources to consider the world’s energy needs, including research from secondary sources.

P7f Forces and motion (UK KS3:7K, 9K & 9L)

<table>
<thead>
<tr>
<th>Syllabus code</th>
<th>P7f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics Textbook:</td>
<td>Pages 8-29 &amp; 80-93</td>
</tr>
<tr>
<td>Review questions:</td>
<td>Pages 28,29 &amp; 92,93</td>
</tr>
<tr>
<td>End of Topic Test score</td>
<td>%</td>
</tr>
<tr>
<td>Review Test Score</td>
<td>%</td>
</tr>
</tbody>
</table>

- **7Pf1** Describe the effects of forces on motion, including friction and air resistance.
- **7Pf2** Describe the effect of gravity on objects. Secondary sources can be used.
- **8Pf1** Calculate average speeds, including through the use of timing gates.
- **8Pf2** Interpret simple distance/time graphs.
2 (a) Farid has three different fuels.

Draw lines between each fuel and the correct state of matter.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>State of Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fuel is stored in bags.</td>
<td>gas</td>
</tr>
<tr>
<td>Fuel flows along a pipe to where it is needed.</td>
<td>liquid</td>
</tr>
<tr>
<td>Fuel is stored under pressure in cylinders.</td>
<td>solid</td>
</tr>
</tbody>
</table>

Q# 2/ 2016/s/Sec1 Sci/Paper 2?

6 This question is about liquids.

(a) When a liquid is put into a beaker it takes on the shape of the beaker.

Why do liquids take on the shape of the beaker?

Tick (✓) the boxes next to **two** correct answers.

- Liquids have no fixed shape.    [ ]
- Liquids have no fixed volume.    [ ]
- Liquid particles only vibrate.   [ ]
- The particles in a liquid expand. [ ]
- The particles in a liquid move around. [ ]

(b) Pierre investigates the boiling point of water.

- He heats up some pure water in a beaker until it boils.
- Pierre measures the boiling point of the pure water.
- He does this two more times using new samples of pure water.
- Pierre then does this three more times using salt water.
The table shows some of his results.

<table>
<thead>
<tr>
<th>type of water</th>
<th>boiling point in °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>pure water</td>
<td>100</td>
</tr>
<tr>
<td>salt water</td>
<td>102 103</td>
</tr>
</tbody>
</table>

(i) There is one result missing.

The thermometer shows Pierre's missing result.

![Thermometer Image]

What is the temperature on the thermometer? \(...............................\) °C \[1\]

(ii) What effect does adding salt have on the boiling point of water?

\(...............................\) \[1\]

Q# 3/ 2011/w/Sec1 Sci/Stage 7 Progression Test 1/

9 Which of the statements about particles in a solid are correct?

Tick (✓) the three correct statements.

The particles in a solid are:

- further apart than the particles in a liquid. \[
- further apart than the particles in a gas. \[
- able to vibrate about a fixed point. \[
- arranged in a more fixed pattern than particles in a liquid. \[
- not able to vibrate when they reach 0°C. \[
- able to vibrate more as they gain energy. \[

[2]
Q# 4/ 2011/w/Sec1 Sci/Stage 7 Progression Test 2/Q2
(b) (i) Solids, liquids and gases can change from one state of matter to another.

Use the words in the list to write the names of the processes shown in the diagram.

condensation  evaporation  freezing  sublimation

process is

liquid

process is

gas

(ii) Draw an arrow (→) on the diagram to show what happens during the process of melting.

Q# 5/ 2011/w/Sec1 Sci/Stage 8 Progression Test 2/
3 (a) The three states of matter are solid, liquid and gas.

Complete the table to show their properties.

<table>
<thead>
<tr>
<th>property</th>
<th>solid</th>
<th>liquid</th>
<th>gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>shape</td>
<td>fixed shape</td>
<td>same shape as container</td>
<td></td>
</tr>
<tr>
<td>volume</td>
<td></td>
<td>fixed volume</td>
<td>fills the entire container</td>
</tr>
<tr>
<td>can it flow?</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>can it be compressed?</td>
<td>only a little bit</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(b) The particle theory of matter can be used to explain these properties.

Circles have been used to represent the particles of a liquid.

(i) Draw circles to represent the particles of a solid and of a gas.

(ii) Liquids can only be compressed a little bit.

Explain why.

[1]

(c) Gases exert a pressure on the walls of a container.

What causes this pressure?

[1]
Q# 6/ 2015/w/Sec1 Sci/paper 2/

2 Look at the diagram.

It shows gas particles leaving a car exhaust.

(a) The particles are spreading out.

What is the name of this process?
Circle the correct answer.
condensation diffusion fermentation neutralisation [1]

(b) The particles in a solid cannot spread out in the same way.

Tick (✓) two reasons why particles in a solid cannot spread out.

- The particles are already too far apart. ☐
- The particles in a solid do not move around. ☐
- Solids have a fixed shape. ☐
- Solids can only take on the shape of a container. ☐
- The pressure in a solid is too great. ☐ [2]

(c) Solids can change state to become gases.

Look at the diagram to show the changes in state.

solid process A liquid process B gas

Name processes A and B.

A ................................................................................................................................................... [1]

B ...................................................................................................................................................
2 Gabriella investigates change of state.

- She puts water into a beaker and heats it gently.
- Every 2 minutes Gabriella records the temperature.

The graph shows her results.

![Graph showing temperature change over time](image)

(a) How many minutes does it take for the temperature of the water to reach 100 °C?

........................................ minutes

(b) Complete the sentences to explain what is happening to the water particles between 8 and 10 minutes.

The water particles gain more ................................ energy.

The particles move ........................................

This causes the particles to ................................ out.

(c) The diagram shows the particles in liquid water.

![Liquid water diagram](image)

Complete this diagram to show the particles in solid ice.

![Solid ice diagram](image)
Q# 8/ 2017/s/Sec1 Sci/paper 1/

9  This question is about the three states of matter.

(a) Which state of matter has the **strongest** forces between its particles?

(b) Draw straight lines to match the **state of matter** with the **description** of the spacing of the particles.

<table>
<thead>
<tr>
<th>state of matter</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>gas</td>
<td>spread far apart</td>
</tr>
<tr>
<td>liquid</td>
<td>closely packed in a regular pattern</td>
</tr>
<tr>
<td>solid</td>
<td>closely packed but not in a pattern</td>
</tr>
</tbody>
</table>

(c) Youssef puts a small amount of water into a flat dish.

![Image of a flat dish with water](image)

He then leaves the dish outside in the warm sunshine.

After a while the water disappears.

Explain what happens to the water **particles**.
Q# 9/ 2017/s/Sec1 Sci/paper 2/

16 Chen opens a bottle of liquid perfume.

After a few seconds he can smell the perfume.

Some of the liquid perfume evaporates into a gas.

The perfume gas then diffuses.

What happens to the particles of perfume during diffusion?

Tick (√) the correct box.

The particles have less energy.  

The particles move closer together.  

The particles move more slowly.  

The particles spread out.  

[1]

Q# 10/ 2017/s/Sec1 Sci/paper 2/

7 Look at the table of elements in Group 7 (Group 17) of the modern Periodic Table.

<table>
<thead>
<tr>
<th>element</th>
<th>atomic mass</th>
<th>state at room temperature</th>
<th>melting point in °C</th>
<th>boiling point in °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>fluorine</td>
<td>19</td>
<td></td>
<td>-220</td>
<td>-188</td>
</tr>
<tr>
<td>chlorine</td>
<td>35</td>
<td>gas</td>
<td>-101</td>
<td></td>
</tr>
<tr>
<td>bromine</td>
<td>80</td>
<td>liquid</td>
<td>-7</td>
<td>59</td>
</tr>
<tr>
<td>iodine</td>
<td>127</td>
<td>solid</td>
<td>114</td>
<td>184</td>
</tr>
<tr>
<td>astatine</td>
<td>210</td>
<td>solid</td>
<td>301</td>
<td>337</td>
</tr>
</tbody>
</table>

(a) Complete the sentence about the relationship between atomic mass and melting point.

As the atomic mass ........................................ the melting point ........................................... [1]

(b) What is the state of fluorine at room temperature?

................................................................. [1]

(c) Estimate the boiling point of chlorine.

Choose from the list.

-201°C     -34°C     65°C     138°C

The boiling point of chlorine is ........................................ °C [1]
### Q# 1/ 2011/w/Sec1 Sci/Stage 7 Progression Test 2/Q2

(a) Fuel is stored in bags.  
Fuel flows along a pipe to where it is needed.  
Fuel is stored under pressure in cylinders.  
all correct = 1 mark  
Accept fuel flows along pipe to where it is needed connected to gas.

### Q# 2/ 2016/s/Sec1 Sci/Paper 2/Q6

<table>
<thead>
<tr>
<th>(a)</th>
<th>7Cs1</th>
<th>K</th>
<th>2</th>
<th>each correct tick = 1 mark</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>three ticks and two correct = 1 mark</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>three ticks and one correct = 0 marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>four or five ticks = 0 marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liquids have no fixed shape.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liquids have no fixed volume.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Liquid particles only vibrate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The particles in a liquid expand.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>The particles in a liquid move around.</td>
</tr>
</tbody>
</table>

(b) (i) 7Eo1 7Cs1  
E 1 103

(ii) 7Ec1 7Cs1  
E 1 increases / goes up

### Q# 3/ 2011/w/Sec1 Sci/Stage 7 Progression Test 1/Q9

| 2 | further apart than the particles in a liquid.  
n further apart than the particles in a gas.  
able to vibrate about a fixed point.  
arranged in a more fixed pattern than particles in a liquid.  
not able to vibrate when they reach 0°C.  
able to vibrate more as they gain energy. |
|---|------------------------------------------|
|   | 3 correct = 2 marks  
2 correct = 1 mark  
1 correct = 0 marks  
If 4 boxes ticked, 3 correct = 1 mark  
If 4 boxes ticked, 2 correct = 0 marks  
If 5/6 boxes ticked = 0 marks |

Patrick Brannac  
www.SmashingScience.org
Q# 4/ 2011/w/Sec1 Sci/Stage 7 Progression Test 2/Q2

<table>
<thead>
<tr>
<th>(b) (i)</th>
<th>2</th>
<th>solid</th>
<th>freezing</th>
<th>liquid</th>
<th>evaporation</th>
<th>gas</th>
<th>each label in correct position = 1 mark</th>
</tr>
</thead>
</table>

Q# 5/ 2011/w/Sec1 Sci/Stage 8 Progression Test 2/

<table>
<thead>
<tr>
<th>Question</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td>Mark</td>
</tr>
<tr>
<td>(a)</td>
<td>3</td>
</tr>
<tr>
<td>(b) (i)</td>
<td>2</td>
</tr>
<tr>
<td>(ii)</td>
<td>1</td>
</tr>
<tr>
<td>(c)</td>
<td>1</td>
</tr>
</tbody>
</table>
### Question 6

<table>
<thead>
<tr>
<th>Question number</th>
<th>2</th>
<th>Answer</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>1</td>
<td>condensation, diffusion, fermentation, neutralisation</td>
<td>more than one answer circled = 0 marks</td>
</tr>
<tr>
<td>(b)</td>
<td>2</td>
<td>The particles are already too far apart</td>
<td>each correct tick = 1 mark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The particles in a solid do not move around.</td>
<td>if three ticks and two correct = 1 mark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solids have a fixed shape.</td>
<td>if three ticks and one correct = 0 marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Solids can only take on the shape of a container.</td>
<td>if four or five ticks = 0 marks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The pressure in a solid is too great.</td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>1</td>
<td>A melting, B evaporating / boiling</td>
<td>both needed for 1 mark</td>
</tr>
</tbody>
</table>

### Question 7

<table>
<thead>
<tr>
<th>Question number</th>
<th>2</th>
<th>Answer</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>1</td>
<td>8</td>
<td>Accept any value between 7.9 and 8</td>
</tr>
<tr>
<td>(b)</td>
<td>3</td>
<td>The water particles gain more kinetic energy.</td>
<td>each correct word = 1 mark</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The particles move faster.</td>
<td>Do not accept heat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>This causes the particles to spread out.</td>
<td>Accept (further) apart / quicker / more rapidly / more vigorously</td>
</tr>
<tr>
<td>(c)</td>
<td>2</td>
<td>all particles touching or almost touching particles in rows / particles in a set pattern</td>
<td>There must be an attempt to draw the spheres touching the box does not need to be full</td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td>Marks</td>
<td>Further Information</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>-------</td>
<td>---------------------</td>
</tr>
<tr>
<td>9(a)</td>
<td>solid</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>9(b)</td>
<td>![Diagram](gas, liquid, solid)</td>
<td>1</td>
<td>all correct = 1 mark</td>
</tr>
<tr>
<td>9(c)</td>
<td>any two from particles gain energy / (some) particles have more kinetic energy / (some) particles move faster particles have overcome attraction between them / (idea that) forces between particles have been broken particles have spread further apart (in the gas phase)</td>
<td>2</td>
<td>Accept evaporation / water changes to a gas / water changes to water vapour Do not accept water boils Accept particles diffuse into the air Accept (water) molecules instead of particles at least one mark should be associated with particles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>The particles have less energy. ☐ The particles move closer together. ☐ The particles move slower. ☐ The particles spread out. ✓</td>
<td>1</td>
<td>more than one tick = 0 marks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
<th>Marks</th>
<th>Further Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>7(a)</td>
<td>As the atomic mass increases the melting point increases. or As the atomic mass decreases the melting point decreases.</td>
<td>1</td>
<td>The sentences must be comparative Accept gets bigger / gets larger instead of increase Accept atomic mass gets heavier for increase Accept gets smaller instead of decrease Accept atomic mass gets lighter for decrease</td>
</tr>
<tr>
<td>7(b)</td>
<td>gas</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7(c)</td>
<td>-34 °C</td>
<td>1</td>
<td>Accept other indications of correct answer e.g. circling or underlining but answer line takes precedence</td>
</tr>
</tbody>
</table>
11 This diagram shows an erupting volcano.

After an eruption, the magma and lava cool. Rock is formed.

(a) What is the name of this rock?

Underline the answer from the list.

    igneous rock
    metamorphic rock
    sedimentary rock

(b) Clouds of sulfur gas are released into the air when a volcano erupts.

    Sulfur is a bright yellow crystalline solid at room temperature.
    Sulfur does not dissolve in water.
    Sulfur does not conduct electricity.

Is sulfur a metal or a non-metal?

Which piece of information in the box helped you to decide?
(c) Volcanic eruptions also happened many millions of years ago.

Layers of volcanic ash covered the bodies of fish.

Over many years this ash formed rock.

This picture shows part of the rock that has been formed.

(i) This picture shows a fish which is now a ........................................... [1]

(ii) What is the name of the type of rock in the picture?

Underline the answer from the list.

igneous rock

metamorphic rock

sedimentary rock

[1]
1 The structure of the Earth is made up of layers.

(a) Label the diagram of the layers of the Earth using these words.

![Diagram of Earth layers](image)

(b) Tick (√) the boxes next to the two correct statements.

- The inner core is the hottest part of the Earth. [ ]
- Iron and nickel are only found in the crust. [ ]
- Solid rocks are found in all the layers. [ ]
- The mantle is made up of semi-molten rock called magma. [ ]
Different types of soils have different properties.

<table>
<thead>
<tr>
<th>type of soil</th>
<th>pH</th>
<th>texture</th>
<th>contains</th>
</tr>
</thead>
<tbody>
<tr>
<td>sandy</td>
<td>8.0</td>
<td>grit-like</td>
<td>granite</td>
</tr>
<tr>
<td>silty</td>
<td>7.0</td>
<td>fine particles</td>
<td>quartz</td>
</tr>
<tr>
<td>chalky</td>
<td>8.0</td>
<td>small stones</td>
<td>calcium carbonate</td>
</tr>
<tr>
<td>peaty</td>
<td>4.5</td>
<td>fibre-like</td>
<td>organic material</td>
</tr>
<tr>
<td>loamy</td>
<td>7.5</td>
<td>mixed</td>
<td>sand, silt and clay</td>
</tr>
</tbody>
</table>

(iii) Some soils trap too much water. Water drains straight through other soils.

Why does sandy soil dry very quickly after rain? [1]

(b) Yasmin collects a sample of soil. She does some tests on the soil. She makes some notes.

*b

The soil is a light colour.

I can see little, grit-like grains in the soil.

When I tested the pH, it was 8.0.

I cannot see any stones or fibres in the soil.

(i) The type of soil that Yasmin has collected is

because

and

(ii) Particle size, pH and colour are properties of soil. They can be used to classify soils.

Suggest another property that could be used to classify soils. [1]
11 Look at the picture. It shows a fossil.

The fossil record provides evidence of organisms that have lived on the Earth.

(a) Complete the sentences about fossils.

Choose words from the list.

age decayed hard size soft squashed

Fossils are often the remains of the ________________ parts of the animal.
The rest of the animal would have ________________
The fossil record can be used to estimate the ________________ of the Earth. [3]

(b) Rocks are found in layers.

Look at the diagram.

Suggest which layer has the oldest fossils.

............................................................................. [1]

(c) Fossils can be found in sedimentary rocks such as sandstone.

Why do igneous rocks not contain fossils?

Tick (✓) the correct answer.

There were no animals around when igneous rocks formed. □

Animals only lived near water where sedimentary rocks formed. □

Igneous rocks form under pressure. □

The temperature of the molten rock would have destroyed the remains of the organism. □
Look at the information about six different rocks.

<table>
<thead>
<tr>
<th>rock</th>
<th>description of rock</th>
<th>how rock was formed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>large crystals of different colours</td>
<td>liquid rock (magma) cooled slowly underground</td>
</tr>
<tr>
<td>B</td>
<td>black with small crystals</td>
<td>liquid rock (lava) from an erupting volcano cooled rapidly above ground</td>
</tr>
<tr>
<td>C</td>
<td>black with lots of thin layers</td>
<td>mudstone was changed by high pressure</td>
</tr>
<tr>
<td>D</td>
<td>white hard solid</td>
<td>limestone was changed by heat and high pressure</td>
</tr>
<tr>
<td>E</td>
<td>yellow and crumbles into sand</td>
<td>layers of sand were compressed</td>
</tr>
<tr>
<td>F</td>
<td>white and grey hard solid</td>
<td>chalk was changed by heat and high pressure</td>
</tr>
</tbody>
</table>

(a) Rocks A and B both formed from cooling liquid rock.

(i) What type of rock are A and B?

.......................................................................................................................................................... [1]

(ii) The crystals in rock A are larger than in rock B.

Suggest a reason why.

.......................................................................................................................................................... [1]

(b) Which rock is a sedimentary rock?

Choose from C, D, E or F. .................................................................................................................................. [1]
# Mark Scheme Past exam questions for topic C7e: The Earth

## Q# 1/2011/w/Sec1 Sci/Stage 7 Progression Test 1/

<table>
<thead>
<tr>
<th>Question</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Mark</strong></td>
</tr>
<tr>
<td>(a)</td>
<td>1</td>
</tr>
<tr>
<td>(b)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(c) (i)</td>
<td>1</td>
</tr>
<tr>
<td>(ii)</td>
<td>1</td>
</tr>
</tbody>
</table>

## Q# 2/2011/w/Sec1 Sci/Stage 7 Progression Test 1/

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Mark</strong></td>
</tr>
<tr>
<td>(a)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q# 3/ 2011/w/Sec1 Sci/Stage 7 Progression Test 2/Q6a

<table>
<thead>
<tr>
<th>(iii)</th>
<th>1</th>
<th>water passes straight through it / is free draining</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b)</td>
<td>(i)</td>
<td>2</td>
</tr>
<tr>
<td>(ii)</td>
<td>1</td>
<td>nutrients / permeability / drainage / texture</td>
</tr>
</tbody>
</table>

Q# 4/ 2015/w/Sec1 Sci/paper 1/

<table>
<thead>
<tr>
<th>Question number</th>
<th>11</th>
<th>CSS00359</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td>Mark</td>
<td>Answer</td>
</tr>
<tr>
<td>(a)</td>
<td>3</td>
<td>Fossils are often the remains of the hard parts of the animal. The rest of the animal would have decayed. The fossil record can be used to estimate the age of the Earth.</td>
</tr>
<tr>
<td>(b)</td>
<td>1</td>
<td>E</td>
</tr>
<tr>
<td>(c)</td>
<td>1</td>
<td>There were no animals around when igneous rocks formed. Animals only lived near water where sedimentary rocks formed. Igneous rocks form under pressure. The temperature of the molten rock would have destroyed the remains of the organism.</td>
</tr>
</tbody>
</table>

Q# 5/ 2016/s/Sec1 Sci/paper 1/

<table>
<thead>
<tr>
<th>Question number</th>
<th>2</th>
<th>CSS00270_A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part</td>
<td>CF</td>
<td>Skill</td>
</tr>
<tr>
<td>(a)</td>
<td>(i)</td>
<td>7Ce1</td>
</tr>
<tr>
<td>(ii)</td>
<td>7Ce1</td>
<td>A</td>
</tr>
<tr>
<td>(b)</td>
<td>7Ce1</td>
<td>A</td>
</tr>
</tbody>
</table>
Q1. pH paper is used to show whether a solution is acidic, neutral or alkaline.

One type of pH paper shows the following range of colours.

<table>
<thead>
<tr>
<th>colour of pH paper</th>
<th>red</th>
<th>orange</th>
<th>yellow</th>
<th>green</th>
<th>blue</th>
<th>purple</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH value</td>
<td>0 - 4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8 - 10</td>
<td>11 - 14</td>
</tr>
</tbody>
</table>

Some solutions were tested with pH Paper. The results are shown below.

(a) Complete the following table by placing a tick in the correct column for each substance.

<table>
<thead>
<tr>
<th>substance</th>
<th>colour of pH paper</th>
<th>acidic</th>
<th>neutral</th>
<th>alkaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>orange juice</td>
<td>red</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>egg white</td>
<td>blue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oven cleaner</td>
<td>purple</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>milk</td>
<td>yellow</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Which substance was the most alkaline?

.......................................................................................................................

1 mark

(c) Equal amounts of egg white and milk are mixed. What is the most likely pH of the mixture?

Tick the correct box.

pH2  pH6  pH7  pH14

.......................................................................................................................

1 mark

Q2. (a) Vinegar is sometimes put on chips. It has a sharp, sour taste.

What does the taste tell you about vinegar?

Tick the correct box.

- It contains salt.
- It contains sugar.
- It is an acid.
- It has turned bad.

.......................................................................................................................

1 mark

(b) Washing soda crystals react with acid to give off carbon dioxide.

If you added some washing soda crystals to vinegar, what would you see happening?

.......................................................................................................................

1 mark
(c) Red cabbage can be used to test for acids and alkalis. It is bright red in acids and purple in alkalis.

(i) What colour is it in lemon juice?

.............................................................................................................

(i) Complete the sentence below.

Substances which change colour when you add acid or alkali are called .........................

1 mark

(d) The labels have fallen off two bottles. The labels say ‘Distilled Water’ and ‘Sulphuric Acid’.

(i) Why should you not taste the liquids to see which is which?

.............................................................................................................

(i) You can use some washing soda crystals to find out what is in each bottle. Describe what you would do and what you would see in each case.

.............................................................................................................

.......................................................................................

2 marks

Q3. (a) Neutral litmus paper is:

- purple in neutral solutions;
- red in acids;
- blue in alkalis.

Use this information to answer the questions.

(i) A piece of neutral litmus paper turned red in some grapefruit juice. What does this show about the grapefruit juice?

.............................................................................................................

1 mark
(ii) Gwen added drops of sodium hydroxide solution to the grapefruit juice. The litmus paper soon turned blue. What does the blue colour show about the sodium hydroxide solution?

...........................................................................................

1 mark

(iii) Gwen then tested some water with a new piece of neutral litmus paper. The pH of the water was 7. What colour was the litmus paper in the water?

...........................................................................................

1 mark

(b) What name is given to the reaction between an acid and an alkali?

Tick the correct box.

- distillation
- neutralisation
- precipitation
- separation

1 mark

Q4. Dilute acids react with many things.

Tick the four boxes by the correct descriptions.

Tick no more than four boxes.

- Acids always dissolve glass.
- Acids can be burned as fuels.
- Acids damage teeth.
- Acids react with metals such as magnesium.
- Acids turn universal indicator solution blue.
- Acids may harm your skin.
- Acids react with limestone.
- Acids are always poisonous.

4 marks

Q5. The chart is taken from a bottle of Johnson’s pH5.5 Facial Wash.

- normal soap
- soap with moisturisers
- normal facial washes
- Johnson’s pH5.5 facial wash
- healthy skin
(a) From the information in the chart give:

(i) a substance which is almost neutral.
.............................................................................................................

.............................................................................................................

1 mark

(ii) the substance which is most alkaline.
.............................................................................................................

.............................................................................................................

1 mark

(b) Tick one box to describe Johnson's facial wash.

It is very alkaline.  
It is slightly alkaline. 
It is neutral. 
It is slightly acidic. 

1 mark

(c) A bee sting is acidic. Which one of the substances given in the chart would be best to neutralise the sting?
.............................................................................................................

.............................................................................................................

1 mark

Q6. The table below gives information about four gases. It shows the volume of each gas that will dissolve in 1000 cm³ of water at two different temperatures.

<table>
<thead>
<tr>
<th>gas</th>
<th>volume dissolved in 1000 cm³ water at 20°</th>
<th>volume dissolved in 1000 cm³ water at 60°</th>
</tr>
</thead>
<tbody>
<tr>
<td>ammonia</td>
<td>680 000 cm³</td>
<td>200 000 cm³</td>
</tr>
<tr>
<td>carbon dioxide</td>
<td>850 cm³</td>
<td>380 cm³</td>
</tr>
<tr>
<td>hydrogen chloride</td>
<td>442 000 cm³</td>
<td>338 000 cm³</td>
</tr>
<tr>
<td>oxygen</td>
<td>30 cm³</td>
<td>19 cm³</td>
</tr>
</tbody>
</table>

Use the information in the table to answer the following questions.

(a) (i) Which one of the four gases is the most soluble at 60°C?
.............................................................................................................

.............................................................................................................

1 mark

(ii) Which one of the four gases is the least soluble at 20°C?
.............................................................................................................

.............................................................................................................

1 mark

(b) How does a rise in temperature affect the amount of gas which will dissolve?
.............................................................................................................
(c) The table below shows the pH of a solution of each of the four gases.

<table>
<thead>
<tr>
<th>gas</th>
<th>pH of a solution of the gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>ammonia</td>
<td>10</td>
</tr>
<tr>
<td>carbon dioxide</td>
<td>6</td>
</tr>
<tr>
<td>hydrogen chloride</td>
<td>1</td>
</tr>
<tr>
<td>oxygen</td>
<td>7</td>
</tr>
</tbody>
</table>

Which gas dissolves in water to form:

(i) an acid? .............................................................................................. 1 mark
(ii) an alkali? ............................................................................................ 1 mark
(iii) a neutral solution? .............................................................................. 1 mark

Q7. Owen used litmus paper to find out if six different liquids were acidic, alkaline or neutral. He dipped pieces of litmus paper into each liquid.

He wrote some of his results in the table below. Complete the table of results.

<table>
<thead>
<tr>
<th>liquid</th>
<th>What happened to blue litmus paper?</th>
<th>What happened to red litmus paper?</th>
<th>Is the liquid acidic, alkaline or neutral?</th>
</tr>
</thead>
<tbody>
<tr>
<td>lemon juice</td>
<td>went red</td>
<td>stayed red</td>
<td>acidic</td>
</tr>
<tr>
<td>water</td>
<td>stayed blue</td>
<td>stayed red</td>
<td></td>
</tr>
<tr>
<td>sodium hydroxide solution</td>
<td>stayed blue</td>
<td>went blue</td>
<td></td>
</tr>
<tr>
<td>alcohol</td>
<td></td>
<td></td>
<td>neutral</td>
</tr>
<tr>
<td>ammonia solution</td>
<td></td>
<td>went blue</td>
<td></td>
</tr>
<tr>
<td>sour milk</td>
<td>went red</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5 marks

Q8. The table shows the pH of five soil samples.

<table>
<thead>
<tr>
<th>soil sample</th>
<th>pH of soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6.0</td>
</tr>
<tr>
<td>B</td>
<td>7.5</td>
</tr>
<tr>
<td>C</td>
<td>7.0</td>
</tr>
<tr>
<td>D</td>
<td>4.5</td>
</tr>
<tr>
<td>E</td>
<td>8.0</td>
</tr>
</tbody>
</table>

Use letters from the table to answer questions (a), (b) and (c).

(a) Which soil sample is neutral? .........................
(b) (i) Most types of heather grow better in acidic soil. In which of the soil samples should heather grow well? .......................... 1 mark

(ii) Cabbage grows better in alkaline soil. In which of the soil samples should cabbage grow well? ................................. 1 mark

(c) Lime is an alkaline substance which is sometimes put onto acidic soils. What type of reaction takes place between the lime and the acid? ........................................................................................................ 1 mark

Q9. (a) Sunil picked yellow, red and purple primula flowers from his garden. He dipped the different flower petals into water and into two different solutions. The pH of one solution was 1 and the pH of the other was 10. The table shows the results.

<table>
<thead>
<tr>
<th>colour of flower petals</th>
<th>in solutions of pH 1</th>
<th>in water pH 7</th>
<th>in solution of pH 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>yellow</td>
<td>stayed yellow</td>
<td>stayed yellow</td>
<td>stayed yellow</td>
</tr>
<tr>
<td>red</td>
<td>stayed red</td>
<td>stayed red</td>
<td>turned green</td>
</tr>
<tr>
<td>purple</td>
<td>turned pink</td>
<td>stayed purple</td>
<td>turned blue</td>
</tr>
</tbody>
</table>

Which colour of flower petal would be most useful to make an indicator for both acids and alkalis? Explain your answer.

........................................................................................................................................................................................................................................ 2 marks

Sunil crushed petals from each flower separately in some liquid and poured off the coloured solutions. Then he put drops of each coloured solution into the middle of different pieces of filter paper.

The solutions spread out on the filter paper. The diagrams show his results.
(b) What is the name of this method of investigating coloured substances?
..................................................................
1 mark

(c) Sunil made notes on his experiment. Some words are missing.
Complete the sentences.

When I crushed a flower in a liquid it produced a coloured solution.
This is because a coloured substance had ......................... in the liquid. This shows that the liquid is a ......................... for these coloured substances.
My experiment shows that one of the flowers probably contained two coloured substances. This was the ......................... flower.

3 marks

Q10. (a) Many chemicals are dangerous if not used carefully.
Read the two hazard descriptions. Look at the hazard labels.
Draw a line from each description to the correct label.
(b) The label on a bottle of kitchen cleaner says:

**It leaves kitchen and bathroom surfaces bright and shiny.**

Another part of the label says:

**Contains sulphamic acid**

**Irritating to eyes and skin**

**Keep out of reach of children**

(i) The chart shows the colour of universal indicator in different solutions.

<table>
<thead>
<tr>
<th>type of solution</th>
<th>strongly acidic</th>
<th>weakly acidic</th>
<th>neutral</th>
<th>weakly alkaline</th>
<th>strongly alkaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>colour of universal indicator</td>
<td>red</td>
<td>orange</td>
<td>green</td>
<td>blue</td>
<td>purple</td>
</tr>
</tbody>
</table>

What colour will the kitchen cleaner turn universal indicator?

........................................................................................................

1 mark

(ii) Which hazard label do you expect to see on the bottle?
Write the correct letter from the list above.

........................................................................................................

1 mark

**Q13.** Water from red cabbage can be used to find out if a liquid is acidic, alkaline or neutral.

<table>
<thead>
<tr>
<th>Type of liquid added to the cabbage water</th>
<th>colour of the cabbage water</th>
</tr>
</thead>
<tbody>
<tr>
<td>acidic</td>
<td>red</td>
</tr>
<tr>
<td>alkaline</td>
<td>blue</td>
</tr>
<tr>
<td>neutral</td>
<td>purple</td>
</tr>
</tbody>
</table>

John added three different liquids to the cabbage water.

(a) Use the information above to complete the table below.

<table>
<thead>
<tr>
<th>Liquid added to the cabbage water</th>
<th>colour of the cabbage water</th>
<th>Is the liquid acidic, alkaline or neutral?</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>purple</td>
<td></td>
</tr>
<tr>
<td>lemon juice</td>
<td>blue</td>
<td>acidic</td>
</tr>
<tr>
<td>washing up liquid</td>
<td>blue</td>
<td></td>
</tr>
</tbody>
</table>
(b) What word describes chemicals which change colour in acids or alkalis?  

Tick the correct box.  
filters □ indicators □  
liquids □ solids □  

1 mark

Q14. The diagrams show two different types of apparatus for measuring volumes of liquid.  

Each piece of apparatus contains some dilute hydrochloric acid.

(a) What is the name of apparatus B?  

(b) What is the volume of dilute hydrochloric acid in:  

(i) apparatus A?  ................. cm$^3$  

(ii) apparatus B?  ................. cm$^3$  

1 mark

(c) Wayne wants to add exactly 3 cm$^3$ of dilute hydrochloric acid to some chalk in a beaker.  

(i) How can he remove exactly 3 cm$^3$ of the acid from apparatus A?  

(ii) Wayne adds the acid to the chalk. He sees bubbles.  

Which **two** things does this show? Tick **two** boxes.  

A gas is produced. □ Chalk is a gas. □  
Chalk is an acid. □ The acid reacts with the chalk. □  
The acid is boiling. □  

2 marks
Q15. Bees and wasps are both insects which use a sting as part of their defence. The pH values of their stings are shown on the diagrams.

bee sting, pH 2
wasp sting, pH 10

(a) Complete the table below to show whether the stings are acidic or alkaline and what colour they would turn universal indicator paper.

<table>
<thead>
<tr>
<th>acid or alkaline</th>
<th>colour of universal indicator paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>bee sting (pH 2)</td>
<td></td>
</tr>
<tr>
<td>wasp sting (pH 10)</td>
<td></td>
</tr>
</tbody>
</table>

(b) The table below shows five household substances and the pH of each substance

<table>
<thead>
<tr>
<th>name of substance</th>
<th>pH of substance</th>
</tr>
</thead>
<tbody>
<tr>
<td>bicarbonate toothpaste</td>
<td>8</td>
</tr>
<tr>
<td>lemon juice</td>
<td>3</td>
</tr>
<tr>
<td>vinegar</td>
<td>4</td>
</tr>
<tr>
<td>washing soda</td>
<td>11</td>
</tr>
<tr>
<td>water</td>
<td>7</td>
</tr>
</tbody>
</table>

Give the name of one substance in the table which would neutralise each sting.

(i) bee sting ............................................................................................. 1 mark

(ii) wasp sting ............................................................................................. 1 mark

Q17. Ben put a beaker weighing 50 g on a balance. He added 50 g of dilute hydrochloric acid and 2.5 g of calcium carbonate to the beaker. The total mass of the beaker and its contents was 102.5 g.
(a) The hydrochloric acid reacted with the calcium carbonate. How could Ben tell that a chemical reaction was taking place in the beaker?

........................................................................................................................................................................ 1 mark

(b) The word equation for the reaction which took place is:

hydrochloric acid + calcium carbonate → calcium chloride + carbon dioxide + water

When the reaction stopped, the total mass had decreased from 102.5 g to 101.4 g.
Some water had evaporated from the beaker. What else caused the drop in mass?
Use the word equation to help you answer the question.

........................................................................................................................................................................ 1 mark

(c) When the reaction stopped, Ben tested the contents of the beaker with universal indicator paper. The calcium carbonate had neutralised the acid. What is the colour of universal indicator paper in a neutral solution?

........................................................................................................................................................................ 1 mark

(d) Which two materials in the list below are mainly calcium carbonate?
Tick the two correct boxes.

coal


glass


limestone


marble


sandstone


2 marks

(e) Metals react with acids.
What gas is produced when a metal reacts with an acid?

.......................................................................................................................... 1 mark

Maximum 6 marks

Q18. The pH scale shown below is used to measure how acidic or alkaline a solution is.

acidic neutral alkaline

1 2 3 4 5 6 7 8 9 10 11 12 13 14

pH scale
The graph below shows how the pH of the liquid in Barry's mouth changed as he ate a meal.

(a) (i) Use the graph to give the pH of the liquid in Barry's mouth before he started to eat.

pH ..................  

(ii) What does this pH tell you about the liquid in Barry's mouth before he started to eat? Use the pH scale above to help you.

Tick the correct box.

- It was acidic.
- It was alkaline.
- It was colourless.
- It was neutral.

(b) Look at the graph above.

What happened to the pH of the liquid in Barry's mouth as he ate the meal?

........................................................................................................................................................................

(c) Barry chews special chewing gum after each meal. The chewing gum neutralises the liquid in his mouth.

What type of substance neutralises an acid?

Tick the correct box.

- an acid
- an alkali
- an indicator
- a solid

Maximum 4 marks
Q19. A pupil used a sensor to record the change in pH of 10 cm³ of an acid solution when an alkali solution was added a little at a time. The concentrations of the alkali and acid solutions were fixed.

His results are shown in the table below.

<table>
<thead>
<tr>
<th>volume of alkali added (cm³)</th>
<th>pH of resulting mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>5.0</td>
</tr>
<tr>
<td>2.0</td>
<td>5.0</td>
</tr>
<tr>
<td>4.0</td>
<td>5.0</td>
</tr>
<tr>
<td>6.0</td>
<td>5.5</td>
</tr>
<tr>
<td>8.0</td>
<td>6.0</td>
</tr>
<tr>
<td>10.0</td>
<td>7.0</td>
</tr>
<tr>
<td>12.0</td>
<td>8.0</td>
</tr>
<tr>
<td>14.0</td>
<td>8.5</td>
</tr>
<tr>
<td>16.0</td>
<td>9.0</td>
</tr>
<tr>
<td>18.0</td>
<td>9.0</td>
</tr>
<tr>
<td>20.0</td>
<td>9.0</td>
</tr>
</tbody>
</table>

(a) Use his results to draw a graph on the grid below.

- Label the axes.
- Plot the points.
- Draw a smooth curve.

(4 marks)

(b) Look at the graph. What would be the likely pH of the solution if the pupil added a further 2 cm³ of alkali solution?

.............

(1 mark)
Mark Scheme C7c Acids and Alkalis

M1. (a) 

<table>
<thead>
<tr>
<th>Substance</th>
<th>Acidic</th>
<th>Neutral</th>
<th>Alkaline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange juice</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Egg white</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Oven cleaner</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Milk</td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

*If more than one box is ticked in any row, award no mark for that row. Do not accept a tick in 'neutral'.*

(b) Oven cleaner

(c) pH7

M2. (a) *It is an acid* ✓

*If more than one box is ticked, award no mark.*

(b) Bubbling

Accept ‘fizzing’ or ‘froth’ or ‘effervescence’ or ‘gas given off’ or ‘carbon dioxide given off’ do not accept ‘a reaction’

(c) (i) Red or bright red

(ii) Indicators

(d) (i) Acid can be poisonous or burn or is dangerous or harmful

Accept ‘it makes you ill’ or ‘it is corrosive’ or ‘because it might be acid’ do not accept ‘it will kill you’

(ii) The answer should refer to the use of washing soda crystals with both liquids

Any one from

- Pour some of the liquid from each bottle onto the washing soda
- Add washing soda to a sample from each bottle
do not accept ‘add washing soda to each bottle’

Any one from

- One bubbles and one does not accept ‘one of them bubbles’
- One gives off carbon dioxide and one does not accept ‘one of them gives off carbon dioxide’
- The acid bubbles or gives off carbon dioxide do not accept ‘it bubbles’ or ‘it gives off carbon dioxide’
- The water does not bubble or give off carbon dioxide

M3. (a) (i) Acid or acidic

Accept ‘has acid in it’ do not accept ‘more acid than alkali’

(ii) Alkali or alkaline

Accept ‘it neutralises acid’ do not accept ‘turns the acid into an alkali’

(iii) Purple

(b) Neutralisation ✓

*If more than one box is ticked, award no mark.*

M4. Acids damage teeth ✓

1 Acids react with metals such as magnesium ✓

1 Acids may harm your skin. ✓

1 Acids react with limestone. ✓

1 i.e. ticks in the third, forth, sixth and seventh boxes if more than four boxes are ticked, deduct one mark for each incorrectly ticked box

Minimum mark zero

M5. (a) (i) Any one from

- Soap with moisturisers
do not accept ‘soap’ or ‘pH 7.3’

- Normal facial wash

1 Normal soap

do not accept ‘soap’ or ‘pH 10.0’

1 Normal soap

do not accept ‘soap’ or ‘pH 10.0’

M6. (a) (i) Hydrogen chloride

1 Oxygen

1 Less gas will dissolve

Accept ‘it gets less’ or ‘lowers it’ do not accept ‘it dissolves less quickly’

1 Any one from

- Carbon dioxide accept ‘CO₂’
- Hydrogen chloride accept ‘HCl’

1 Ammonia accept ‘NH₃’

1 Oxygen accept ‘O’ do not accept ‘O’
### M7.

<table>
<thead>
<tr>
<th>Liquid</th>
<th>What happened to blue litmus paper</th>
<th>What happened to red litmus paper</th>
<th>Is the liquid acidic, alkaline, or neutral?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lemon</td>
<td>Went red</td>
<td>Stayed</td>
<td>Acidic</td>
</tr>
<tr>
<td>Water</td>
<td>Stayed</td>
<td>Stayed</td>
<td>Neutral</td>
</tr>
<tr>
<td>Sodium Hydroxide solution</td>
<td>Stayed</td>
<td>Went blue</td>
<td>Alkaline</td>
</tr>
<tr>
<td>Alcohol</td>
<td>Stayed</td>
<td>Stayed</td>
<td>Neutral</td>
</tr>
<tr>
<td>Ammonium solution</td>
<td>Stayed</td>
<td>Went blue</td>
<td>Alkaline</td>
</tr>
<tr>
<td>Sour milk</td>
<td>Went red</td>
<td>Stayed</td>
<td>Acidic</td>
</tr>
</tbody>
</table>

Both answers are required for the mark.

Accept ‘blue’ or ‘did not change’ for stayed blue.
Accept ‘red’ or ‘did not change’ for stayed red.
Accept ‘alkali’ for alkaline.
Accept ‘acid’ for acidic.
Do not accept ‘went blue’ for stayed blue.
Do not accept ‘went red’ for stayed red.

### M8.

(a) C

(b) (i) A or D

(ii) B or E

(c) Neutralisation

### M9.

(a) Purple

- Any one from:
  - It changes colour in both acids and alkalis. Do not accept ‘it changes colour in acids’ or ‘it changes colour in alkalis’.
  - It goes pink in acid or pH1 and blue in alkaline or pH10.

(b) Chromatography

(c) Dissolved answers must be in the correct order.
Do not accept ‘made a solution’.

- Solvent.
- Red.
- Accept ‘second’.

### M10.

(a) Any one from:
- Amylase is denatured or destroyed.
- Enzymes work best at the right pH. Do not accept ‘enzymes only work at the right pH’.
- Do not accept ‘amylase does not work at this pH’.
- Do not accept ‘amylase is killed at this pH’.

(b) (i) An alkali
- Accept ‘strongly or weakly alkaline’.

(ii) Neutralisation
- Do not accept ‘digestion’.

(c) (i) Any one from:
- Blood sugar level does not rise as high after eating pasta.
- Accept ‘blood sugar is lower’.
- Do not accept ‘there is not as much starch in pasta’.
- Amount of insulin produced is related to the blood sugar level.

(ii) 0.9 mg/cm³.
- Accept answers from 0.8 mg/cm³ to 1.0 mg/cm³.
The unit is required for the mark.
M12.  

(a) in tube B: no oxygen
in tube C: no water or water vapour
accept ‘no air’
accept ‘no moisture’
accept ‘it was dry’ or ‘it was not wet’

(b) (i) acidic
(ii) hydrogen
(c) (i) it increased or it was more accept ‘it was heavier’
(ii) any one from
• oxygen or water was added
• the oxygen has mass
• rust contains iron and oxygen or water
accept ‘rust is iron oxide’
• the iron reacted with oxygen or water

(d) Answers must refer to either test-tube D or to sea water.
any one from
• the nail was more rusty in D than in A
accept ‘D was the only one which was rusty’
accept ‘D was very rusty’
• it was more rusty in sea water
• sea water contains salt

M13.  

<table>
<thead>
<tr>
<th>Liquid added to cabbage water</th>
<th>Colour of cabbage water</th>
<th>Is the liquid acidic or alkaline or neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>water</td>
<td>purple</td>
<td>neutral</td>
</tr>
<tr>
<td>lemon juice</td>
<td>red</td>
<td>acidic</td>
</tr>
<tr>
<td>washing up liquid</td>
<td>blue</td>
<td>alkaline</td>
</tr>
</tbody>
</table>

(b) indicators
if more than one box is ticked, award no mark

M14.  

(a) measuring cylinder
(b) (i) 4
(ii) 35
(c) (i) push the plunger in
accept ‘squeeze the syringe’
do not accept a reference to pouring
until it reads 1.0 cm³
accept ‘to 1’
award two marks for ‘remove 1 cm³
and push the rest into a beaker’
(ii) A gas is produced.

The acid reacts with the chalk.
if more than two boxes are ticked, deduct one mark for each incorrect tick

M15.  

<table>
<thead>
<tr>
<th>(a)</th>
<th>acidic or alkaline</th>
<th>colour of universal indicator paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>bee sting (pH2)</td>
<td>acidic</td>
<td>red</td>
</tr>
<tr>
<td>wasp sting (pH10)</td>
<td>alkaline</td>
<td>blue accept ‘purple’</td>
</tr>
</tbody>
</table>

award one mark for each correct row

M16.  

(a) cast iron
do not accept ‘4.5’

(b) (i) 0.8
(ii) high carbon steel

(c) (i) any one from
• for buildings
accept any other reasonable answer, for example ‘street lights’ or ‘fence posts’
• for bridges

(ii) any one from
• oxygen
accept ‘air’
• water
accept ‘moisture’

M17.  

(a) any one from
• it would be fizzing
• there would be effervescence
• bubbles would be given off
accept ‘gas or carbon dioxide would be given off’
accept ‘there was a rise in temperature’
accept ‘there was a loss of mass’

(b) any one from
• carbon dioxide was lost
accept ‘carbon dioxide was produced’
accept ‘gas was given off’
• the carbon dioxide had mass
accept ‘the gas also weighed something’

(c) green
(d) limestone
marble

if more than two boxes are ticked, deduct one mark for each incorrect tick
minimum mark zero

(e) hydrogen
M18.  
(a)  
(i)  7

*do not accept ‘neutral’*

(ii)  it was neutral √
if more than one box is ticked, award no mark
consequential marking applies
accept ‘it was acidic’ if the answer to part (i) was less
than 7
accept ‘it was alkaline’ if the answer to part (i) was
greater
than 7 and up to 14

(b)  any one from
•  it decreased or went down
accept ‘it dropped to 5’
•  it became acidic or more acidic

(c)  an alkali √
if more than one box is ticked, award no mark

1 (L4)

M19.  
(a)  
•  volume or alkali in cm³ on the x
axis and pH of mixture on the y axis
*pupils can gain credit for correct responses to other
parts if the axes are wrongly labelled*

•  appropriate scales for volume of alkali and pH of
mixture
*this mark cannot be awarded for a non-linear scale*

•  11 points correctly plotted

1 (L7)

smooth curve of best fit
*do not accept a line drawn from point to point*

(b)  9.0

accept ‘9’

1 (L6)

C8p EQ 2nd 58 marks Atoms compounds and mixtures

Q# 1/ Q1.  
Amy’s family are at the beach during the summer. Amy and her sister have a bucket containing seawater and sand.

Read the following statements.
Which are true and which are false?

Tick one box for each statement.

true false

Water is a solvent for salt.  

Sand sinks in water because water is more dense than sand.  

When a solid dissolves in water, the solid is called a solute.  

2 marks

(b)  Seawater contains dissolved salt.

Describe what Amy can do to separate and collect pure water from seawater.

........................................................................................................................................
........................................................................................................................................

2 marks

Patrick Brannac  
www.SmashingScience.org
(c) Draw a line from each of the **substances** below to the **group** that it belongs to.

Draw only **three** lines.

Draw a line from each **group** to the correct **description**.

Draw only **three** lines.

<table>
<thead>
<tr>
<th><strong>substance</strong></th>
<th><strong>group</strong></th>
<th><strong>description</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>seawater</td>
<td>compound</td>
<td>It contains two or more types of atoms or molecules which can be physically separated.</td>
</tr>
<tr>
<td>salt</td>
<td>mixture</td>
<td>It contains only one type of atom.</td>
</tr>
<tr>
<td>oxygen</td>
<td>element</td>
<td>Two or more types of atoms are chemically joined together.</td>
</tr>
</tbody>
</table>

**Q# 2/ Q11.** The drawing shows the label on a box of fertiliser for houseplants.

(b) Part of the Periodic Table is shown below. The three elements N, P and K shown on the fertiliser label are also shown in the table.

<table>
<thead>
<tr>
<th>Li</th>
<th>Be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Na</td>
<td>Mg</td>
</tr>
<tr>
<td>K</td>
<td>Ca</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>C</th>
<th>N</th>
<th>O</th>
<th>F</th>
<th>Ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>Si</td>
<td>P</td>
<td>S</td>
<td>Cl</td>
<td>Ar</td>
</tr>
<tr>
<td>Ga</td>
<td>Ge</td>
<td>As</td>
<td>Se</td>
<td>Br</td>
<td>Kr</td>
</tr>
</tbody>
</table>

(i) The element N is nitrogen. What are the names of the other **two** elements?

P .................................................................

K .................................................................

2 marks
Q# 3/ Q33. The drawing below shows a gemstone set in a gold ring.

Crystals of gemstones are found in different rocks.

(c) Gemstones called rubies are made from an aluminium compound with the formula \( \text{Al}_2\text{O}_3 \).

The chemical symbol for aluminium is Al.

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

..........................................

1 mark

(ii) Suggest the name of the compound with the formula \( \text{Al}_2\text{O}_3 \).

.............................................................................................................

1 mark

(iii) How many atoms are there in the formula \( \text{Al}_2\text{O}_3 \)?

............

1 mark

(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?

.............................................................................................................

1 mark
Q# 4/ Q8. The diagrams represent the way 'atoms' are arranged in six chemical substances.

Each 'atom' is represented by a circle.

The 'atoms' are labelled with their chemical symbols.

(a)  
(i) Which diagrams represent the structures of chemical elements? Write the numbers.

..................................................................................................................................................... 1 mark

(ii) Explain how you made your decision.

..................................................................................................................................................... 1 mark

(b) Give the formulae of two of the compounds represented in the diagrams.

1. .....................................................................................................................................................

2. ..................................................................................................................................................... 2 marks

(c) Give the name of substance 6.

..................................................................................................................................................... 1 mark
(d) Give the names of the chemical elements whose atoms can be represented by the following symbols.

C .................................................................

Cl .................................................................

Cu .................................................................

3 marks

Q# 5/ Q31. 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.

.............................................................................................................................

1 mark

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

Choose from:

<table>
<thead>
<tr>
<th>metallic element</th>
<th>mixture</th>
<th>non-metallic element</th>
<th>compound</th>
</tr>
</thead>
<tbody>
<tr>
<td>iron</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sulphur</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iron sulphide</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 marks
(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></td>
</tr>
<tr>
<td>iron</td>
<td></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.

sulphur + oxygen → .............................................................................

Q# 6/ Q18. The list below shows properties that different elements can have.

- magnetic
- can be compressed
- very high melting point
- very low melting point
- good conductor of heat
- poor conductor of heat
- good conductor of electricity
- poor conductor of electricity

(a) Which **two** properties from the list above make aluminium suitable for saucepans?

1. .................................................................................................................
2. .................................................................................................................

(b) Which property in the list above explains why:

(i) copper is used in the cable of a television?

........................................................................................................................
(ii) a lot of oxygen gas can be pumped into a very small container?

........................................................................................................................................ 1 mark

**Q# 7/ Q28.** Joe bought a potted plant. He kept it well watered but some of the leaves turned yellow.

Joe thought that the plant did **not** have enough light for photosynthesis. He moved the plant closer to the window but more leaves turned yellow.

(a) He then thought that the plant did **not** have enough minerals.

The table below gives information about minerals.

<table>
<thead>
<tr>
<th>mineral</th>
<th>why the mineral is needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>magnesium</td>
<td>to make chlorophyll</td>
</tr>
<tr>
<td>nitrogen</td>
<td>to make protein</td>
</tr>
<tr>
<td>phosphorus</td>
<td>to grow and transfer energy</td>
</tr>
<tr>
<td>potassium</td>
<td>to make fruit</td>
</tr>
</tbody>
</table>

(b) Joe bought some fertiliser for his plant.

The names and formulae of four different fertilisers are shown below.

![Fertilisers](image)

(i) Give the letter of one box of fertiliser, A, B, C or D, that would provide each of the minerals in the table below.

Write the letters in the table.
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>62</td>
</tr>
<tr>
<td>solder</td>
<td>4</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?

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

(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
(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 above to help you.

.............................................................................................................................................

1 mark

(ii) Rusting requires water and a gas from the air.

Give the name of this gas.

.............................................................................................................................................

1 mark

Q# 9/ Q24. (a) Samantha opened a tin of white paint. The paint consisted of a liquid and particles of titanium dioxide that are insoluble in the liquid.

The paint had separated into two layers, as shown below.

![Diagram of paint separation]

(i) What type of substance is the paint?

Tick the correct box.

a compound  an element  a mixture

1 mark

(ii) What type of substance is titanium dioxide?

Tick the correct box.

a compound  an element  a mixture

1 mark

(iii) Why did the particles of insoluble titanium dioxide sink to the bottom?

.............................................................................................................................................

1 mark

(b) Samantha stirred the paint and used it to paint a window frame.

She got some of the paint on the glass.
Samantha could **not** get the paint off the glass with water.

When she used a different liquid called white spirit the paint came off.

**Why could she remove the paint with white spirit but **not** with water?**

Q# 10/ Q12. The diagrams represent the arrangement of atoms or molecules in four different substances, A, B, C and D.

![Diagrams of substances A, B, C, and D](image)

Each of the circles, ○, □ and ● represents an atom of a different element.

(a) (i) Which substance is a compound?


(ii) Which substance is a mixture?


(iii) Which **two** substances are elements?


1 mark
(iv) Which two substances could be good thermal conductors?
…………… and ……………
1 mark

(v) Which substance could be carbon dioxide?
…………
1 mark

(b) The following experiment was set up. Test-tubes containing substances B and C were placed together as shown. The substances did not react.

They were left for five minutes.

![Diagram of test-tubes](image)

substance B + substance C

test-tubes put together

mixed of substance B and substance C

(i) How many molecules are there in the mixture compared to the total number in substances B and C?

……………………………………….………………………………………
1 mark

(ii) Complete the diagram which is a model of this experiment.

![Complete diagram](image)

Maximum 7 marks

Q# 11/ Q22. The drawing shows a gold mask from a tomb in Egypt. The gold is still shiny after thousands of years.
(a) What is pure gold? Tick the correct box.

<table>
<thead>
<tr>
<th>a compound</th>
<th>a mixture</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>an element</td>
<td>a solution</td>
</tr>
</tbody>
</table>

1 mark

(b) The list shows some of the properties of gold.

- It conducts electricity.
- It melts at 1064°C.
- It is yellow.
- It is easily scratched.
- It stays shiny.
- It conducts heat.

(i) Which one of these properties shows that gold does not react with oxygen in the air?

........................................................................................................................................................................

1 mark

(ii) Which two of the properties above are properties of all metals?

1. ........................................................................................................................................................................
2. ........................................................................................................................................................................

2 marks

(c) Old iron objects from tombs in Britain are often covered with rust.

Iron reacts with oxygen when it rusts.

What else is needed for iron to go rusty? Choose one substance from the list below.

lead
nitrogen
carbon dioxide
water

........................................................................................................................................................................

1 mark

(d) A box contains a collection of metal objects from a tomb.

What piece of equipment would you use to separate the iron objects from the other metal objects?

........................................................................................................................................................................

1 mark

Mark Scheme C8p EQ Atoms compounds and mixtures

<table>
<thead>
<tr>
<th>Q# 1/ Q1. (a)</th>
<th>true</th>
<th>false</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>
</tbody>
</table>

for all three correct boxes ticked, award two marks
for any two correct, award one mark

(b) • evaporate the water or evaporation accept ‘heat it’

accept ‘it goes from liquid to gas’
accept ‘boiling’
do not accept an incorrect use of evaporation, e.g. ‘she evaporates salt from sand’

• condense the water vapour or condensation
accept ‘it goes from gas to liquid’
do not accept ‘it condenses to water vapour’

accept, for two marks, ‘distil or distillation’
accept, for one mark, ‘condensation then evaporation’

1 (L5)
1 (L6)
(c) all three lines are required for one mark
if more than one line goes from any one box,
do not award the mark

Q# 2/ M11 (b) (i) P: phosphorus 1 (L6)
K: potassium 1
(ii) K 1
do not accept 'potassium’

Q# 3/ M33 (c) (i) oxygen ‘O₂’ is insufficient 1 (L5)
(ii) • aluminium oxide accept ‘aluminium trioxide’ 1 (L6)
(iii) • 5 1 (L6)
(d) (i) any one from • at the bottom • below copper ‘less reactive’ is insufficient 1 (L6)

Q# 4/ M8. (a) (i) accept ‘C’ 1
3 accept ‘O’ 1
5 accept ‘S’

all three answers are required for the mark
if more than one line goes from any one box,
do not award the mark

(b) any two from • CO₂ accept ‘O₂ C’ 1 (L7)
• CH₄ accept ‘H₂ C’ 1 (L7)
• NaCl accept ‘Cl Na’ or ‘NaCl₂’
do not accept names of compounds 1 (L7)
(c) sodium chloride or salt do not accept ‘NaCl’ 1 (L7)
(d) carbon 1 (L7)
chlorine do not accept ‘chloride’ 1 (L7)
copper answers must be in the correct order 1 (L7)

Q# 5/ M31. (a) any one from • the mixture glowed accept ‘the temperature increased’
• there was a colour change
• a black solid formed
• a new substance has been formed accept ‘a compound or iron sulphide was formed’
accept ‘there is no longer any sulphur or yellow or iron or grey’ 1 (L6)
(b) • iron: metallic element accept ‘metal’
• sulphur: non-metallic element accept ‘non-metal’
• iron sulphide: compound if all three answers are correct, award two marks
if two answers are correct, award one mark 2 (L5)
(c) • sulphur: no • iron: yes
both answers are required for the mark 1 (L5)
(d) (i) • zinc sulphide do not accept ‘zinc sulphate’ 1 (L6)
(ii) • sulphur dioxide accept ‘sulphur oxide’ or ‘sulphur trioxide’ 1 (L6)

Q# 6/ M18. (a) very high melting point answers may be in either order

do not accept 'good conductor' 1 (L3)

(b) (i) good conductor of electricity do not accept 'good conductor' 1 (L3)

(ii) can be compressed 1 (L4)

Q# 7/ M28 (b) (i)

<table>
<thead>
<tr>
<th>mineral</th>
<th>letter of fertiliser</th>
</tr>
</thead>
<tbody>
<tr>
<td>magnesium</td>
<td>B</td>
</tr>
<tr>
<td>nitrogen</td>
<td>A or C</td>
</tr>
<tr>
<td>phosphorus</td>
<td>D</td>
</tr>
<tr>
<td>potassium</td>
<td>C</td>
</tr>
</tbody>
</table>

accept 'Epsom Salts' or 'MgSO₄,' or 'magnesium sulphate' 1 (L5)
accept 'A and C or 'Easy Grow' or 'NH₄NO₃,' or 'ammonium nitrate' or 'Saltpetre' or 'KNO₃,' or 'potassium nitrate' 1 (L5)
accept 'Superphosphate' or 'Ca(H₂PO₄)₂' or 'Saltpetre' or 'KNO₃' or 'potassium nitrate' 1 (L5)

if all four answers are correct, award three marks 1 (L6)
if three answers are correct, award two marks 1 (L6)
if one or two answers are correct, award one mark 1 (L6)

(ii) 3 1 (L6)

(iii) 9 1 (L6)

Q# 8/ M30. (a) steel do not accept 'stainless steel' do not accept 'carbon' 1 (L5)

(b) • brass
• solder
answers may be in either order 1 (L5)
both answers are required for the mark

(c) 80
accept '100 – 20' 1 (L5)

(d) (i) it does not contain iron accept 'it does not contain steel' accept 'only iron rusts' or 'only steel rusts' accept 'it is made of tin, copper and zinc' 1 (L6)

(ii) oxygen
accept 'O₂' 1 (L6)

Q# 9/ M24. (a) (i) a mixture

✓ if more than one box is ticked, award no mark 1 (L5)

(ii) a compound ✓ if more than one box is ticked, award no mark 1 (L5)

(iii) any one from
• they are denser than the liquid accept 'it is heavier than the liquid or the paint'
accept 'the solid particles are more dense or heavier or too heavy' accept 'the solid is denser'
do not accept 'solid particles are heavy' without a comparison or qualifier eg 'too heavy'
• the liquid is less dense than the solid accept 'the liquid is less dense' or 'the liquid is lighter'

(b) any one from
• it is insoluble in water
• water is not a solvent for the paint
• it dissolves in white spirit
• white spirit is a solvent for the paint 'it is waterproof' is insufficient 1 (L5)

Q# 10/ M12. (a) (i) C 1 (L5)

(ii) D 1 (L5)

(iii) A and B answers may be in either order both answers are required for the mark

(iv) A and D answers may be in either order both answers are required for the mark

(v) C 1 (L7)

(b) (i) the same accept 'seven' 1 (L7)

(ii) a random, mixed arrangement of both types of molecule should be drawn with the molecules not touching each other 1 (L7)

Q# 11/ M22. (a) an element ✓ if more than one box is ticked, award no mark 1 (L7)

(b) (i) it stays shiny 1 (L4)

(ii) it conducts electricity 1 (L3)

it conducts heat answers may be in either order accept 'it conducts' for one mark if neither of the fully correct answers is given accept 'it stays shiny' 1 (L3)

(c) water 1 (L3)

(d) any one from
• a magnet
• an electromagnet 1 (L4)
Q# 1/ Q12 (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

Q# 2/ Q13 (b) The table below gives information about three of the planets in our solar system.

<table>
<thead>
<tr>
<th>planet</th>
<th>average distance from Sun (millions of km)</th>
<th>time for one orbit (Earth years)</th>
<th>Average surface temperature of planet (ºC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturn</td>
<td>1427</td>
<td>30</td>
<td>−180</td>
</tr>
<tr>
<td>Uranus</td>
<td>2870</td>
<td>84</td>
<td>−210</td>
</tr>
<tr>
<td>Pluto</td>
<td>5900</td>
<td>248</td>
<td>−230</td>
</tr>
</tbody>
</table>

(i) The time for one orbit of the planet Neptune is 165 Earth years. Estimate the average distance of Neptune from the Sun. Use information in the table to help you. ......................................................... millions of km

(ii) How does the surface temperature of these planets vary with distance from the Sun? Use information in the table to help you. ........................................................................................................

(iii) Explain why the temperature varies with distance from the Sun in this way. .................................................................................................................................

Q# 3/ Q14. (a) Alfie made a model of part of the solar system. He used metal balls for the Sun, the Moon and the planets.

- E goes around D.
- B, C, D, F and G go around A.
Give the letter that is used to label:

(i) the model Sun; ............ 1 mark
(ii) the model Earth; ............ 1 mark
(iii) the model Moon; ............ 1 mark
(iv) the model planet with the largest orbit. ............ 1 mark

(b) The bar chart shows the force of gravity on eight of the planets.

<table>
<thead>
<tr>
<th>Planet</th>
<th>Gravity (N/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>5</td>
</tr>
<tr>
<td>Venus</td>
<td>7</td>
</tr>
<tr>
<td>Earth</td>
<td>12</td>
</tr>
<tr>
<td>Mars</td>
<td>4</td>
</tr>
<tr>
<td>Jupiter</td>
<td>25</td>
</tr>
<tr>
<td>Saturn</td>
<td>13</td>
</tr>
<tr>
<td>Uranus</td>
<td>11</td>
</tr>
<tr>
<td>Neptune</td>
<td>12</td>
</tr>
<tr>
<td>Pluto</td>
<td>3</td>
</tr>
</tbody>
</table>

(i) The gravity on Neptune is 12 N/kg.
   On the chart above, draw a bar for the planet Neptune. Use a ruler. 1 mark

(ii) Give the name of a planet where you would weigh more than you weigh on Earth. 1 mark
................................................................

(iii) On which planet would a spaceship need the largest force to take off? 1 mark
................................................................

Q# 4/ Q3. (a) The diagram below shows the positions of the Sun, Moon and Earth during a solar eclipse.
Write numbers (1–4) on the diagram below to label the features during an eclipse.
1. the Earth
2. the Moon
3. the Sun
4. a region where the total eclipse of the Sun is taking place
Q# 5/ Q30  On 11th August 1999 there will be an eclipse. The shadow of the Moon will pass over part of the Earth.

(a) The diagram below shows the Moon, the Moon’s shadow and the Earth.

![Moon and Earth diagram](image)

On the diagram, draw an arrow pointing towards where the Sun must be.

(b) The map shows the shape of the Moon’s shadow and the path it will take across Cornwall.

![Moon's shadow map](image)

The Moon’s shadow will take about 2 minutes to move across a house in Falmouth. It will take less than 2 minutes to move across a house in Padstow. Explain why it will take less time for the Moon’s shadow to move across a house in Padstow than to move across one in Falmouth.

(c) Why does the Moon’s shadow move over the surface of the Earth?

Q# 6/ Q4. The table below shows information about four planets.

<table>
<thead>
<tr>
<th>planet</th>
<th>time taken to orbit the Sun (Earth years)</th>
<th>distance from the Sun (million km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0.25</td>
<td>60</td>
</tr>
<tr>
<td>Venus</td>
<td>0.5</td>
<td>108</td>
</tr>
<tr>
<td>Earth</td>
<td>1.0</td>
<td>150</td>
</tr>
<tr>
<td>Mars</td>
<td>2.0</td>
<td>228</td>
</tr>
</tbody>
</table>

The diagram below shows the orbits of the Earth, Mercury, Venus and Mars, and their position at one particular time.

The arrows show the direction in which the planets move.
(a) Show the position of each planet six months later by drawing a letter X on the orbit of each planet.  

(b) Use the information in the table to calculate the largest and smallest distance between the Earth and Venus.

closest ............................................ million km  

furthest ............................................. million km  

(c) The speed of light is 300 000 km/second. Calculate how long light takes to reach the Earth from the Sun.

........................................................................................................... s  

130
Q# 7/ Q6. The table shows information about three planets in our solar system.

<table>
<thead>
<tr>
<th>planet</th>
<th>time taken to orbit the Sun (Earth-years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mars</td>
<td>2.0</td>
</tr>
<tr>
<td>Venus</td>
<td>0.6</td>
</tr>
<tr>
<td>Earth</td>
<td>1.0</td>
</tr>
</tbody>
</table>

(a) Give one reason why Venus takes less time than Earth to orbit the Sun.

...........................................................................................................................
(b) The diagram below shows the orbits of Venus and Earth. The Sun is a source of light. Venus does not produce its own light.

On the diagram above, draw rays of light to show how Venus can be seen from Earth. Use a ruler.

Draw an arrow on each ray to show the direction of light.

(c) The diagram below shows how the astronomer Ptolemy drew the solar system 2000 years ago.

(i) The planets Uranus and Neptune are missing from his diagram. Suggest why Ptolemy did not include these planets in his diagram.

........................................................................................................................................

(ii) Today we know the correct arrangement of the planets in our solar system. Give one way the diagram above is incorrect. Complete the sentence below.

In the correct arrangement ..............................................................
Q# 8/ Q7. 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.

.................................................................................................................................................. 1 mark

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

You can see the Sun because it .............................................. light.
You can see a satellite because it ........................................... light.

1 mark

(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.

1 mark

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

- Sun
- Hubble telescope
- Earth

.............................................................................................................................................. 1 mark
(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.

Q# 9/ Q8. (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

Mark Scheme P7B EQ The Earth and Beyond 1st 39marks

Q# 1/ M12.  (d) (i)  the greater
the distance
accept 'it increases' the greater the time for
one orbit

(ii)  an answer from 1.6 to 6 inclusive

(e)

[Diagram]

award a mark for X marked on the orbit within
the
tolerances shown

Q# 2/ M13.  (b) (i)  a number
greater than 2870 and smaller than 5900

(ii)  the further away the lower the
temperature
accept the converse
accept 'the further away the colder it is'

Q# 3/ M14.  (a) (i)  A

(ii)  D

(iii)  any one

(iv)  G
accept 'Jupiter'

(b) (i)  a bar drawn to 12 N/kg
the top of the bar must be in the middle third
between
10 and 15

(ii)  any one

- Jupiter
- Saturn
- Neptune
(iii) Jupiter

Q# 4/ M3. (a)

for all four numbers in the correct place, award two marks
for any two or three numbers in the correct place, award one mark

(b) any one from
• 21st August
• 22nd August
• 23rd August
accept dates written in another format
• 2017

Q# 5/ M30. (a) horizontal arrow pointing to the left
the arrow may be drawn anywhere
on the diagram

(c) any one from
• the part of the shadow which passes over Padstow is narrower
• the part of the shadow which passes over Falmouth is wider or bigger

(d) any one from
• the Moon moves around the Earth
• the Earth spins on its axis
  accept ‘the Earth turns or rotates or goes round’
  do not accept ‘the Earth moves around the Sun’
  or ‘the Earth moves’ or ‘the Sun moves’

Q# 6/ M4. (a)

for all four correct, award two marks
for any two or three correct, award one mark
accept a cross drawn that lies within the width of the Sun for each planet, e.g.

(b) • 42
accept ‘150-108’
• 258
accept ‘150+108’

(c) 500
accept $\frac{150,000,000}{300,000}$ or $\frac{150,000,000}{300,000}$
accept ‘8.3 minutes’
accept ‘about 8 minutes’

Q# 7/ M6. (a) any one from
a comparative statement is needed
• Venus is nearer to the Sun
  ‘it is closer’ is insufficient
• the Sun’s gravity on Venus is greater
• it travels faster
• it has a smaller orbit
accept ‘it does not have as far to go’

(b) • a straight line from the Sun to Venus
and a straight line from Venus to Earth
• arrows drawn on both rays in the correct direction

accept two discontinuous straight lines that touch the Sun,
Venus and the Earth
do not accept a line from the Sun which touches the Earth

(c) (i) any one from
• they had not been discovered
  accept ‘he did not know they existed’
• they had not been seen
  accept ‘they could not be seen’
  do not accept ‘they did not exist’
  ‘they are too far away’ is insufficient

(ii) any one from
• the Earth is not at the centre
  answers must refer to the arrangement
  and not to missing planets
• the planets do not go round the Earth
  or the planets orbit the Sun
• the Earth goes round the Sun
• the Sun is in the middle
  accept answers which give the correct order
  of the planets in the solar system
  ‘there are more planets’ is insufficient

Q# 8/ M7.  (a) • gravity ✓
  if more than one box is ticked, award no mark

(b) any one from
• telecommunications
  accept ‘communication’
• television or TV
• telephones
  accept ‘phone’ or ‘fax’
• radio
• weather
• military or spy observations
• land use observations
• GPS
  accept ‘navigation’
• internet
• monitoring or taking pictures of the Earth
  ‘looking at or taking pictures of planets or stars
  or galaxies’ is insufficient as it is given in the question

(c) • produces
  reflects
  answers must be in the correct order
  both answers are required for the mark

(d) • a bar drawn to 4

(e) (i) • Hubble
telescope Earth Sun
  accept ‘Hubble’ or ‘telescope’ for Hubble
telescope
  answers must be in the correct order
  all three answers are required for the mark

(ii) • They are further away than the Sun
  ✓ if more than one box is ticked, award no mark

Q# 9/ M8.  (a) •

(b) •
  Sun Mercury Venus Earth Mars Jupiter
  Saturn Uranus Neptune
  award one mark for the Sun in the correct
  position
  award one mark for both Earth and Neptune
  in the correct positions

(c) (i) any one from
• weather forecasting
  accept ‘weather’
• communications
  accept ‘phone’ or ‘fax’
• telescopes
• global positioning system
  accept ‘GPS’
• TV
• spying
  accept ‘taking photographs’
• internet

(ii) • gravity ✓
  if more than one box is ticked, award no mark

P7e EQ Energy and energy resources 79marks 16Pgs

Q1. Energy comes from a variety of sources.
Complete the table below.
The first one has been done for you.

<table>
<thead>
<tr>
<th>source of energy</th>
<th>directly from the Sun</th>
<th>indirectly from the Sun</th>
<th>not from the Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>nuclear</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hydro-electric</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>solar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>geothermal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>oil</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q2. Coal is a non-renewable energy resource.
(a) Give two other non-renewable energy resources.
1. ...............................................................
2. ...............................................................

Wood is a renewable energy resource.
(b) Why can wood be described as a renewable energy resource?

(c) Give two other renewable energy resources.
1. ...............................................................
2. ...............................................................

(d) Complete the statement below to describe what happens when wood burns.
When wood burns, chemical energy in the wood is transformed into ......................... energy, which is transferred to the surroundings.

Q3. Each of these things found in the home uses a different fuel.
Draw one line from each item to the fuel it uses.
Use each fuel only once.

cooker

fireplace

central heating boiler

coil

gas

3 marks
Q4. Oil is an important energy resource. It provides about 38% of the energy used for transport, heating and generating electricity.

(a) The energy stored in oil came from the Sun. Describe how energy from the Sun became stored in oil.

....................................................................................................................................................

.................................................................................................................................................... 2 marks

(b) (i) Oil can be described as a non-renewable energy resource. Explain why.

.................................................................................................................................................... 1 mark

(ii) Tick the boxes by two other non-renewable energy resources.

<table>
<thead>
<tr>
<th>coal</th>
<th>wind</th>
</tr>
</thead>
<tbody>
<tr>
<td>solar</td>
<td>tidal</td>
</tr>
<tr>
<td>natural gas</td>
<td>wave</td>
</tr>
</tbody>
</table>

Q5. (a) Many substances burn. Some of them are used as fuels. Some fuels are burned in power stations to generate electricity. Tick the boxes by the two fuels which are most often burned in power stations.

| coal | paraffin wax | natural gas | petrol | paper |

(b) Some power stations do not burn fuels. They use other energy resources to generate electricity. Give two energy resources which are not fuels and which are used to generate electricity.

1 ....................................................................................................................................................

2 .................................................................................................................................................... 2 marks
Q6. Peter burns a piece of crispbread to find out how much energy is stored in it. Energy from the burning crispbread raises the temperature of the water in the test-tube.

(a) Describe one way Peter has arranged the apparatus so that he is working safely.

.....................................................................................................................................................
..................................................................................................................................................... 2 marks

(b) Peter wants to find out if potato crisps contain as much energy as crispbread. He does the experiment again using a piece of potato crisp. Suggest two things he must do to make the experiment a fair test.

..................................................................................................................................................... 1 mark

The table shows some of the nutritional information from a packet of crispbread and a packet of potato crisps.

<table>
<thead>
<tr>
<th></th>
<th>energy in kJ</th>
<th>protein in g</th>
<th>carbohydrate in g</th>
<th>Fat in g</th>
<th>fibre in g</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 g of crisp bread</td>
<td>1455</td>
<td>11.6</td>
<td>58.1</td>
<td>7.3</td>
<td>14.7</td>
</tr>
<tr>
<td>100 g of potato crisps</td>
<td>2072</td>
<td>5.8</td>
<td>57.9</td>
<td>28.7</td>
<td>4.3</td>
</tr>
</tbody>
</table>

(c) Peter burns 1.0 g of potato crisp instead of 1.0 g of crispbread in a similar experiment. What result will he get when he burns the potato crisp? Tick the correct box.

- The change in the temperature of the water will be greater. [ ]
- The change in the temperature of the water will be the same. [ ]
- The change in the temperature of the water will be smaller. [ ]
- There will be no change in the temperature of the water. [ ]

(ii) Use the table in part (b) to give two reasons for choosing crispbread rather than potato crisps as part of a balanced diet.

1. ............................................................................................................................................... 2 marks

2. ............................................................................................................................................... 2 marks
Q6. Fossil fuels are used to generate electricity, but over half of the world's population uses biomass as a fuel.

(a) What is ‘biomass’, which is used as a fuel?

................................................................. 1 mark

(b) Biomass and fossil fuels are both energy resources. What is the original source of this energy?

................................................................. 1 mark

(b) Give the names of three fossil fuels which are often burned to generate electricity.

1. .......................................................... 2. .......................................................... 3. ..........................................................

1 mark

(d) Fossil fuels are often described as non-renewable energy resources. Explain why they are called ‘non-renewable’.

................................................................. 1 mark

(e) There are advantages and disadvantages of burning different fuels.

(i) Give one advantage of using biomass rather than fossil fuel as an energy resource.

................................................................. 1 mark

(ii) Give one advantage of using fossil fuel rather than biomass as an energy resource.

................................................................. 1 mark

(iii) Give one disadvantage of using both fossil fuel and biomass.

................................................................. 1 mark

Q8. The tides can be used to generate electricity. A dam is built across a river estuary, as shown below.

(a) The water is higher on one side of the dam than on the other. As the water begins to flow through the dam it turns a turbine. The turbine generates electricity. Describe the useful energy changes which take place in this process.

................................................................. 2 marks

(b) Explain why tides are classified as a renewable energy source.

................................................................. 1 mark

(c) Give one way, other than from the tides, of generating electricity by using the sea.

................................................................. 1 mark
(d) Apart from cost, give one advantage and one disadvantage of an oil-fired power station compared with a tidal power station.

advantage ..............................................................................................................

disadvantage ...........................................................................................................

Q10. Some pupils are designing a web page about energy resources. Their design is shown below. It is not quite finished.

(a) To complete the web page, the pupils want to add a drawing of some fossil fuels. Give the names of two fossil fuels.

1. .........................................................................................................................

2. .........................................................................................................................

(b) Four energy resources are labelled on the web page:

water behind dams the wind fossil fuels wood

How many of these can be used to generate electricity?

............................ ............................ ............................ ............................ ............................ 1 mark
Q11. (a) The photographs show ways of getting energy from three different energy resources. On the line under each photograph write the name of the energy resource. Choose from the list below.

<table>
<thead>
<tr>
<th>batteries</th>
<th>biomass</th>
<th>wind</th>
<th>sunlight</th>
<th>tides</th>
</tr>
</thead>
</table>

(i)

(ii)

(iii)

(b) Name one fossil fuel.

(c) Complete the sentence below.

The purpose of the machine in photograph (i) is to generate .................

Q12. Meera used the Internet to find out about energy resources. The drawing below shows what Meera saw on her computer screen.

(a) Coal is a fossil fuel. Give the names of two other fossil fuels in the list on the screen.
(b) (i) Wave energy is an example of a renewable energy resource.
From the list on the screen above choose **two** other renewable energy resources.
........................................................................................................
........................................................................................................
2 marks

(ii) Meera found out how wave energy can be used to generate electricity.
She saw the diagram below on the Internet.

Each box below shows a stage in generating electricity.

A The air turns the turbine.

B The turbine turns the generator.

C The waves move up the chamber.

D The generator produces electricity.

E The waves push the air up the chamber.

On the lines below write the letters of the stages in the correct order.
Two have been done for you.

.....C.....  ..........  ......A.....  ..........  ..........  2 marks
Q13. The drawing shows Mark’s house. He uses three methods to generate electricity.

(a) Draw a straight line from each of the two methods below to the main energy resource used to generate electricity. Draw only two lines.

<table>
<thead>
<tr>
<th>Method</th>
<th>Energy Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar cells</td>
<td>Sunlight</td>
</tr>
<tr>
<td>Petrol generator</td>
<td>Heat</td>
</tr>
</tbody>
</table>

(b) (i) The solar cells cannot work at night. Give the reason for this.

(ii) The wind turbine cannot generate electricity all the time. Give the reason for this.

Q14. The table below gives information about three fuels that can be used in cars.

✓ shows a substance is produced when the fuel burns.

X shows a substance is not produced when the fuel burns.

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Physical State</th>
<th>Energy Released, in kJ/kg</th>
<th>Some of the Substances Produced When the Fuel Burns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>Petrol</td>
<td>Liquid</td>
<td>48 000</td>
<td>✓</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Gas</td>
<td>121 000</td>
<td>X</td>
</tr>
<tr>
<td>Ethanol (alcohol)</td>
<td>Liquid</td>
<td>30 000</td>
<td>✓</td>
</tr>
</tbody>
</table>

(a) Which fuel, in the table, releases the least energy per kilogram (kg)?
(b) Some scientists say that if hydrogen is burned as a fuel there will be less pollution. From the information in the table, give **one** reason why there will be less pollution.

(c) Which of the three **fuels** in the table can be compressed into a small container?

(d) Which gas in the air is needed for fuels to burn?
Tick the correct box.

- carbon dioxide
- nitrogen
- oxygen
- water vapour

(e) Petrol and ethanol are both fuels. Petrol is made from oil. Scientists say that oil could run out in 100 years. In some countries people plant sugar cane and use it to make ethanol. Sugar cane will **not** run out. Explain why.

Q15. The drawing below shows a solar panel fixed to the roof of a house in Britain.

(a) Daniel measured the energy output from this solar panel during one day in June. The graph below shows his results.

(i) Why does the energy output from the solar panel vary during the day?
(ii) Daniel used the solar panel to run a motor. The motor needs 0.7 kJ/s to run at full speed. Use the graph to find out how long Daniel’s motor would run at full speed.

............. hours

1 mark

(b) Daniel measured the energy output from a different solar panel. This type of solar panel turns so that it always faces the Sun.

The graph below shows the energy output for this panel during one day in mid-summer.

(i) On the graph above draw another curve to show how the energy output for this solar panel might vary on a day in mid-winter.

2 marks

(ii) Between 7am and 7pm the solar panel turns through an angle of 180°. Calculate the angle the solar panel turns through each hour.

1 mark

Q16. The drawing below shows a garden water feature. It is solar-powered.

The solar cell absorbs energy from the Sun. The solar cell is connected to a motor in the bowl. The motor drives a pump.
Water is pumped up to the jug and it flows back down to the bowl.

(a) Use the information above to help you to complete the following sentences. Choose words from the list.

\[
\text{chemical} \quad \text{electrical} \quad \text{gravitational potential} \quad \text{kinetic} \\
\text{light} \quad \text{sound} \quad \text{thermal}
\]

(i) The useful energy change in the solar cell is from light to .................................... energy. 1 mark

(ii) The useful energy change in the motor is from electrical energy to .................................... energy. 1 mark

(iii) As the water flows from the jug to the bowl .......................................................... energy is changed into .................................... energy. 2 marks

(b) Give one advantage and one disadvantage of using a solar cell to power the water feature.

advantage .......................................................................................................................... 1 mark

disadvantage .................................................................................................................. 1 mark

maximum 6 marks

Q18. The drawings below show six ways of providing energy.

A  coal fire  
burns coal to provide heat

B  turbine  
turns a generator to provide electricity

C  petrol generator  
burns petrol to provide electricity

D  gas boiler  
burns gas to provide heat

E  solar panel  
uses solar energy to provide heat

F  wave turbine  
uses wave energy to provide electricity
(a) From the drawings, give the names of two fossil fuels.

(b) 1. ..............................................................

2. ..............................................................

(b) (i) What is the source of energy for a solar panel?  

........................................................................

(ii) Why can the solar panel not work at night?  

........................................................................

(c) What makes the blades of the turbine in drawing B go round?  

........................................................................

(d) Renewable energy resources will not run out. From the drawings, give one energy source that will not run out.

........................................................................

Mark Scheme P7e EQ Energy & energy resources 79 marks

M1.  

<table>
<thead>
<tr>
<th>energy source</th>
<th>directly from the Sun</th>
<th>indirectly from the Sun</th>
<th>not from the Sun</th>
</tr>
</thead>
<tbody>
<tr>
<td>nuclear</td>
<td></td>
<td></td>
<td>* ✓</td>
</tr>
<tr>
<td>hydro-electric</td>
<td>* ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>solar</td>
<td>* ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>geothermal</td>
<td>* ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>oil</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

if more than one box is ticked in any row  
award no mark for that row

M2.  

(a) any two from  

• oil accept ‘petrol’  
• gas  
• uranium or nuclear accept ‘geothermal’ or ‘peat’  

(b) can be grown or more trees can be planted accept ‘can be replaced’  

do not accept ‘can be used again’ or ‘can be recycled’

(c) any two from  

• wind  
• wave ‘water’  
• tidal  
• solar accept ‘the Sun’  

or ‘sunlight’  

• biomass or a stated biomass, such as straw accept ‘alcohol’ do not accept ‘wood’ accept ‘hydroelectric’  

(d) any one from  

• thermal accept ‘heat’  
• radiant  
• light  

M3.  

award a mark for each correct line  
if more than one line is drawn from any item, or to any fuel,  
deduct one mark for each extra line; minimum mark zero

Patrick Brannac  

www.SmashingScience.org
M4. (a) one mark is for storing energy by photosynthesis; the other mark is for the formation of oil from living things.

Living things use energy from the Sun to grow.

Accept 'plants and animals store energy from the Sun'.

Oil is formed from the remains of living things.

Accept 'oil is made of dead animals or plants'.

(b) (i) because it cannot be replaced once it is used or because it takes a long time to form.

Do not accept 'you cannot use it over and over again' or 'it cannot be recycled'.

(ii) coal ✓

Natural gas ✓

If more than two boxes are ticked, deduct one mark for each incorrectly ticked box. Minimum mark zero.

M5. (a) coal ✓

Natural gas ✓

If more than two boxes are ticked, award no mark. Deduct one mark for each incorrectly ticked box. Minimum mark zero.

(b) Any two from

- Soot or carbon
- Ash
- Smoke
- Sulphur dioxide
- Carbon monoxide
- Oxides of nitrogen
- Nitrogen oxide
- Carbon dioxide
- Lead
- Acid rain

Do not accept 'greenhouse gases' or 'water' or 'gas'.

(c) Any two from

- Geothermal
- Wind
- Solar
- Sun
- Running water
- Hydro or 'HEP' or 'water power'
- Tidal

Do not accept 'water'.

Accept 'nuclear' or 'uranium'.

M6. (a) Any one from

- The test-tube is pointing away from him.
  Accept 'the test-tube is pointing away from the edge of the bench' do not accept 'the test-tube is at an angle'.
- He used a cork and a pin to hold the burning crispbread.
  Accept 'he used a pin' or 'he is not holding the crispbread' or 'the cork is on the stand'.
- The test-tube is held in a clamp.
  Accept 'he used a clamp' or 'the test-tube is held tightly'.
- It is away from the edge of the bench.
- The apparatus is arranged over the base of the stand for stability.
  Accept 'the tube is over the base'.

Do not accept 'he is wearing goggles'.

(b) Any two from

- Use the same amount of water.
  Accept 'use the same mass or weight of crisp'.

Do not accept 'use the same mass of food'.

- The crisp must be the same distance from the test tube as the crispbread was.
- Start with water at the same temperature.
- Shield both experiments from the draught.

Do not accept 'use the same apparatus' or 'heat for the same amount of time'.

(c) The change in the temperature of the water will be greater.

If more than one box is ticked, award no mark.

(d) (i) Fibre is not digested.

Accept 'it is not absorbed' or 'it does not get broken down'.

Do not accept 'it is insoluble'.

(ii) Any two from

- It contains less fat.
  Accept 'it is less fattening' or 'it contains less energy'.

- It contains more fibre.

- It contains more protein.

Do not accept 'more carbohydrate'.

(e) Oranges ✓

If more than one box is ticked, award no mark.

M7. (a) Answers must give a definition of biomass and not just provide examples.

Material from living things or plant matter.

(b) The Sun

Accept 'sunlight' or 'the Big Bang'.

Do not accept 'light' or 'photosynthesis'.
(c) coal
oil
natural gas or methane
answers may be in any order
all three fossil fuels are required for the mark
accept ‘gas’ for natural gas
accept ‘peat’ as one of the three fossil fuels

(d) they cannot be replaced or no more can be produced
accept ‘they get used up’
do not accept ‘they cannot be used again’

(e) (i) any one from
• it is renewable
• it is widely available
accept ‘you can grow more of it’
accept ‘it will conserve fossil fuels’
do not accept ‘it is cheaper to produce’

(ii) any one from
• it takes up less space
• it is more suitable for use in vehicles
• it contains more energy per unit mass
accept ‘it is more concentrated’
accept ‘it can be transported more easily’

(iii) any one from
• pollution
• they release greenhouse gases
accept a specific example of a pollutant
eg. ‘carbon dioxide is released’

M8. (a) The first marking point is for the transfer of energy from water to turbine.
The second marking point is for the transfer of energy from turbine to generator.
The third marking point is for the transfer of energy away from the generator.
any two from
• potential energy in the water to kinetic energy in the turbine
accept ‘P.E. to K.E.’
accept ‘transferred from the water to the turbine’
accept ‘K.E. in the water to K.E. in the turbine’
accept ‘P.E. in the water to K.E. in the water’
• kinetic energy in the turbine to kinetic energy in the generator
accept ‘transferred from the turbine to the generator’
• kinetic energy in the generator to electrical energy in the circuit
accept ‘K.E. to electrical energy’
accept ‘from the generator to the circuit’
accept ‘transferred from the generator by electricity’
accept ‘K.E. in the turbine to electrical energy in the circuit’
accept ‘potential energy in the water to electrical energy in the circuit’ for both marks
accept ‘P.E. to electrical energy’
or ‘from the water to the circuit’ for one mark

(b) any one from
• because the Moon’s pull or gravity is always there
• because the tides or the water cannot run out or be used up
accept ‘because there are tides every day’
or ‘because there is an endless supply’

(c) • from wave energy or from the waves
accept ‘Ocean Thermal Energy Conversion’ or ‘OTEC’
do not accept ‘hydro-electric power’

(d) it is easier to control or it can be turned on when it is needed
accept ‘the tides only give power at certain times’
or ‘you can build an oil-fired power station anywhere’
or ‘it is smaller’
any one from
• oil is non-renewable
accept ‘oil will run out’
• it causes pollution
accept ‘it gives out greenhouse gases’
or ‘it can cause oil spills’

M10. (a) any two from
• oil
accept ‘petrol’ or ‘diesel’ or ‘kerosene’
• coal
• natural gas
accept ‘gas’
accept ‘peat’ or ‘turf’

(b) four or all of them
accept ‘water behind dams, the wind, fossil fuels and wood’

M11. (a) (i) wind
(ii) sunlight
(iii) tides

(b) any one from
• coal
• gas
accept ‘methane’
• oil
accept ‘petrol’ or ‘diesel’ or ‘kerosene’
• peat
accept ‘peat’

(c) electricity

M12. (a) oil
natural gas
accept ‘gas’
answers may be in either order
(b) (i) any two from answers may be in either order
- wind
- solar
- tidal
- biomass
- geothermal

(ii) C E A B D
if all three letters are correct, award two marks
if one letter is correct, award one mark

M13. (a) air movement

(b) (i) no light
accept 'no rays from the Sun'
do not accept 'no heat from the Sun'
accept 'no sunshine'
accept 'not enough light'
accept 'it is dark'
accept 'they cannot collect the Sun's energy at night'
accept 'because they need light to work'
accept 'no Sun'

(ii) it might not be windy the wind might not be strong enough
accept 'no wind'
accept 'needs air movement' or 'wind'
accept 'sometimes the wind is weak'
accept 'sometimes the wind is stronger'

M14. (a) ethanol or alcohol
if more than one box is ticked, award no mark

(b) any one from
- burning hydrogen does not produce carbon monoxide
  accept 'petrol or ethanol'
  or 'alcohol produces carbon monoxide'
- burning hydrogen does not produce sulphur dioxide
  accept 'petrol produces sulphur dioxide'
- burning hydrogen only produces water
- burning petrol causes acid rain
  accept 'hydrogen or ethanol or alcohol does not cause acid rain'

(c) hydrogen
accept 'H2'
accept 'gas'

(d) oxygen ✓
if more than one box is ticked, award no mark

(e) any one from
- it can be grown
accept 'it does not take long to grow'
- it can be replanted
accept 'it can be replaced'
- it is renewable
- it can be reproduced
accept 'it produces seeds'

M15. (a) (i) any one from
- the Earth rotates
  accept 'the Sun appears to move across the sky'
  accept 'the Sun is in a different position at different times of day'
- the amount of sunlight varies
  accept 'different cloud cover'
- the angle of the Sun varies
  accept 'in the middle of the day the energy received is greatest'
do not accept 'in the middle of the day the Sun is hottest or brightest'

(ii) 6.0
accept any number from 5.8 to 6.2

(b) (i) a graph starting after 6 am and ending before 6 pm
a line below the existing line and flat or reaching a maximum between 12 noon and 1 pm

(ii) 15
accept '180'

M16. (a) (i) electrical

(ii) kinetic
accept 'movement'

(iii) • gravitational potential
accept 'gravitational' or 'potential'

- kinetic or sound or thermal
  accept 'heat' for thermal
  accept for two marks 'kinetic into sound' or 'kinetic into thermal'
answers must be in the correct order

(b) advantage
- the energy will always be replaced
accept 'it will not run out'
- it is renewable
accept ‘it does not use fuel or mains electricity’
• it is free to run
accept ‘it is cheap’
• a battery might leak
accept ‘no pollution with a solar cell’ 1 (L5)

**disadvantage**
• if the Sun goes in the pump will stop
• it will not work at night or in the dark
accept ‘it must be in the Sun to work’
accept ‘it is not sunny all the time’
do not accept ‘can be used again’

M17. (a) (i) • 100
accept ‘5 ×20’

1 (L7)
• Ncm
accept ‘cmN’
accept ‘1.0 Nm’ for two marks
do not accept lower case n

(ii) 100
accept ‘the same’
accept the numerical answer to part a i
the mark for the unit may be awarded in part a ii
if not given in part a i
the unit is not required for the mark

1 (L7)
(iii) • 10
accept the numerical answer to a ii ÷ 10

1 (L7)

(b) • it decreased
accept ‘it slowed down’
any one from
• less light energy changed to electrical energy
accept ‘less light to power plane’
accept ‘it received less energy’
both the answer and the correct explanation
are required for the mark
do not accept ‘it stopped’
• the voltage produced by the solar cell was lower

accept ‘less electrical or kinetic energy produced’
‘less light’ is insufficient do
not accept ‘no light to provide energy’

M18. (a) • coal

1 (L4)
• gas
accept ‘coal fire’ or ‘A’
accept ‘gas boiler’ or ‘D’
answers may be in either order
accept ‘petrol’ or ‘petrol generator’ or ‘C’ or ‘oil’
answer may be in either order
‘fire’ is insufficient
‘boiler’ is insufficient
‘generator’ is insufficient

(b) (i) • the Sun
accept ‘solar energy’ or ‘solar’
accept ‘light’ or ‘sunlight’
references to heat are insufficient

1 (L4)
(ii) any one from
• it is dark
• no light
• the Sun has set
accept ‘it needs light’
accept ‘no Sun’
references to heat are insufficient

1 (L3)
(c) • wind
accept ‘moving air’ or ‘air’
accept ‘air currents’

1 (L3)
(d) any one from
• Sun or solar energy
• waves
• wind
accept ‘solar panel’ or ‘E’
accept ‘wave turbine’ or ‘F’
accept ‘wind turbine’ or ‘turbine’ or ‘B’
‘water’ is insufficient

1 (L4)
Q1. The table below shows information about four planets.

<table>
<thead>
<tr>
<th>planet</th>
<th>time taken to orbit the Sun (Earth years)</th>
<th>distance from the Sun (million km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercury</td>
<td>0.25</td>
<td>60</td>
</tr>
<tr>
<td>Venus</td>
<td>0.5</td>
<td>108</td>
</tr>
<tr>
<td>Earth</td>
<td>1.0</td>
<td>150</td>
</tr>
<tr>
<td>Mars</td>
<td>2.0</td>
<td>228</td>
</tr>
</tbody>
</table>

The diagram below shows the orbits of the Earth, Mercury, Venus and Mars, and their position at one particular time.
The arrows show the direction in which the planets move.

(a) Show the position of each planet six months later by drawing a letter X on the orbit of each planet.

(b) Use the information in the table to calculate the largest and smallest distance between the Earth and Venus.

closest ........................................ million km

furthest ........................................ million km
(c) The speed of light is 300,000 km/second. **Calculate** how long light takes to reach the Earth from the Sun.

............................................................................................................................................. s 1 mark

(d) The diagram below shows the path of an asteroid around the Sun.

(i) **On the path of the asteroid**, draw a letter S to show the position where the asteroid is travelling the slowest.

**On the path of the asteroid**, draw a letter F to show the position where the asteroid is travelling the fastest. 1 mark

(ii) Explain why the speed of the asteroid changes.

............................................................................................................................................. 1 mark

Q# 2/ Q1. The diagram shows a firework rocket.

(a) Three forces act as the rocket flies through the air. Which arrows show the directions of these three forces?

............................................................................................................................................... 3 marks

(b) When there is no fuel left, the rocket falls to the ground.

(i) Give the name of the force which pulls it down.

............................................................................................................................................... 1 mark
(ii) Give the name of the force which acts against the motion of the rocket.

........................................................................................................................................... 
1 mark

Q# 3/ Q10 The drawing shows a boy with a bow and arrow. He is holding the arrow and pulling it back.

(a) Two horizontal forces act on the arrow. These are the force exerted by the boy’s hand and the force exerted by the string. The arrow is not moving.

The boy pulls the arrow with a force of 150 N. What is the size of the force exerted by the string on the arrow?

............... N

1 mark

(b) When the boy lets go of the arrow, it starts to move forward.

Explain why it starts to move.

........................................................................................................................................... 
1 mark

(c) The arrow flies across a field and hits a target.

Two forces act on the arrow while it is in the air. Air resistance acts in the opposite direction to the movement, and gravity acts downwards. These two forces cannot balance each other, even when they are the same size. Why is this?

........................................................................................................................................... 
1 mark

Q# 4/ Q10.

The picture shows a man called Aristotle. He lived in Greece over 2000 years ago.

Aristotle said that the heavier an object is, the faster it will fall to the ground.

(a) The drawings below show a bowling ball, a cricket ball and a ping-pong ball. Lila dropped them all at the same time from the same height.
If Aristotle was correct, which of the three balls would you expect to reach the ground first? Give the reason for your answer.

.............................................................................................................................................................................
1 mark

(b) Joe said that it would be a fairer test if Lila had only used a cricket ball and a hollow plastic ball as shown below.

.............................................................................................................................................................................
1 mark

(c) About 400 years ago in Italy, a man called Galileo had a different idea. He said that all objects dropped from the same height would reach the ground at the same time.

(i) Lila dropped a hammer and a feather at the same time from the same height.

.............................................................................................................................................................................
1 mark

(ii) Gravity acts on both the hammer and the feather as they fall. Give the name of one other force which acts on them as they fall.

.............................................................................................................................................................................
1 mark
(iii) An astronaut on the moon dropped a hammer and a feather at the same time from the same height.

How would the results of the astronaut’s experiment on the Moon be different from Lila’s experiment on the Earth?

Explain your answer.

2 marks

Q11.

The graph shows how the speed of a 0.1 kg mass changes as it falls.

(a) Read from the graph the speed of the mass at 0.4 s and 0.8 s. Use your results to work out the average speed of the mass between 0 and 0.4 s and then between 0 and 0.8 s. Give the units.

(i) final speed at 0.4 s = 

average speed between 0 and 0.4 s = 

1 mark
(ii) final speed at 0.8 s = ....................
average speed between 0 and 0.8 s = ......................

(b) Using the average speeds calculated in (a), work out how far the mass falls in:
(i) 0.4 s
........................................................................................................................
1 mark

(ii) 0.8 s
........................................................................................................................
1 mark

(c) Complete the sentence:

If the mass falls for double the time, it will fall .............................................
times as far

1 mark

Q# 6/ Q11. Ruth is investigating how much a piece of wood can bend. She hangs some
masses on the end of the piece of wood and measures how far the wood has bent.

(a) Give the name of the force which pulls the masses downwards.
........................................................................................................................
1 mark

(b) The graph below shows Ruth’s results.
Q# 7/ Q12.

A video recorder is loaded with a tape which plays for 180 minutes. The length of the tape is 260 m.

(a) (i) Calculate the speed of the tape, in metres per minute.

.............................................................. m/min

1 mark

(ii) What is the speed of the tape in metres per second?

.............................................................. m/s

1 mark

(b) To rewind the tape quickly, a different motor is used, which rewinds the tape at a maximum speed of 1.08 m/s.

(i) At this speed, how long would it take to rewind the tape completely? Give the units.

..............................................................

1 mark

(ii) In fact, it takes slightly longer than this to rewind the tape. Explain why.

..............................................................

1 mark

Maximum 4 marks

Q# 8/ Q12. The photograph shows two rubber tyres.

One is old and worn and the other is new.
(a) A car is moving along a road. What force between the tyres and the road makes the car stop? Tick the correct box.

- [ ] air resistance
- [ ] friction
- [ ] gravity
- [ ] weight

1 mark

(b) The diagram and the table show the stopping distance of a car.

![Diagram showing position of car when brakes are put on and when it stops]

<table>
<thead>
<tr>
<th>type of road surface</th>
<th>stopping distance, in metres</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>new tyres on a dry road</td>
</tr>
<tr>
<td>smooth tarmac</td>
<td>18</td>
</tr>
<tr>
<td>rough tarmac</td>
<td>13</td>
</tr>
<tr>
<td>concrete</td>
<td>12</td>
</tr>
</tbody>
</table>

(i) What happens to the stopping distance when a road gets wet?

……………………………………………………………………………………………………………………………

1 mark

(ii) Why does the stopping distance change when a road gets wet?

……………………………………………………………………………………………………………………………

1 mark

(iii) What happens to the stopping distance as tyres get old and worn?

……………………………………………………………………………………………………………………………

1 mark

(iv) What is the safest type of road surface in the table?

……………………………………………………………………………………………………………………………

1 mark
A sky-diver jumped out of an aeroplane. After falling for some time she opened her parachute. The graph below shows how the speed of the sky-diver changed from the moment she jumped out of the aeroplane until she landed on the ground.

(a) What happened at 180 seconds and at 360 seconds after the sky-diver jumped out of the aeroplane?

180 seconds ………………………………………………………………………..

360 seconds ………………………………………………………………………. 2 marks

(b) There was an increase in air resistance on the sky-diver as her speed increased. Explain how the graph shows this.

…………………………………………………………………………………… 1 mark

(c) Two sections of the graph show where the air resistance was equal and opposite to the sky-diver’s weight. Which sections are they?

Give the letters.

………………. and ……………… 1 mark

(d) (i) Use the graph to estimate how far the sky-diver fell between 180 s and 360 s.

…………………………………………………………………………………… 1 mark

(ii) Why can this only be an approximate figure?

…………………………………………………………………………………… 1 mark

Maximum 6 marks
Q# 1/ Q1. (a) 

for all four correct, award two marks
for any two or three correct, award one mark
accept a cross drawn that lies within the width of the Sun for each planet, e.g.

(b) • 42
accept ‘150-108’

• 258
accept ‘150+108’

(c) \[
\frac{150,000,000}{300,000} \quad \frac{150 \text{ million}}{300,000}
\]
accept ‘8.3 minutes’
accept ‘about 8 minutes’

(d) (i) 
both answers are required for the mark
accept an answer within the dotted lines at either end of the ellipse

(ii) attracted by the Sun’s gravity
accept ‘increased gravity near to Sun’

Q# 2/ M1. (a) A D E
letters may be written in any order if more than three letters are given deduct one mark for each incorrect letter;
minimum mark zero

(b) (i) gravity or weight

(ii) air resistance or drag
accept ‘friction’ or ‘wind resistance’
do not accept ‘wind’ or ‘upthrust’

(c) the bright flash of light was seen first
if more than one box is ticked award no mark

light travels faster than sound
accept ‘the sound takes longer to reach you’
or ‘light travels faster’
do not accept ‘the sound takes time to reach you’
or ‘light travels fast’

Q# 3/ M10. (a) 150

(b) there is nothing to balance the force of the string
accept ‘it is pushed by the string’
accept ‘there is a forward force acting on it’
accept ‘potential energy is’
converted to kinetic energy’ or ‘energy from the bow is transferred to the arrow’

(c) any one from
• because they are not in opposite directions
  accept ‘because they are in different directions’
• because they are not both horizontal
  do not accept ‘because they are at an angle’
• because they do not act along the same line
  accept ‘gravity pulls down and friction pushes across’

Q# 4/ Q10.
(a) Both the correct ball and the correct reason are required for the mark.
the bowling ball because it has the greatest mass or it is the heaviest
do not accept ‘because it is bigger’
‘the bowling ball because it is bigger’ insufficient

(b) any one from
• they are the same diameter
  accept ‘they are the same size’
• they produce the same air resistance or friction

(c) (i) they would both reach the ground at the same time
(ii) air resistance
  accept ‘friction’
(iii) either
• the feather and the hammer landed at the same time
• there is no atmosphere or air resistance on the moon
  or air on the moon
• they would take longer to fall on the moon
  because there is lower gravity than on the Earth
  do not accept ‘there is no gravity on the moon’

Q# 5/ Q11.
(a) (i) final speed = 4 m/s average speed = 2 m/s
  the unit is required for the mark in (i) and (ii)

(b) (i) distance = 2 × 0.4 = 0.8 m
  accept numerical answer to (a) (i) ÷ 0.4

(ii) distance = 4 × 0.8 = 3.2 m
  accept numerical answer to (a) (ii) ÷ 0.8

(c) 4 times
  accept a correct statement based on the answers to (b) (i) and (b) (ii)

[5]

Q# 6/ M11. (a) gravity or weight
(b) (i) distance = 2 × 0.4 = 0.8 m
  accept numerical answer to (a) (i) × 0.4

(ii) distance = 4 × 0.8 = 3.2 m
  accept numerical answer to (a) (ii) × 0.8

(c) 4 times
  accept a correct statement based on the answer to (b) (i) and (b) (ii)

[6]

Q# 7/ Q12.
(a) (i) 1.44
  accept ‘1.4’ or ‘1.44444’

(ii) 0.024
  consequential marking applies
  accept the answer to (a) (i) ÷ 60

(b) (i) 240.7 s or 241 s
  unit is required
  accept ‘4 minutes’

(ii) any one from
• it takes time to reach the maximum speed
• it slows down before the end
• it is not the average speed

Q# 8/ M12. (a) friction

[4]
if more than one box is ticked, award no mark 1 (L3)

(b) (i) it gets longer accept 'it is more' 1 (L3)

(ii) any one from
• there is less friction or grip
• the road is slippery accept 'water is a lubricant' 1 (L3)

(iii) it gets longer accept 'it is more' 1 (L3)

(iv) concrete 1 (L4)  [5]

Q# 9/ Q13.
(a) 180 seconds: the parachute opened
360 seconds: she landed answers must be in the correct order do not accept 'her speed dropped' 1

(b) any one from
• the slope of the graph decreases or the curve gets less steep
• the graph begins to level out
• the acceleration gets less accept 'it curves between A and B' 1

(c) B and D letters may be in either order both letters are required for the mark 1

(d) (i) any answer between 1000 m and 1350 m the unit is required for the mark 1

(ii) because its speed takes time to reach 6 m/s accept 'because the speed is not constant'
• because it was slowing down at first
• because the speed is difficult to read accept 'because the speed may not be exactly 6 m/s'
accept 'because the graph curves at the corner' 1  [6]