Skills Builder Workbook 8 Answers

All sample answers to the Cambridge Secondary 1 Checkpoint-style questions have been written by the authors of this work.

Unit 1 Plants

1.1 Photosynthesis

1 Label drawn to leaf, which is coloured green.

2 carbon dioxide, energy from light, water

3 biomass, oxygen

4 Arrow at bottom right coloured blue and labelled ‘water’.

5 Arrow going into the leaf coloured brown and labelled ‘carbon dioxide’.

6 The sentence (or sentences) should include some of these ideas:

- It is the way that plants make their food.
- It uses carbon dioxide and water to make biomass and oxygen.
- It uses energy from light (usually sunlight).

1.2 How light level affects photosynthesis

1 the type of plant; the mass of the plant; the temperature

2

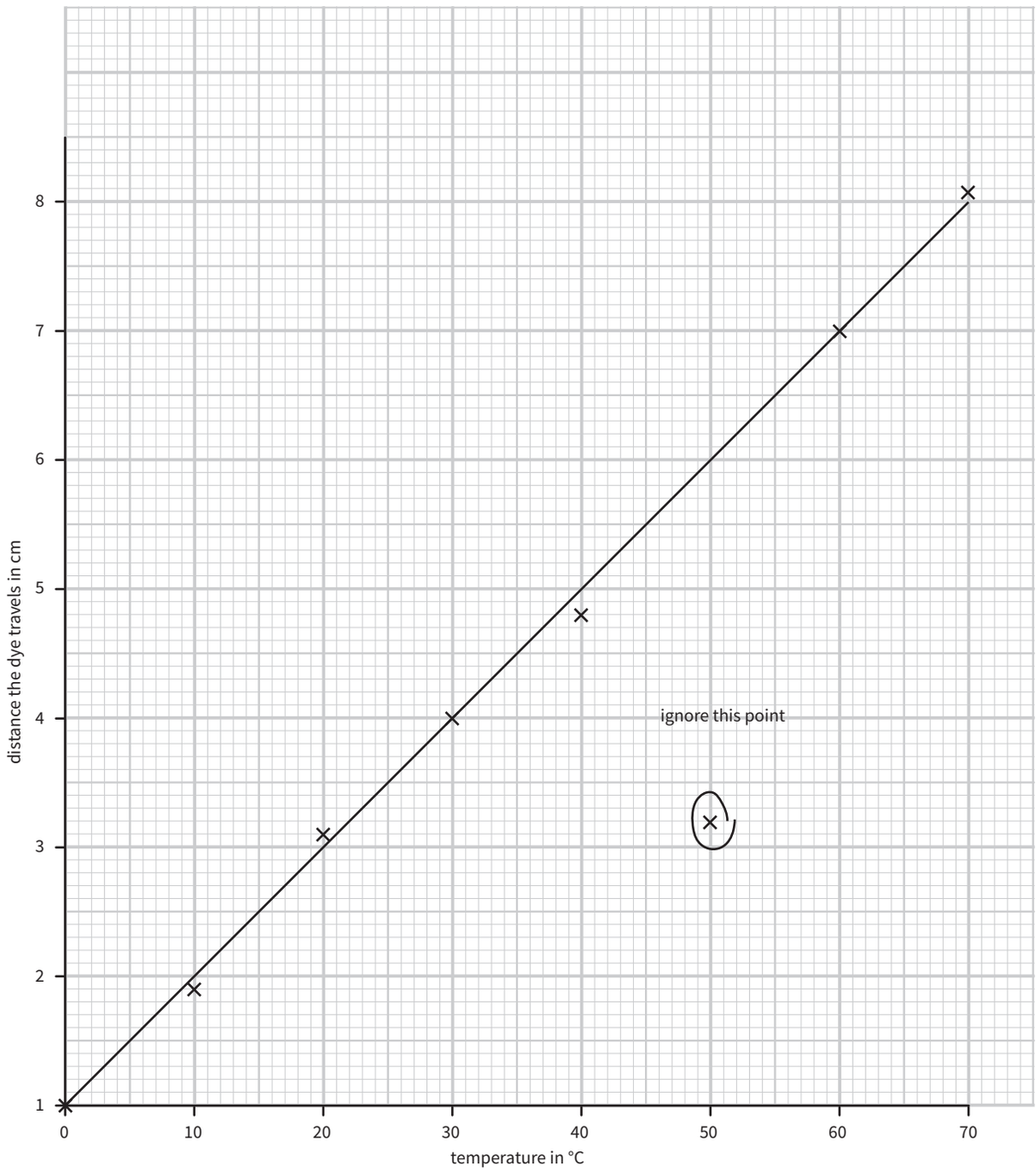
Apparatus	Amount of light	Volume of gas collected in cm^3
A	high	18.3
B	low	7.2
C	none	0.5

3 Plants photosynthesise faster when they have more light.

1.3 Water movement and temperature

1 3.2 at 50 ^{0}C

2



3 As temperature increases, the rate of transport of water in celery stalks increases.

Unit 2 Food and digestion

2.1 Food test results

1 starch

2 Put some of the food to be tested on the white tile. Add a drop of iodine solution to the food.

3 orange-brown

4 blue-black

5 sugar

6 Crush or chop some of the food and put it into a test tube. Add some Benedict's solution. Heat gently.

7 blue

8 brick red

9

Food	Colour after testing with iodine solution	Colour after testing with Benedict's solution	Conclusion
steamed rice	blue-black	blue	contains starch but not sugar
chicken	orange-brown	blue	does not contain starch or sugar
sweet bun	blue-black	brick red	contains starch and sugar
lemonade	orange-brown	brick red	contains sugar but not starch

2.2 Analysing information about nutrients

1 chicken

2 orange

3 8 g

4 Nor is right. Brazil nuts contain 60 g of fat, but only 180 mg of calcium.

5 Brazil nuts, because they contain the most calcium.

Alternatively, students may suggest milk. This has the second highest quantity of calcium, but students may think it is easier to digest than brazil nuts. It also has less fat, which they may think makes it a better choice.

2.3 Digesting starch using amylase

1 There was starch on the glass rod.

2 To avoid mixing up liquids from the two test tubes, and to avoid getting iodine solution into the test tubes.

3 The amylase has broken down all of the starch in tube **A**.

4 There was no amylase in tube **B**. So there was nothing to break the starch down, and it was still there after 8 minutes.

5 Amylase works faster at 40 °C than at 20 °C.

He could investigate the first question, because he can use amylase in the laboratory and measure how quickly it digests starch at 40 °C and at 20 °C.

He cannot investigate the second question, because he cannot see amylase molecules or starch molecules. They are much too small, and you need very specialised equipment to visualise the shape of molecules.

Unit 3 The circulatory system

3.1 Parts of the circulatory system

1 **a** heart

b blood vessel

c blood

d artery

e vein

2 Blood picks up oxygen in the lungs.

All arteries carry blood away from the heart.

Oxygen enters and leaves the blood by diffusion.

3.2 Investigating pulse rate

1 the person's age

2 the pulse rate

3 the time of day; whether the person is resting or exercising

4 The boys can take three readings and then calculate a mean pulse rate for that age. A single person may not be representative of most people of that age.

5 It controls another variable. If someone has just been moving around, their pulse rate may be higher than if they had just been sitting quietly, even if they are sitting down when the pulse rate is measured. The boys want the only thing that is different to be the age of the person.

Unit 4 Respiration

4.1 Measuring lung volumes

1 Use the measuring cylinder to measure a known volume of water – say 50 cm^3. Pour the water into the bottle and mark its level as representing 50 cm^3. Repeat with another known volume – say another 50 cm^3 – and mark its level as 100 cm^3. Keep doing this until the bottle is full.

2

Person	Boy or girl	Wind or string player	Volume displaced in cm^3
1	boy	wind	2100
2	boy	wind	1965
3	boy	wind	2005
4	girl	wind	1950
5	boy	string	1865
6	boy	string	1950
7	girl	string	1905
8	girl	string	1910
9	girl	string	1885

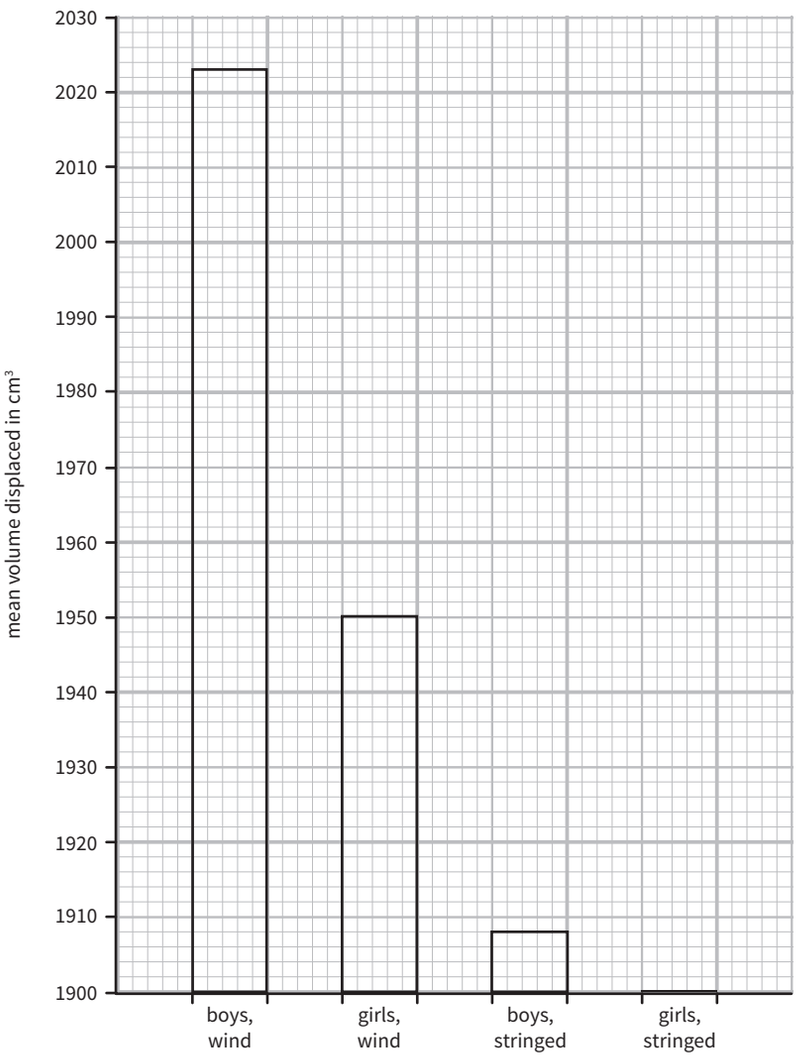
Note that the people need not be listed in this order.

3 $(2100 + 1965 + 2005) \div 3 = 2023\,cm^3$

4 $(1865 + 1950) \div 2 = 1908\,cm^3$

5 $(1905 + 1910 + 1885) \div 3 = 1900\,cm^3$

6



4.2 Looking at data on lung volumes

1 Yes. Boys who play wind instruments displace an average of $2023\,cm^3$, which is greater than the one girl who plays a wind instrument with a displacement of $1950\,cm^3$. Boys who play stringed instruments have an average of $1908\,cm^3$, while for girl string players this is $1900\,cm^3$.

Another way of answering this question would be to calculate the average for all of the boys, and the average for all of the girls. However, this would not be appropriate, because more boys than girls play wind instruments, and more girls than boys play stringed instruments, which would skew the results.

2 Yes. Boys who play wind instruments have an average of $2023\,cm^3$, which is greater than for boys who play stringed instruments with a value of $1900\,cm^3$. Similarly, the girl who plays a wind instrument displaces $1950\,cm^3$, compared with the girl string players with an average of $1900\,cm^3$.

3 Collecting more results from more people in the orchestra; Making three measurements for each person.

4.3 Respiration by yeast

1 A measuring cylinder, to measure out the yeast and sugar solutions.

2 Hold the thermometer in the liquid and stir gently.

Make sure her eyes are level with the meniscus to read the temperature.

3 The temperature will increase, because respiration releases energy. Some of this energy is given off as heat.

4 She needs to have another cup where there is no respiration. For example, she could have a cup containing just yeast and water with no sugar, or a cup with just sugar solution and no yeast. She can then compare the temperature in the two cups.

Unit 5 Reproduction and development

5.1 Comparing egg cells and sperm cells

1 For example:

Egg cell	Sperm cell
has food reserves in the cytoplasm	does not have food reserves in the cytoplasm
round in shape	elongated
no tail	has a tail
has an extra layer round the outside	does not have a layer round the outside
larger	smaller
has a cell membrane	has a cell membrane
has a nucleus	has a nucleus
has cytoplasm	has cytoplasm

2 Accept any statement that makes clear what the difference is, and that states a sensible reason for the difference, for example:

Sperm cells have a tail to swim to the egg cell, but egg cells do not need to swim.

5.2 Interpreting data about smoking

1 **a** respiratory diseases

b diseases of the digestive system

2 39%

3 2 x 39 (or answer to question 2) = 78

4 21%

5 5 x 21 (or answer to question 4) = 105

6 The bar chart shows that the percentages of deaths due to smoking were **greater** for **men** than for **women** OR **smaller** for **women** than for **men**.

7 Accept any explanation that suggests that more men than women are smokers, or that men smoke more than women.

Unit 6 States of matter

6.1 Change of state

1 solid

2 Particles should be shown touching all each other, in rows with fixed places.

3 gas

4 Particles should be shown spread out and not touching any others.

5 The words in bold should be circled by the students.

For a solid to melt the particles must **gain** energy.

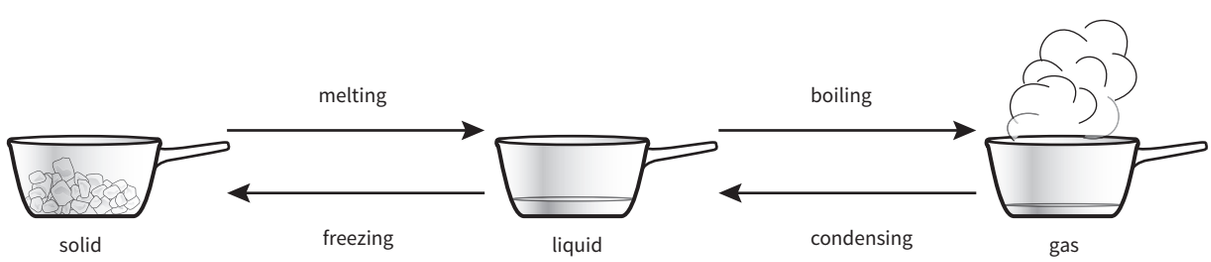
The particles vibrate **more.**

The particles have enough energy to escape the **strong** forces holding them in their places.

The particles can now move **past** each other.

The solid has changed state and become a **liquid**.

6



6.2 Investigating diffusion in the air

1 So that he is not waiting for the perfume and so that he cannot anticipate smelling it. If he does not know exactly when it is sprayed they can be sure he really has smelt it.

2 Particles of the perfume diffuse through the air.

3 Less time because the particles do not have to travel so far.

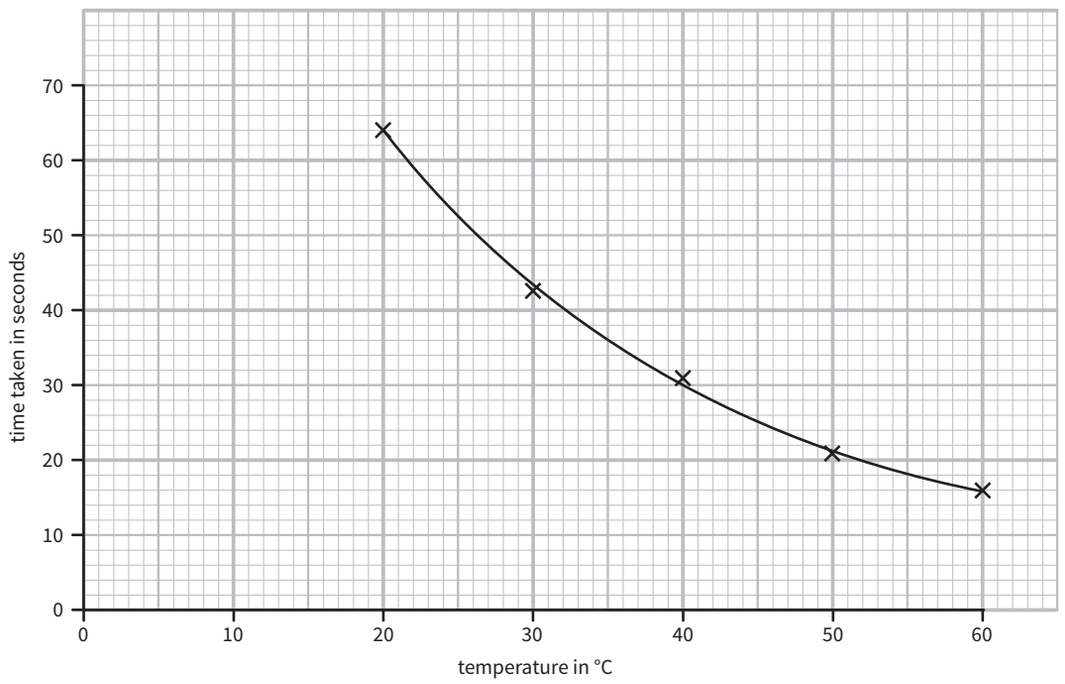
4 The windows should be closed. This is to be sure the test is fair. The breeze from the window could make the perfume particles move more quickly or it may make them move out of the room.

5 More time because the lower temperature means the particles have less energy so do not move as quickly.

6.3 Investigating diffusion in a liquid

1 the volume of water used; the volume of dye used; the type of dye

2 See illustration below. Credit use of a pencil and ruler; the axes the correct way round; suitable use of scale; points plotted accurately and neatly; points joined appropriately into a smooth best-fit curve.



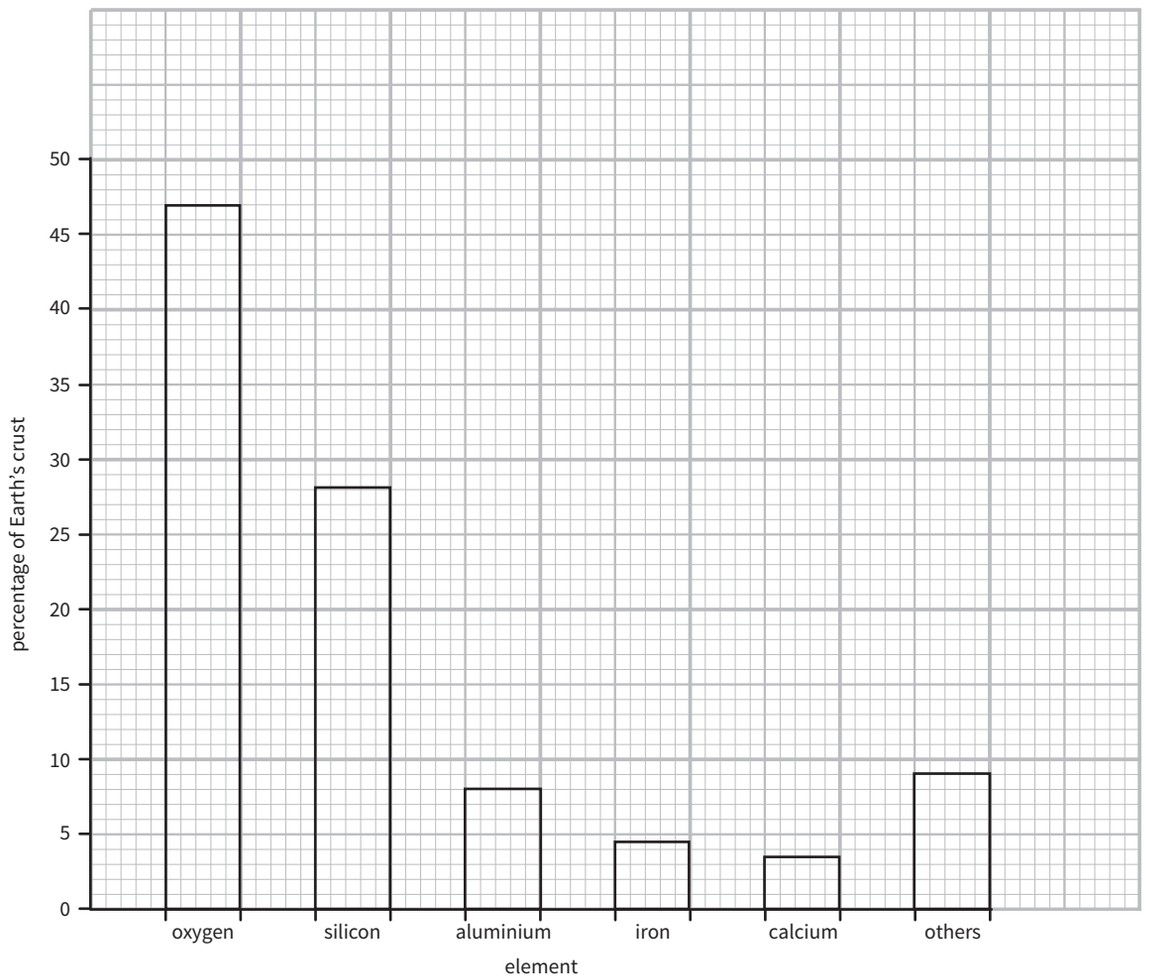
3 Yes. The graph shows that as the temperature increases, the time taken for diffusion decreases.

4 They could repeat the investigation.

Unit 7 Elements and compounds

7.1 Elements on Earth.

1



Credit the use of a ruler and pencil; suitable and correct scale; spaces between bars; correct height of bars; axes correctly labelled.

7. 2 Using the Periodic Table.

1 left

2 aluminium

3 magnesium or beryllium

4 helium or neon

5 nitrogen, oxygen, fluorine or neon

7.3 True or false?

1 true

2 false

3 false

4 true

5 false

6 true

7 false

8 true

7.4 Naming compounds

1 potassium and chlorine

2 potassium

3 magnesium and oxygen

4 copper oxide

5 iron chloride

7.5 Understanding formulae

1 Calcium oxide, CaO, has one atom of calcium bonded with **one atom of oxygen.**

2 Sodium oxide, Na_2O, has **two atoms of sodium bonded with two atoms of oxygen.**

3 H_2S

4 CH_4

5 Compounds: MgO; $CaCO_3$; K_2O

Elements: O_2; Na; Ar; H_2; Li

Unit 8 Mixtures

8.1 Mixture or compound?

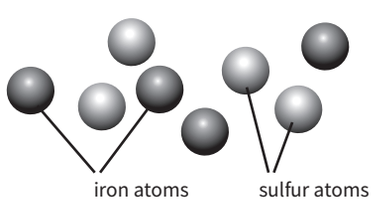
1 Anna produces a new product.

Iron is magnetic.

Something in Amal's beaker is attracted to a magnet.

Anna's test tube contains a compound.

The atoms in Amal's beaker look like this.



8.2 Choosing equipment

1 filter funnel, filter paper, conical flask, evaporating basin, safety glasses, Bunsen burner, tripod and pipe clay triangle

2 Credit diagram drawn using a pencil and ruler. Label lines should touch the items, be drawn horizontal and written labels should be straight.

Diagram should show filter funnel with filter paper in place and placed in the neck of a conical flask. They should show the beaker of the mixture being tipped into the filter funnel.

3 Credit diagram drawn using a pencil and ruler. Label lines should touch the items, be drawn horizontal and written labels should be straight.

Diagram should show an evaporating basin on a tripod in a pipe clay triangle. A Bunsen burner should be shown underneath.

4 She must wear safety glasses because when she heats the evaporating basin, the mixture of salt and water may spit. Credit other suggestions such as taking care with the hot evaporating basin.

8.3 Dissolving salt

1 The reading taken for 20 cm^3 water has been plotted incorrectly on the graph (on the 25 cm^3 line). Students should have circled this in red on the graph.

2 The point should be plotted accurately on the 20 cm^3 line.

3 The reading taken for 60 cm^3 water, 26 g, looks too high and is the same as the reading for 70 cm^3 water. Students should have circled this in blue on the graph and in the results table.

4 The line should be straight and go through or very close to as many points as possible, with about the same number off the line above as below, ignoring the circled ones.

5 The graph shows that the larger the volume of water, the larger the mass of salt that can be dissolved.

Unit 9 Material changes

9.1 Physical or chemical?

1 In a physical change no new substances are formed.

When iron atoms bond with sulfur atoms, it is a chemical change.

When you cook an egg, it is a chemical change.

2 **a** oxygen + hydrogen ➔ water

b water

c oxygen and hydrogen

9.2 Writing word equations

1 iron + sulfur ➔ iron sulfide

2 Note that magnesium chloride should be written as shown.

magnesium + hydrochloric ➔ **magnesium** + hydrogen
acid **chloride**

3 Similarly here with zinc chloride, unless students can write the whole equation on one line.

zinc + hydrochloric ➔ zinc + hydrogen
acid chloride

4 magnesium + sulfuric acid ➔ magnesium sulfate + hydrogen

9.3 What happens to the atoms when chemicals react?

1 The magnesium atoms should be coloured green and oxygen atoms coloured red.

2 **a** The magnesium atoms should be coloured green, chlorine atoms coloured yellow, hydrogen atoms left blank.

b magnesium chloride

3 **a** 2, 2, 2, 2

b yes

4 **a** The oxygen atoms should be coloured red and hydrogen atoms blank.

b The number of hydrogen atoms in the reactants is **the same as** the number of hydrogen atoms in the products.

c The number of oxygen atoms in the reactants is the same as the number of oxygen atoms in the products.

9.4 What happens to the mass in a chemical reaction?

1 24 g

2 80 g

3 The reaction has produced a gas. Some of the mass is lost as this gas has escaped from the flask into the room.

Unit 10 Measuring motion

10.1 Speed

The answers to calculation questions are considered in two parts.

First look for the correct answer. If it is correct, the answer gains full credit.

If it is not correct, then look at the working. If the working is written correctly, but the answer is wrong, then give some credit for the working.

1 answer: 5 m / s

working: 100 ÷ 20

2 answer: 7 m / s

working: 350 ÷ 50

3 answer: 750 km / h

working: 1500 ÷ 2

10.2 Units of speed

If the answer is correct, with the correct unit, then give full credit.

If the answer is wrong but the unit is correct, give credit for the unit. Also look at the working and, if it is correct, give some credit for that.

1 answer and unit: 2 m / s

working: 50 ÷ 25

2 answer and unit: 3 cm / s

working: 87 ÷ 29

3 answer and unit: 30 km / h

working: 300 ÷ 10

4 answer and unit: 0.08 m / s

working: 2 ÷ 25

10.3 Another way to describe speed

1 answer and unit: 50 km / h

working: 100 ÷ 2 (accept other values if taken from the graph, e.g. 50 ÷ 1)

2 10 m (accept unit in words)

3 40 s (accept seconds / second / secs / sec)

4 answer and unit: 0.25 m / s

working: 10 ÷ 40

(Accept errors carried forward from answers to parts a and b.)

5 Comparative points can include:

easier to see patterns / changes in speed

a lot of information can be included in a simpler way

General points can include:

can read off values at any point / any time / any distance

can be understood in other languages

gives a visual display of information

can clearly see when object is moving / fast / slow / is stopped

Unit 11 Sound

11.1 What makes sound?

1 pitch–frequency; loudness–amplitude

2 **a** As the pitch of the notes gets higher, the frequency of the sound **gets higher**.

b The amplitude of the notes she plays **stays the same**.

3 increases / gets bigger (not 'gets louder')

11.2 Looking at sound waves

1 **a** increases

b increases

2 **a** decreases

b stays the same

c decreases

Unit 12 Light

12.1 Light rays

1 Straight line drawn from the lamp through the three holes.

Arrowhead on ray pointing **away** from the lamp.

(The line must go through the holes, but accept a continuous line, i.e. one which does not appear to go 'behind' parts of the card. The line should touch the lamp.

Arrowhead(s) can be anywhere on the line.)

2 The answer should convey the idea that light travels in straight lines / cannot bend around the path of the holes / light is blocked by the middle card. (A statement that the holes are not in line, alone, is not sufficient as it does not explain how light travels.)

3 Straight line drawn through the transparent plastic. (No arrow head is required as this is given, but an arrow head in the wrong direction is incorrect. Accept a line either drawn straight through the plastic or up to it and then continuing to the right of it.)

The straight line should continue up to, touching but not emerging to the right of, the opaque card.

There should be no light ray drawn between the opaque card and Elsa.

12.2 Light and shadows

1 C (Accept C circled on diagram, and / or a light ray drawn from the lamp, just touching the bottom of the card, and meeting the wall at C.)

2 tape measure / metre rule(r) / rulers end to end / metre stick

3 distance between card and wall / distance between card and shadow

4 height of shadow

5 Any two from:

distance from the lamp to the wall

size of the card / use the same card

angle of the card (to the wall / lamp) (**card should be parallel to the wall)**

keep the card at the same level (as the lamp) / lamp at same level as card

size of the lamp / bulb **(not power / brightness)**

12.3 Reflection from a non-luminous object

1 Straight line from the lamp to the book. (Line should touch both the lamp and the book but not pass through the book.)

Straight line from the book to Amal's eye. (Both light rays should touch each other and the book. The angle of incidence and angle of reflection at the book do **not** need to be equal.)

Arrowheads on both rays, from lamp to book and from book to Amal's eye.

(Ignore any other light rays drawn.)

2 Straight line from the Sun to Jupiter.

Straight line from Jupiter to Earth.

Arrowheads on both rays, from Sun to Jupiter and from Jupiter to Earth.

12.4 Reflection from a mirror

1 Reflected ray drawn at 50º to normal line (accept ±2º tolerance)

Arrowhead on it, away from mirror.

Should touch the end of the other light ray, the end of the normal line, the mirror. Should not cross the mirror surface.

'**R**' marked between reflected ray and normal.

2 **R** = 50º stated.

3 45º

4 Reflected ray drawn at 45º to normal (accept ±2º tolerance)

Arrowhead on it, away from mirror.

Should touch the end of the other light ray, the end of the normal line, the mirror. Should not cross the mirror surface.

45º marked between reflected ray and normal line.

12.5 Looking at coloured objects

1 blue (only)

2 red, orange, yellow, green, indigo and violet boxes (i.e. all except white and blue)

3 black (only)

4 Only green light is incident, and the blue cup absorbs green light, so no light is reflected.

Unit 13 Magnetism

13.1 Which materials are magnetic?

1 Table with two columns, headed **magnetic** and **not magnetic** (in either order)

The table should, ideally, have an outer border. It must have a horizontal line below the column headers and a vertical line to split the two columns. Horizontal lines between the objects are optional in this case as they are not in pairs.

Objects sorted correctly:

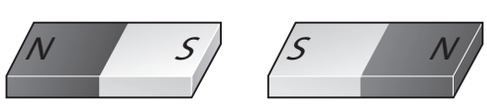
Magnetic	Not magnetic
(iron) nail	(plastic) comb
(iron) gate	(copper) wire
	(aluminium drink) can
	(wooden) toy

13.2 Rules about magnets

1

repel

attract



repel

2 Elsa can: bring the N (or S) pole of the bar magnet up to one end of the horseshoe magnet.

She will see: them repelling / repulsion, if like poles are brought together – if the bar magnet's N (or S) pole is near the N (or S) pole of the horseshoe magnet; or she will see them attracting / attraction, if unlike poles are brought together – if the bar magnet's N (or S) pole is near the S (or N) pole of the horseshoe magnet.

(Answers only need to describe how to identify one pole on the horseshoe magnet, as the other will be determined by finding the first, but ensure there is no contradiction.)

13.3 Drawing a magnetic field pattern

1 Field lines drawn neatly and correctly. Must not touch each other or cross over each other. Arrows must point N to S. Lines must touch magnet at poles.

2 At least two correctly shaped field lines drawn top and bottom of diagram. At least one continuous field line top and bottom. At least one arrow top and bottom pointing N to S. Field lines can meet the sides of the poles.

13.4 Testing an electromagnet

1 Any two from:

(same) battery / cell / current / voltage

(same size of / type of) nail

(same type of / size of) paper clips

2 a circle around the '4' in the third row

3 repeat the reading / do it again ('check it' is not sufficient as this is given in the question.)

4 Any one suggestion from:

more batteries (not just 'bigger battery')

higher current / higher voltage / more powerful battery ('higher' could be 'more' or 'bigger' but answer must be comparative.)