Cambridge Checkpoint Lower Secondary Science Workbook 9 (published 2022) Answers

Most of the questions aim to test your knowledge and understanding of science, but some questions have this icon. These questions aim to test your science enquiry skills.

Some other questions have this icon. These are questions about using models to help you learn about and understand scientific ideas.

Yet other questions have this icon. These questions put science in context.

1 Water and life

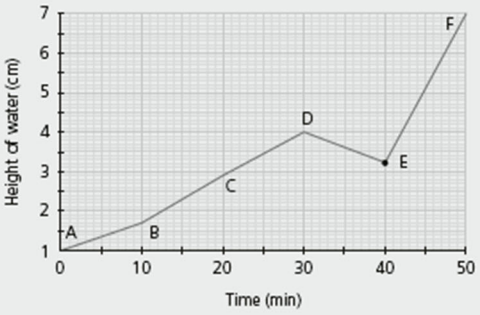
Workbook answers

The transport of water through the root and root hairs

1 To greatly increase the surface area of the root, to allow more water to pass through them and into the plant.

Transport of water through the stem and leaves

2 a and b



b E – 40, 3.2

c It does not follow the trend of increasing water height in the stem. It may be due to an error in measuring, or the celery may be in conditions which are not the same as the other – for example, cooler and damper.

d The longer the time, the more the water rose up the stem.

e 110 minutes.

3 The passage of water from the root hair to the leaf of a plant.

Minerals and how plants use them

4 Magnesium – makes chlorophyll.
Nitrates – make protein.

The human renal system

5 The kidneys filter the blood.
The kidneys remove urea in urine.

6 Empty beaker, filter funnel, filter paper, beaker containing a mixture of rice and peas.

7 a Dialysis.

b It removes urea from the blood but keeps all the vital substances in the blood just as a kidney does.

2 Photosynthesis

Workbook answers

Photosynthesis

1 Water + carbon dioxide $\xrightarrow[\text{chlorophyll}]{\text{light}}$ carbohydrate + oxygen.

2 a Experiments inspired by previous data can produce unexpected results which must be used to revise the model.
b It represents a provisional scientific explanation because further experiments may produce new and unexpected data, which must be brought in and used in the model.

Testing for the carbohydrate called starch in leaves

3 a Beaker, test tube, tripod, gauze, heat-proof mat, Bunsen burner and white tile.
b 1 Dip leaf in hot water to kill cells.
2 Boil test tube of ethanol.
3 Dip leaf in water to soften it.
c i To take the chlorophyll out of the leaf.
ii The Bunsen burner is turned off before ethanol is brought into the laboratory.
d i Iodine solution.
ii Brown.
iii Blue/black.
4 a The leaf does not contain starch.
b Light is needed for starch production and keeping the plant in a cupboard de-starches it.

→

Carbon dioxide and starch production

5 We say the plant has been de-starched.
6 a Put it in a cupboard for two days to de-starch it.
b To remove carbon dioxide from the air.
c Set up a similar plant with sodium hydrogen carbonate to provide carbon dioxide for the plant.
d The plant with soda lime will not have starch in its leaves but the plant with the sodium hydrogen carbonate will.

Light and starch production

7 a It will contain starch.
b i It will not contain starch.
ii The plant has been without light and it needs light to make starch.

Chlorophyll and starch production

8 Chloroplasts contain the green pigment, chlorophyll. Chloroplasts are mainly found in the leaves of a green plant.

Photosynthesis and oxygen

9 a Labels from top to bottom:
– Test tube.
– Filter funnel.
– Canadian pondweed.
– Beaker.
– Supports.
b A gas will have collected in the test tube.
c i Test the gas in the tube with a glowing splint.
ii The gas is oxygen.

3 Genetics

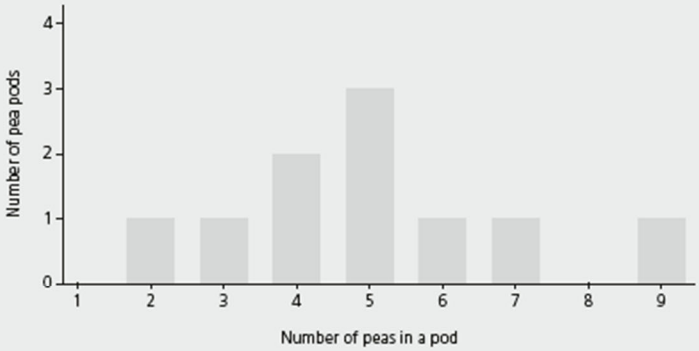
Workbook answers

Variation in living things

1 a For example, long ears.
b 1 Rabbit has shorter legs than the hare.
2 The rabbit is darker while the desert hare is lighter in colour.

2 a Fish A is a lesser weever.
Fish B is a lesser sand eel.
Fish C is an armed bullhead.
Fish D is a three-bearded rockling.
b Lesser weever.
c Lesser sand eel.

4 a



b 8

Variation within a species

3 a Individuals in a species vary in small ways from each other, such as differences in size or eye colour.
b No. Although a species has a certain number of genes which control its characteristics, these genes can occur in different combinations in the individuals of the species and these different combinations produce the variations that are seen in the species.

Chromosomes and genes

5 There are two genes for each body feature in a cell.
There are large numbers of genes on a chromosome.

6 A and C.

Sex chromosomes

7

XX	XX
XY	XY

Chromosomes and gametes

8 a Egg cell.
b The male reproductive cell in a human is called a sperm cell.

9 a 12
b Fertilisation.
c Zygote (fertilised egg) – 24

10 a Pairs of chromosomes separate so only one goes into each gamete.
b The genes on new pairs of chromosomes have slightly different combinations from that of the parents.

The scientific theory of natural selection

11 Pollution from factories landed as soot on tree trunks where the peppered moths rested.
Birds could see the pale-coloured peppered moths better and so ate them.
Dark moths were better camouflaged, so reproduced and more dark-coloured peppered moths were born.

12 a The best-suited of two species will survive in a habitat.
b Predation.

4 Care in fetal development

Workbook answers

Care during fetal development

1 Soft cheeses like Camembert.
Coffee.

2

Food type	Examples
carbohydrate	oats, whole grain breads, cereals, pasta, brown rice
protein	chicken, salmon, beef, peas, lentils, beans
fat	milk, hard cheese, yoghurt
fruits and vegetables	blueberries, raspberries, avocadoes, bananas, oranges, mangoes, apples

3 1 It will be smaller than normal.
2 It will be less able to resist the attack of disease.

4 a The more cigarettes you smoke during pregnancy, the greater the risk of your baby being born with a low birth weight.
b The number is small and there is no indication about mothers who smoked and have babies with a normal birth weight. If this was known, a percentage could have been worked out to provide more information. The more than ten group could be divided up into more than ten, more than fifteen, and more than twenty, to provide more information (which may further confirm the relationship).
c Seek out health advice from a clinic, nurse or doctor.

5 a Alcohol or a named non-medicinal drug, such as cannabis, cocaine, heroin and ecstasy.
b Alcohol – any two from: nerve damage, smaller head and abnormal development of eyes, nose and lips.
A named non-medicinal drug – makes fetus grow more slowly and less able to fight disease.

6 a Controlling and maintaining the baby's body temperature.
b Incubator.
c Any three from: provides food through a tube, provides oxygen through a tube, temperature controller, humidity controller, monitors for checking the baby's temperature, breathing rate and heart rate.

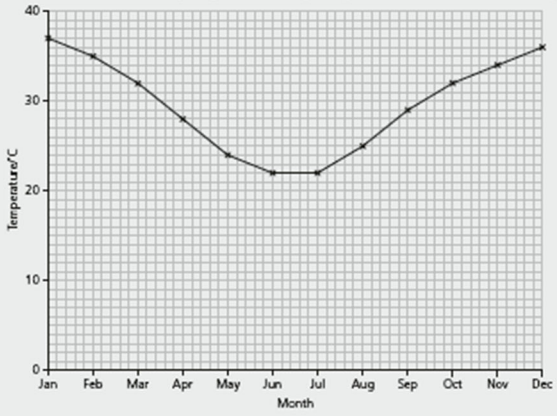
5 Environmental change and extinction

Workbook answers

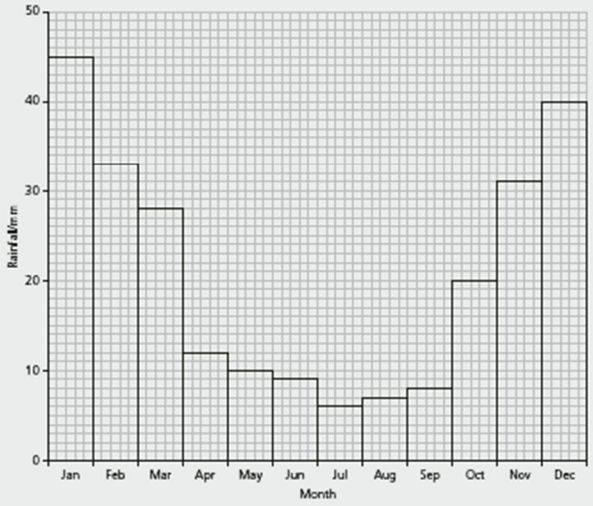
Organisms in the environment

1 a Over time, the average length of the roots of plants will increase, in order to reach the water.
b In this environment, plants could begin to grow prickles or spines or make chemicals that taste bad or are poisonous, in order to deter predators such as deer.
c Over time, the birds may begin to develop longer beaks or demonstrate digging behaviour.

2 a



b



c April.
d Desert.
e iii High temperatures and low rainfall.

Ecological models: The food web

3 a Any two from: plant roots, leaves, seeds, bark.
b Answer from: fox, owl, shrew, robin, sparrow-hawk.
c The passage of nutrients and energy from the food to the feeder.
d It may change with the season as when the leaves fall, the caterpillars are no longer available. It may change due to human influence, such as pesticides or complete destruction. Natural disease may strike one species in the chain and make it no longer available.

Population change

4 a The number of hares was greatly reduced (due to the more frequent visits of humans).
b The larger number of foxes caught and ate more hares.

Endangered species

5 Zoos can increase the birth rate by offering great care to the adults and pregnant and nursing mothers. They can reduce the death rate by protecting the pandas (especially young ones) from predation.

6 a Hunting for food; hunting to kill the whales that are eating fish that people eat.
b It is a good reason if the people have no other source of food, but a bad reason if they have other sources of food because hunting leads to extinction.

6 The periodic table

Workbook answers

Sorting out elements

1 Dalton constructed the atomic theory. Döbereiner began sorting elements into groups of three, called triads. Newlands set out elements in the order of their atomic weights, starting with the lowest.

How the periodic table was made

2 Arranging the elements in a table according to their properties.
3 The atomic number of the element is the number of protons in its nucleus.
4 a K.
b Lithium.
5 Because they are arranged in the same group in the periodic table.
6 The number of protons in an atom.

Group 1 in the periodic table

7 a Lithium.
b The melting point decreases.
c 450°C (based on the idea that 450 was the difference between lithium and sodium).
8 Lithium – fizzes and floats on water.
Sodium – fizzes strongly.
Potassium – bursts into flame.
9 The elements become more reactive with water.
10

Atom	Number of protons	Number of electrons	Number of neutrons
lithium	3	3	4
sodium	11	11	12
potassium	19	19	20

7 Bonds and structures

Workbook answers

The electrons in an atom

1 a Proton – positive charge.
Electron – negative charge.
Neutron – no charge (neutral).
b Neutral.

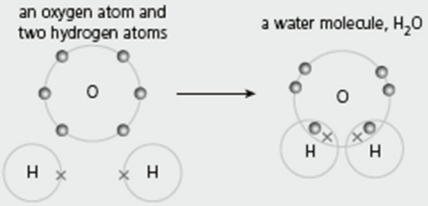
2 a A – electron.
B – shells.
C – nucleus.
b i Nucleus.
ii It contains protons, which have a positive charge.

3 Neon – Ne – c.
Helium – He – b.
Beryllium – Be – a.

Covalent bonding

4 An atom is a particle from which all substances are made. Molecules are atoms linked together by different kinds of bonds.

5



Ions and ionic bonding

6 a An ion is an atom which becomes charged.

b

	Sodium	Chlorine
cation	✓	
anion		✓
charge	positive	negative

Structures

7 An ionic bond forms when one or more electrons move between atoms so that their outer orbit (shell) of electrons becomes full and the atoms become stable.

8

Statement	True	False
Covalent bonds make molecules.	✓	
Most molecules are solids at room temperature.		✓
Covalent molecules do not usually dissolve in water.	✓	
Covalent bonds do not make molecules.		✓
Most molecules are liquids or gases at room temperature.	✓	

9 a Four.
b It is made of sheets of carbon atoms which are only loosely joined together so they can slide over each other.
c It can conduct electricity because all of the electrons are not bound in bonds and are free to move.

Giant ionic structures

10 a Atoms which have different charges which form ionic bonds to make a lattice structure.
b The shape is made by the way the atoms of sodium and chlorine pack together when they form ionic bonds.

11 That the boiling and melting points will be very high.

12 a NaCl.
b A formula unit is a diagrammatic representation of the atoms involved in making an ionic bond. In this diagram, the symbol of each atom is enclosed in a bracket.

8 Density

Workbook answers

Defining and comparing density

1 The amount of matter present in a certain volume of a substance, such as 1cm³.

Density in solids

2 a Cut each block to the same dimensions, then place it on a balance scale to find the mass.

b $\text{Density} = \frac{\text{mass}}{\text{volume}}$.

3 a Measure the length, height and width of the block and multiply all three dimensions together.

b $5 \times 5 \times 5 = 125 \text{ cm}^3$

4 a A, G, C, H, B, E, F, D.

b By subtracting $V2 - V1$.

c $\text{D} = \frac{90}{30} = 3 \text{ g/cm}^3$

Density in liquids

5 a D, A, F, C, E, B.

b $\text{Density} = \frac{\text{B} - \text{A}}{\text{V}}$.

c $120 - \frac{100}{14} = 1.4 \text{ g/cm}^3$

Floating and sinking

6 a g/cm³

b kg/m³

c i Vegetable oil.
ii Water.
iii Maple syrup.
iv The less dense material always floats on the denser material.

d Below the vegetable oil.
Above the water.

Density in gases

7 You find the mass of gas in the flask by weighing it and then weighing it again with the gas removed. You find the volume of the flask by filling it with water, then pouring the water into a measuring cylinder. You then divide the mass of gas by the volume of the flask to find the density of the gas.

8 I predict the density of water vapour will be less than that of water. This is because the number of water molecules in any volume of water vapour is much smaller than in the same volume of water.

9 F, C, I, A, H, D, G, B, E.

10 a It lowers the density because fewer particles then occupy the original space.

b It increases the density because there are more particles now occupying the original space.

c They are measured at the same temperature and pressure to make the comparison fair.

11 a Helium.

b Recording weather data high in the atmosphere (so it can be linked with data on the ground by looking for patterns or trends). In astronomy, to examine the night sky and the position of objects in space.

9 Displacement reactions

Workbook answers

Displacement reactions

1 a Yes.
b Iron is more reactive than copper and would displace copper and form iron sulfate.
2 a Because copper sulfate is formed and it is blue.
b It comes from the silver sulfate solution.
c Copper is more reactive than silver and displaces it.
3 Magnesium &water ♥ magnesium hydroxide + hydrogen.

The reactivity series of metals

4 a It glows, makes yellow sparks and a black powder.
b Not changed.
c Forms a black powder on the surface.
5 Calcium.
6 Potassium, sodium, calcium, magnesium, zinc.

The reaction of metals with acids

7 Metal &acid ♥ metal salt &hydrogen.
8 a As you go down the table, the time for collecting a full boiling tube increases.
b Hydrogen.
9 a Hydrogen.
b Metal &hydrochloric acid ♥ metal chloride &hydrogen.
c He could use the same amounts of acid and metal and compare the amounts of hydrogen produced at the end of the reaction.
d Magnesium, aluminium, calcium, zinc.

10 Preparing common salts

Workbook answers

Salts

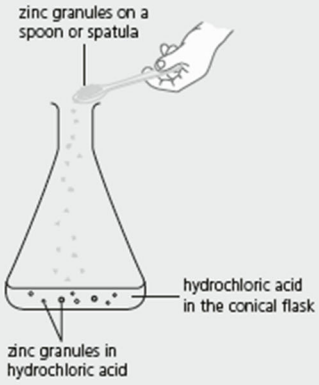
1 Drying agents, setting concrete.
2 Making cosmetics, sewage treatment.

Acids and their salts

3 Chloride, sulfate, nitrate.
4 a Magnesium &nitric acid ♥ magnesium nitrate &hydrogen.
b Lead &hydrochloric acid ♥ lead chloride &hydrogen.
c Aluminium &sulphuric acid ♥ aluminium sulfate &hydrogen.
5 a The fibres form a mesh, like a sieve. The liquid can pass through the small holes between the fibres but the fibres prevent the solids from passing through.
b The liquid that passes through the filter paper.
c The solid that is left behind in the filter paper.
6 Water leaves the surface of a solution in the form of water vapour. This continues until all the water has evaporated.
7 a A solid structure with flat sides.
b Dissolve the substance in water to make a concentrated solution. Place in an evaporating dish, apply a heat source to warm it up (but not boil), then leave to cool and let all the water evaporate to leave crystals behind.

Preparing a salt from a metal and an acid

8 a



b B, D, A, C.
c Evaporation.

Preparing a salt from a metal carbonate and an acid

9 a E, B, A, G, F, D, C.
b The solid is patted with a paper towel to remove any remaining water on the crystals.
10 a Copper carbonate &hydrochloric acid ♥ copper chloride &carbon dioxide & water.
b To make sure all the acid has reacted with it.
c Wear eye protection and maybe wear gloves.
11 a He can use either sample.
b Because both reactions will produce copper sulfate.

11 Rates of reaction

Workbook answers

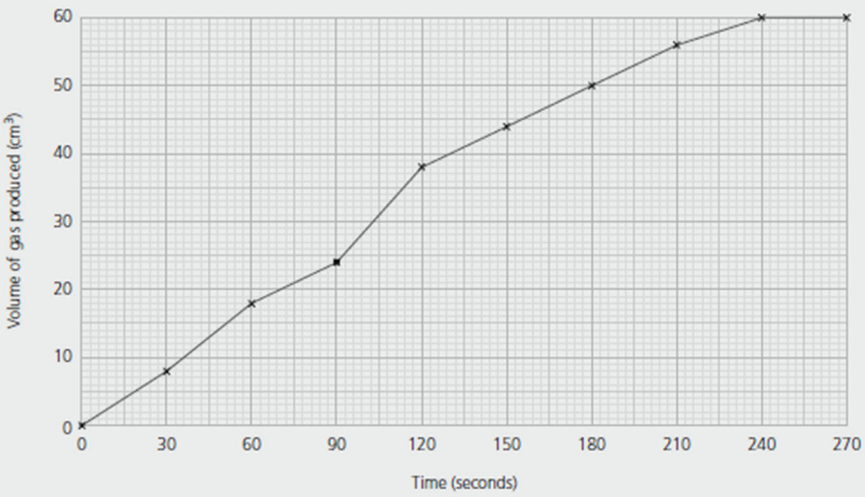
Rates of reaction

1 A measure of the speed of change in a reaction.
2 The mass of the products in a reaction is the same as the reactants in the reaction.
3 The mass of the reactants is the same as the mass of the products.

Measuring rates of reaction

4 a A top-pan balance.
b C, E, A, D, B.
c A syringe.
5 a A syringe.
b 240 seconds.
c The volume of gas did not increase after that time.

d

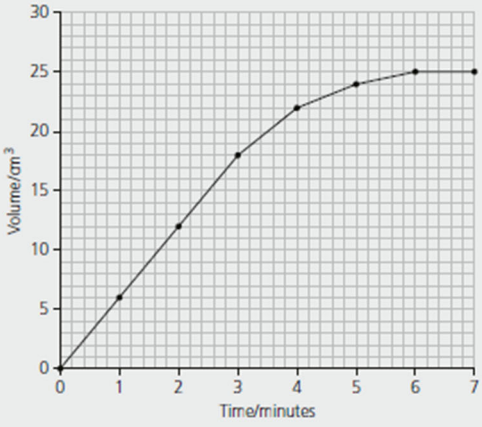


e About 13cm³.
f 90 seconds in.
g The syringe stuck.

Factors affecting rates of reaction

6 A measure of the amount of solute in the solution.
7 a A powdered form.
b It has the largest surface area on which the reaction can take place.
8 a They are getting smaller.
b It is getting larger.
c i Less than 5 minutes.
ii The increase in surface area means the reactants can come into contact more quickly and the reaction is faster.
9 a The speed at which cloudiness occurs and the cross cannot be seen beneath the flask.
b The cross cannot be seen.
c As the temperature of the reaction is raised the speed of the reaction increases.

10 a



b i Below the line of the first graph.
ii The reaction takes place more slowly at the lower temperature and less gas is produced in each minute.

12 Energy

Workbook answers

Thermal energy, internal energy and temperature

1 The total kinetic energy of atoms and molecules in a substance. The total movement energy of atoms and molecules in a substance.

2 An indication of how hot or cold an object is.

3 a Faster.

b Mass.

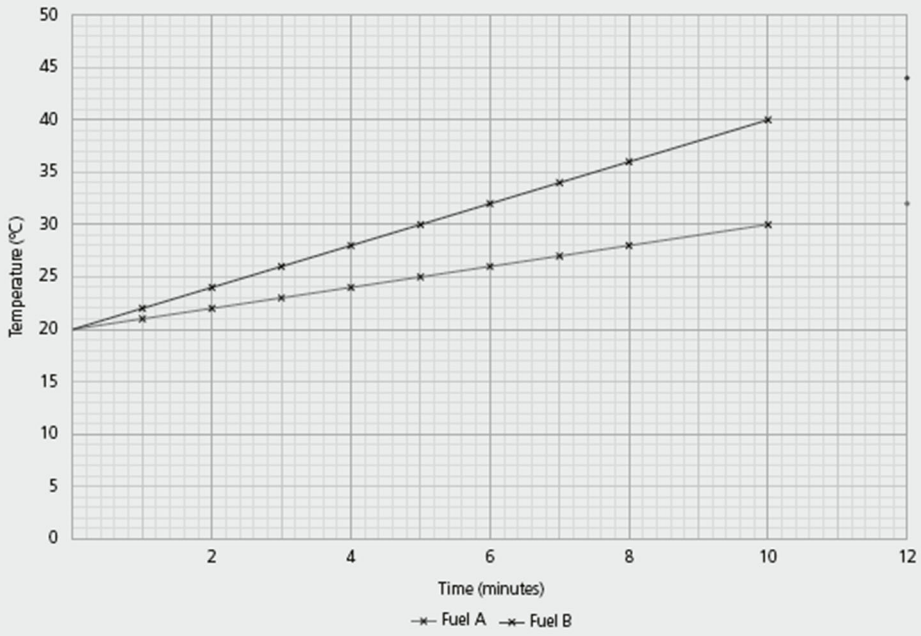
Measuring the amount of thermal energy

4 a Loss of mass 8 5g
Rise in temperature 8 10°C

b 2.1 ↓ $\frac{10}{5}$ 8 4.2KJ/g

➜

5 a



b Fuel A 32°C
Fuel B 44°C

c 12°C

Conservation of energy

6 When any event involving energy occurs, energy is not created or destroyed; it simply changes from one form to another.

Heat dissipation

7 From hotter to cooler.

8 a The tacks nearest the heat source will fall off first as the heat moves along and melts the wax. The tacks furthest away will be the last to fall.

b Rods of different metals which are all the same length and thickness (they have the same mass) are heated in turn and the time for each tack to fall from each rod is recorded.

9 When a heat source is applied to the bottom of the pan, it gives extra energy to the water molecules at the base of the pan. This increases their kinetic energy and they move apart, and make a section of water less dense than the water around it. This difference in density causes the less dense water to rise and form a convection current. Water molecules take the heat they have gained with them. This transferring of heat by particles such as molecules is called convection.

10 a Energy travels in the form of electromagnetic waves.

b A vacuum.

Evaporation

11 a Evaporation will cause the water in the puddles to change to water vapour, and eventually the puddles will dry up and disappear.

b Gas.

c Accept any appropriate everyday example, such as sweat on the surface of the skin, the surface of the lungs and respiratory system.

d Cooler. The energy of the particles that evaporate is lost to the water behind and so it cools.

12 a It lowers the body temperature.

b The evaporating sweat cools the surface of the skin, which in turn cools the blood beneath it and as this circulates, it cools the body.

13 Waves

Workbook answers

Sound and vibrations

1 The sound goes lower as the vibrating length increases.
The sound goes higher as the vibrating length decreases.
2 A vibration is movement of an object about a fixed point. A ruler is held at a fixed point on a table and moves up and down when it vibrates. Air particles swing to and fro about fixed points in the air.
3 a Air particles (molecules of gas).
b It causes the air to become a little denser where the particles are squashed together.
c The air particles move apart and the region of air their becomes less dense.
d Waves.
e Sound waves.

The features of a waveform

4 A Wavelength.
B Amplitude.
5 b.

6 Pitch is how high or low a musical note sounds.
7 a Frequency is the number of waves that pass a certain point in a second.
b A is low frequency, B is high frequency.
c Hertz, Hz.

When sound waves interact

8 a Interfere.
b i Interference and constructive.
ii Interference and destructive.
c It is the place where two waves of the same frequency meet and the compressions of one occur in exactly the same place as the rarefactions of the other so that no sound is generated.

Modelling sound waves

9 a Frequency, wavelength, amplitude.
b **Strengths:** You can visualise easily how the waves are behaving.
Limitations: Sound waves act in three dimensions, while the water waves only act in two.

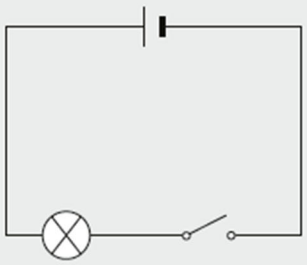
14 Electrical circuits

Workbook answers

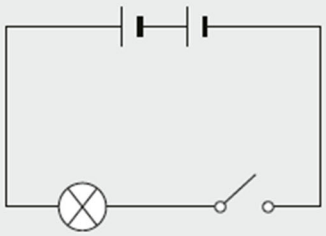
Circuits

1 a The electrons move from the negative terminal to the positive terminal.
b Cell.
c It gives out light and heat.
d The lamp is dimmer.
e The chemicals that take part in the reaction in the cell are used up.
f i It stops flowing.
ii The electrons cannot pass through air; air is an insulator.
2 a The X is on the right by the shorter vertical line.

b



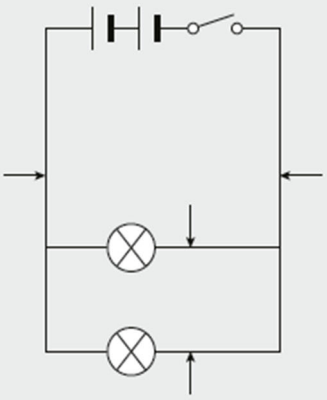
c



d i It shines more brightly.
ii Only a simple answer is required, such as the second cell gives more electrical energy to the circuit.
3 a Aruni.
b Aluminium is a metal and a conductor; wood is an insulator.
4 A Resistor.
B Buzzer.
C Variable resistor.
5 It splits up and flows equally through both wires.

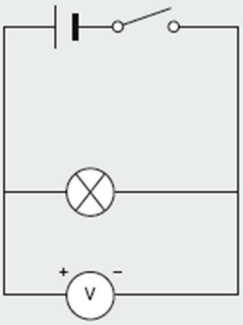
Measuring current

6 Ammeter.
7 Connect the red terminal to the positive terminal of the cell.
8 The reading at A is the same as at B.
9 a 4
b



Measuring voltage

10 A difference in potential energy.
11



Resistance

12 a Ohm, R.
b The resistance is equal to the voltage divided by the current, R 8 $\frac{V}{I}$
c Resistance 8 $\frac{12}{3}$ 8 4 Ω
d Current is $\frac{\text{voltage}}{\text{resistance}}$ 8 $\frac{12}{6}$ 8 2 amps.

15 Planet Earth

Workbook answers

Evidence for tectonic plates

1 It is a huge slab of rock which covers a large part of the Earth's crust, which is moved by the convection currents in the magma below it. It may form land or be covered with water, as in the oceans.
2 Igneous, sedimentary, metamorphic (in any order).
3 a Most fossils are formed by the dead bodies of plants and animals which have been quickly covered by mud and sand. This stops them from being eaten by scavengers or decomposed by microorganisms. Water and minerals pass through the bodies and turn them into rock.
b The living things evolved while all the land was joined together in a supercontinent, which then split to form the continents we know today, taking the plants and animals with them.
4 Volcanoes and earthquakes occur often at plate boundaries.
5 a Magma.
b 1 It cools.
2 It solidifies.
c They align with the lines of force in the Earth's magnetic field.
d As the Earth changes its magnetic field, these changes are recorded in the way the minerals align and can be used to measure the movement of the plates.

How tectonic plates move

6 Measure the strength of earthquakes.
7 Inner core, outer core, mantle, crust (in this order).
8 a Heat.
b Convection currents.
c The currents nearest the surface of the Earth, just under the plates, move them along.

16 Cycles on Earth

Workbook answers

Processes in the carbon cycle

1 a From the air.
b Carbon dioxide + water ♥ carbohydrate + oxygen.
c The soil.
d Starch (carbohydrate).

2 To keep all life process going.

3 a Corn ♥ mouse ♥ owl.
b Owl.

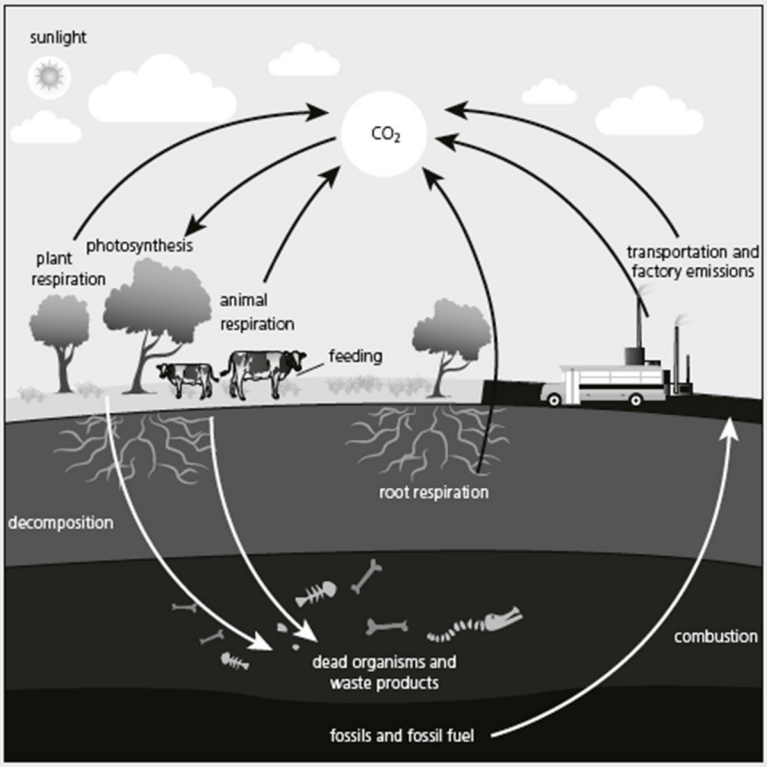
4 a A food chain and web are similar in that they show the path of materials and energy from the food to the feeder. They are different in that a food web shows a range of possibilities for food and materials to pass through the organisms in a habitat.
b A food web is more useful than a food chain.
Strengths: A food web shows the range of ways food and energy can pass through the organisms in a habitat; this is its strength.
Limitations: A food chain just shows one way that food can pass though some organisms in a habitat; this is its limitation.

5 Carbon dioxide.

6 a Keep warm, cook food.
b Fuel + oxygen ♥ carbon dioxide and water.

7 Any two from respiration in animals, respiration from plants, burning fossil fuels, exhausts of petrol and diesel engines, respiration from microorganisms.

8



Carbon dioxide the 'greenhouse gas'

9 1 Combustion.
2 Respiration.

10 It lets heat from the Sun pass through it, but will not let heat radiating back from the Earth pass through it, just like the glass in a greenhouse.

11 It keeps the planet warm enough for life to develop and survive.

Climate change

12 Rise in global temperature.

13 Any three from temperature, wind speed, wind direction, rainfall (precipitation) humidity, air pressure.

14 a It was needed to power the machines for manufacturing in factories.
b Coal.
c It added more carbon dioxide to the atmosphere.
d Oil.

The effects of climate change

15 a The climate will become warmer. The term is 'global warming'.
b The sea levels will rise due to the melting of the ice at the North and South Poles.
c The sea will come further up the shore, making people living there move back; it will flood low-lying areas, making people move to higher ground. It will make islands smaller, making people live closer together or move away and, in some cases, islands will disappear under water, meaning people will have to move away when the island habitats are lost.

16 a The water content will increase due to an increased rate of evaporation.
b It will disrupt the flow of air around the planet that we have now, making weather changes everywhere.
c Flash floods, which is sudden flooding due to rapidly moving, swollen rivers.
d Drought, which will kill plants and animals.

17 a Hurricanes (tropical storms or cyclones), tornadoes, heavy snow storms (blizzards).
b Global warming causes more water to evaporate in hot areas and increases the water content of the hurricane. When it hits land, it causes very heavy rain and flooding.
c They think the events may become more frequent and possibly more severe.

17 Earth in space

Workbook answers

Asteroids

1 Mars and Jupiter.

2 a The gravitational forces between the asteroids and Jupiter.
  b A crater.
  c On the surface of the Moon.
  d Because there is no atmosphere there to cause weathering or erosion.

3 a A bowl of sand, flour or moist clay, a model of an asteroid (modelling clay) with thread attached, a wooden spill with millimetres marked on it, a ruler, a metre rule.
  b Make the surface of the sand smooth, hold the model asteroid a certain height above the surface then drop it. Carefully pull the asteroid out of the sand with the thread, then measure the depth of the crater with the spill and the width of the crater with the ruler.
  c The height of the asteroid above the Moon, which gives an indication of speed of impact and the depth and width of the crater produced.
  d **Strengths:** It allows the modelling of an asteroid dropping straight onto the surface.
  Limitations: It does not provide data for a model asteroid approaching from an angle, as many in real life would do.

The effects of asteroid collision on Earth

4 a It produces a large cloud of ash and dust.
  b It produces a large amount of water vapour and droplets.
  c They block out heat and light from the Sun.

5 Cold, dark.

6 Lack of food.

The formation of the Moon

7 a The Big Splash.
  b A great deal of heat was generated in the collision.

Where stars are born

8 Nebulae.

9 Stellar nursery.

10 The atoms of helium and molecules of hydrogen are brought together by the forces of gravity between them. They form a huge ball and, inside, the forces continue to bring the hydrogen molecules closer together until they fuse to make helium atoms. When this happens, heat and light are released from the ball and it becomes a star.

11 a The stellar dust in the nebula.
  b The lamp became brighter.
  c **Strengths:** The appearance of the star beginning to shine more brightly and the muslin modelling the dust and making its light a little diffuse as occurs in a real stellar nursery.
  Limitations: The increased light was caused by supplying more energy through the addition of batteries instead of squeezing a substance so hard that it produced light and heat (scientists cannot do this yet).