Cambridge Assessment International Education

Cambridge Lower Secondary Checkpoint

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

0029847108

SCIENCE **0893/01**

Paper 1 **April 2024**

45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

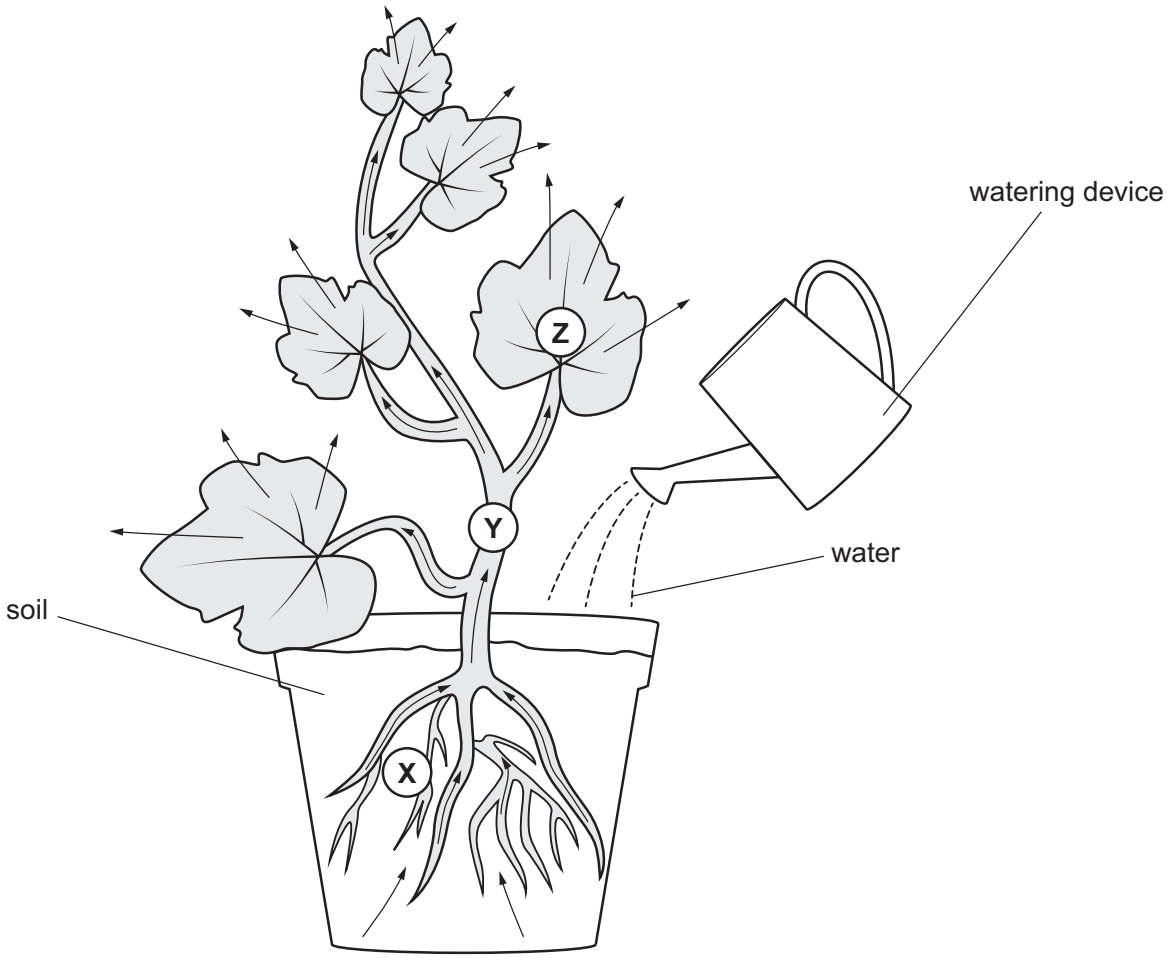
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should show all your working in the booklet.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages.

This question is about the pathway of water through a plant.



Key

→ = pathway (movement) of water

(a) Complete these sentences about the pathway of water through the plant.

At **X**, water is absorbed from the soil into the plant through ..... cells.

At **Y**, water is transported through the stem in ..... vessels.

At **Z**, water is released from the leaf surface by a process called .....

[3]

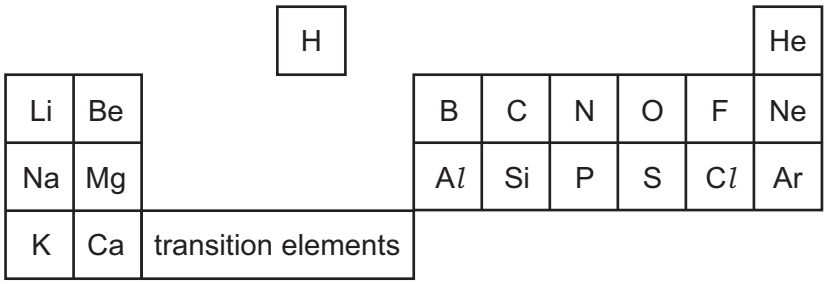
(b) The water added to the plant contains minerals that keep the plant healthy.

One of these minerals is magnesium.

Name **one other** mineral needed to keep the plant healthy.

..... [1]

2 Look at the diagram showing part of the Periodic Table of the elements.



(a) Write down the **symbol** of the element with atoms that contain only 6 electrons.

.....

[1]

(b) The electronic structure of chlorine is 2.8.7.

Write down the electronic structure of potassium.

.....

[1]

3 This question is about density.

(a) Tick (✓) the sentence that correctly describes density.

Density is the height per unit volume of a substance. ☐

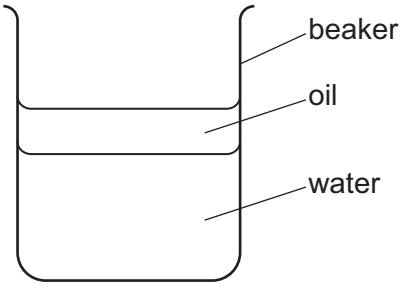
Density is the mass per unit height of a substance. ☐

Density is the mass per unit volume of a substance. ☐

Density is the volume per unit mass of a substance. ☐

[1]

(b) Look at the diagram of a beaker of oil and water.



Explain why the oil is above the water.

.....

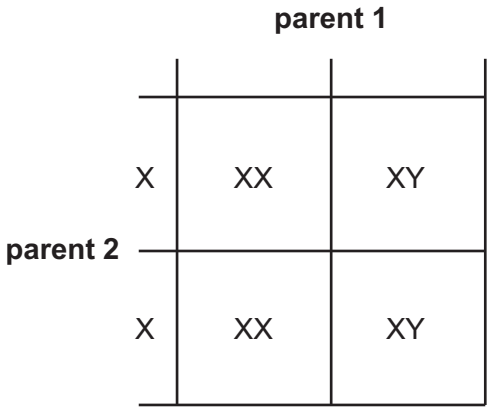
.....

.....

..... [2]

This question is about inheritance of sex and fetal development in humans.

(a) Look at the diagram of a Punnett square.



This Punnett square shows the sex chromosomes of eggs or sperm for **parent 2**.

The sex chromosomes of eggs or sperm for **parent 1** are missing.

The Punnett square also shows the four possible combinations of the sex chromosomes.

(i) Write down the sex chromosomes of eggs or sperm for **parent 1**.

.....

[1]

(ii) The egg cell and the sperm cell fuse together.

Each cell passes chromosomes into the offspring.

What word describes cells like eggs and sperm?

.....

[1]

(b) Smoking is one factor that affects fetal development during pregnancy.

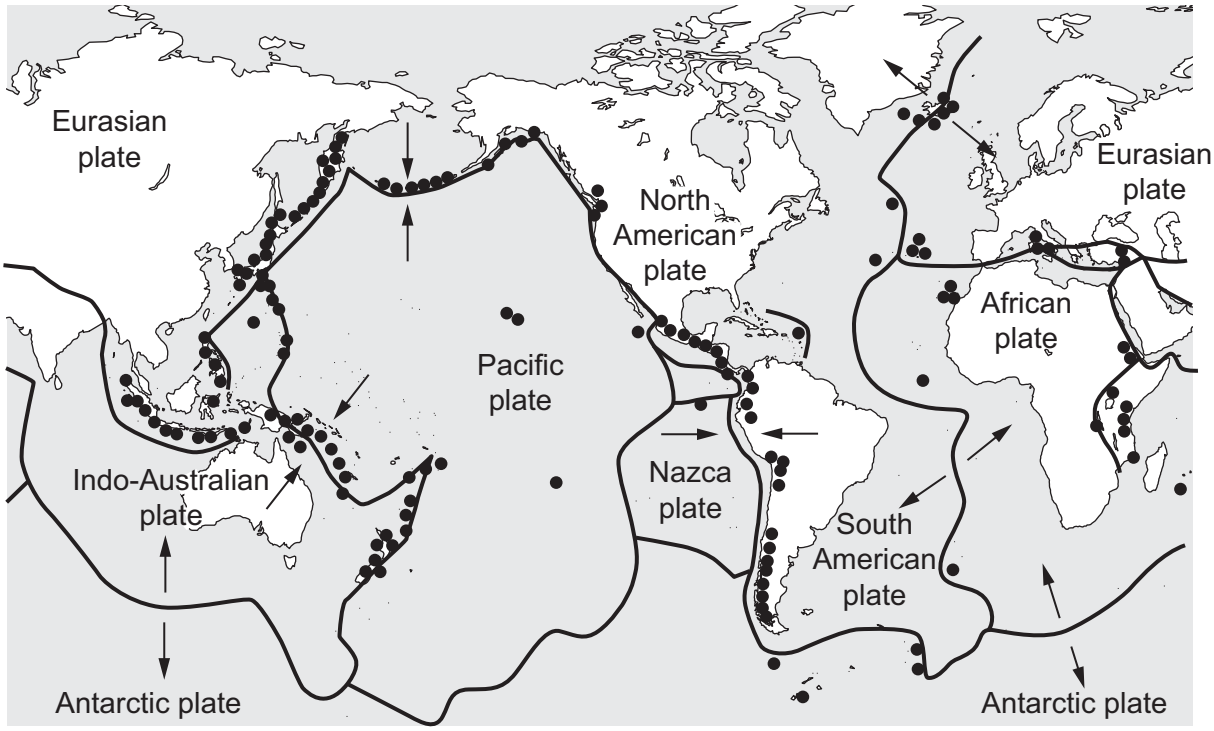
Write down **one other** factor that affects fetal development during pregnancy.

.....

[1]

Aiko uses the internet to investigate the movement of tectonic plates.

Look at the information she finds.



Key

⟶ = direction of tectonic plate movement

● = volcano

—— = plate boundary

(a) Tick (✓) the correct direction of tectonic plate movement.

	direction of tectonic plate movement	
plates	**away from each other**	**towards each other**
Nazca and South American		
Indo-Australian and Pacific		
Indo-Australian and Antarctic		
South American and African		

[2]

(b) Tick (✓) the correct sentence.

Use information from the diagram.

Most volcanoes are along the boundaries of tectonic plates. ☐

Most volcanoes are in the middle of tectonic plates. ☐

Most volcanoes are on the Antarctic plate. ☐

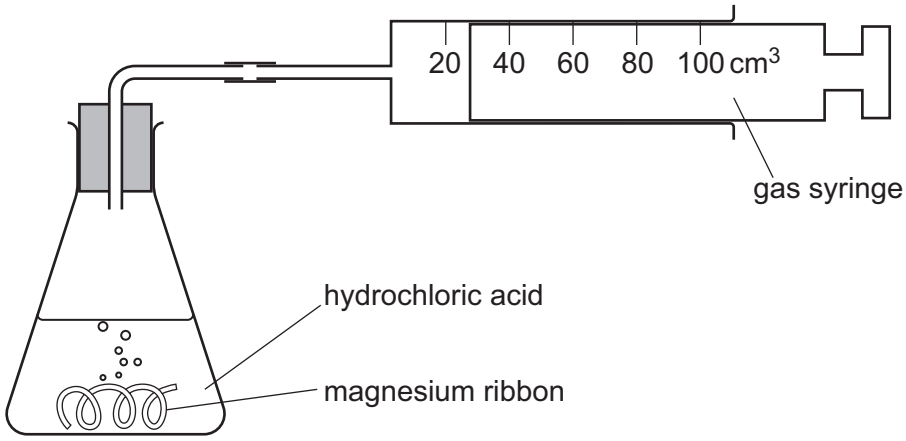
Most volcanoes are on the African plate. ☐

[1]

Safia investigates the reaction between magnesium and hydrochloric acid.

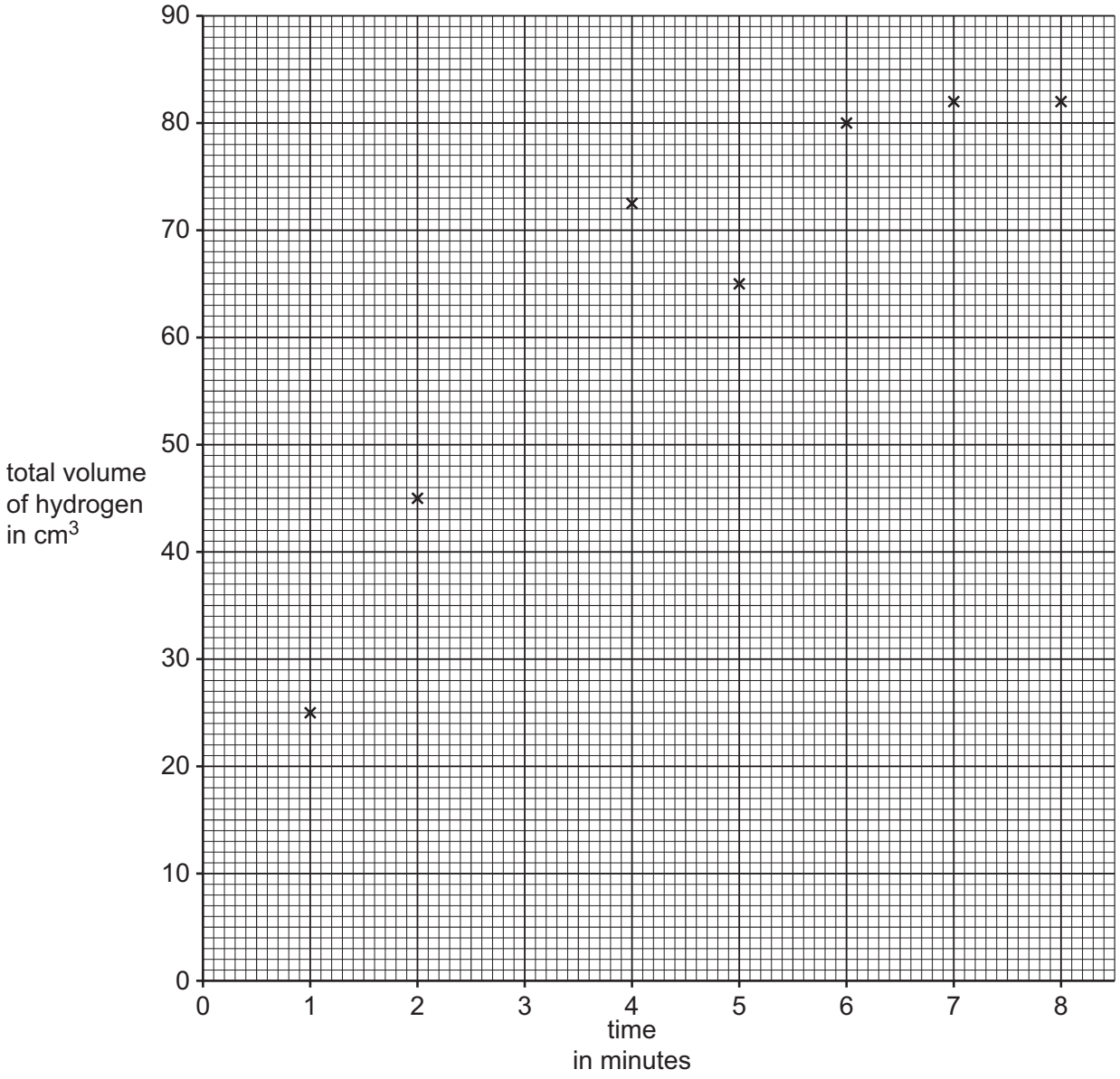
magnesium + hydrochloric acid ⟶ magnesium chloride + hydrogen

Look at the equipment Safia uses.



Safia measures the total volume of hydrogen made each minute for 8 minutes.

She plots her results on the grid.



(a) One result is anomalous.

Circle the anomalous result **and** draw a curve of best fit.

[2]

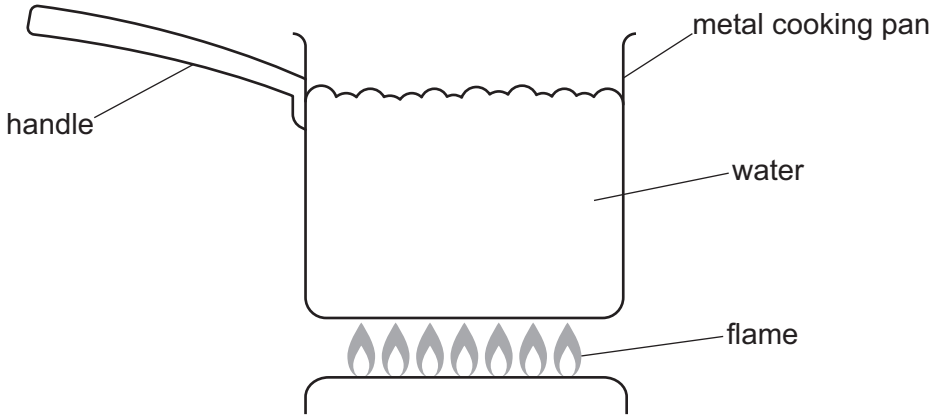
(b) The result for 3 minutes is missing.

Predict the total volume of hydrogen made in 3 minutes.

total volume of hydrogen made in 3 minutes = ... cm^3 [1]

7 Oliver heats cold water in a metal cooking pan.

The water boils.



(a) Oliver makes an **incorrect** statement about the boiling water in the metal cooking pan.

Oliver says,

'The water is given temperature by the flame.'

Suggest **one** reason why Oliver is **incorrect**.

.....

..... [1]

(b) The handle of the metal cooking pan gets hot.

Name the thermal energy transfer process that causes the handle to get hot.

..... [1]

This question is about the carbon cycle.

(a) Name **one** process in the carbon cycle that releases carbon dioxide into the atmosphere.

.....

[1]

(b) Which process in the carbon cycle uses microorganisms to break down carbon compounds in dead plants and animals?

.....

[1]

(c) Which process in the carbon cycle moves carbon compounds along a food chain?

.....

[1]

(d) Which process in the carbon cycle makes glucose?

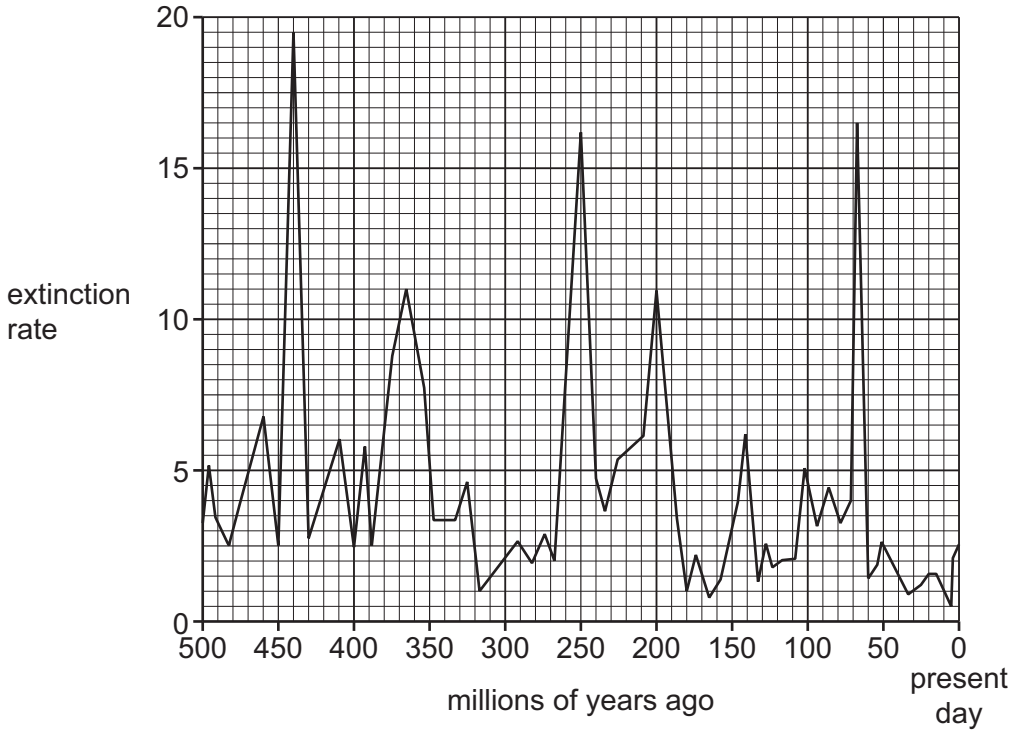
.....

[1]

Mass extinctions of plants and animals have happened during the history of the Earth.

A mass extinction event happens when the value of the extinction rate is greater than 10.

The graph shows how the extinction rate in plants and animals has changed over the last 500 million years.



(a) How many mass extinction events have happened during the last 500 million years?

..... [1]

(b) Increased volcanic activity is one cause of mass extinction.

Suggest why an increase in volcanic activity causes mass extinction.

.....

.....

..... [2]

Mike makes some salts.

He reacts dilute acids with metal carbonates.

(a) Mike draws a table to show which acid reacts with which metal carbonate to make each salt.

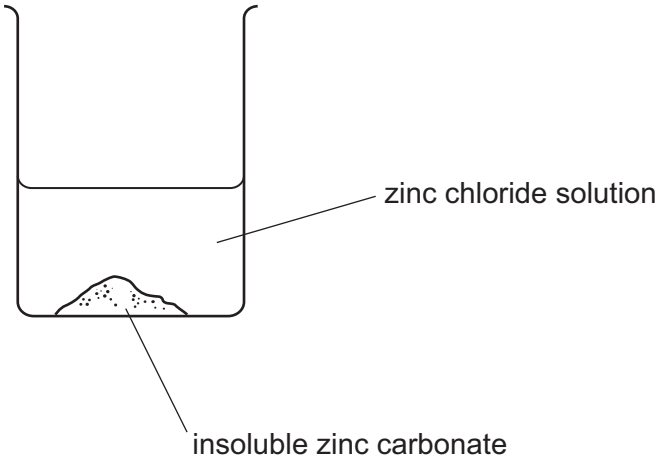
Complete his table.

acid	**metal carbonate**	**salt**
hydrochloric acid	zinc carbonate	zinc chloride
....	copper carbonate	copper sulfate
nitric acid	....	magnesium nitrate

[2]

(b) Mike adds an excess of insoluble zinc carbonate to dilute hydrochloric acid.

When the reaction finishes the beaker contains a mixture of zinc chloride solution and insoluble zinc carbonate.



Describe how Mike makes crystals of pure zinc chloride from the mixture.

.....

.....

.....

..... [2]

This question is about energy conservation.

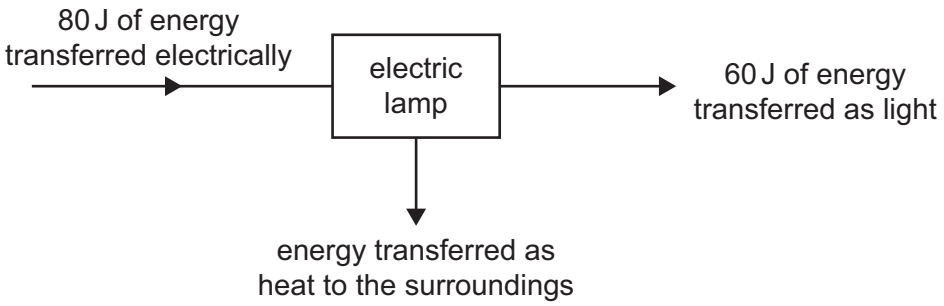
(a) Complete the sentence.

The law of conservation of energy states that energy **cannot** be

..... or .....

[1]

(b) The diagram shows the energy transfers in an electric lamp.

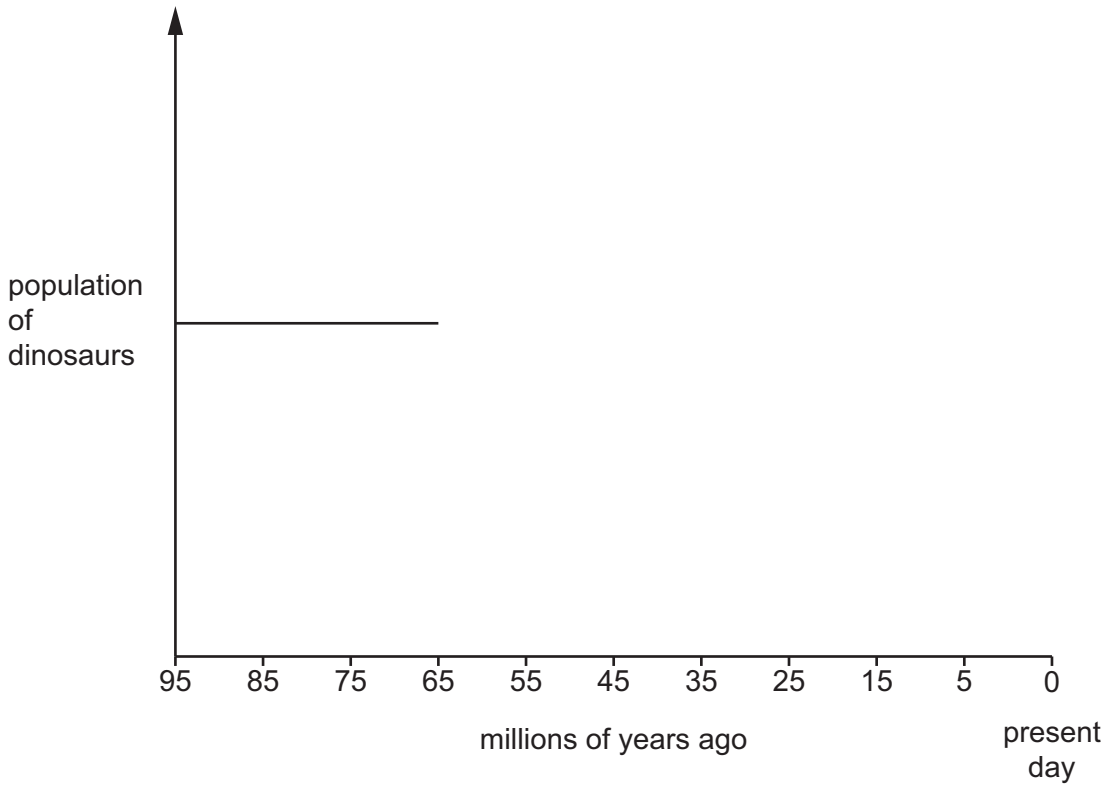


Calculate the energy transferred as heat to the surroundings.

energy transferred as heat to the surroundings = ... J [1]

A massive asteroid collided with the Earth 65 million years ago.

Complete the sketch to predict the effect of this asteroid collision on the population of dinosaurs.



[1]

This question is about natural selection.

(a) Complete these sentences that describe some features of natural selection.

Choose words from the list.

fertilisation **genes** **organisms** **species** **variation**

There are differences in characteristics between the individuals of the same

.....

The characteristics are controlled by .....

[2]

(b) Natural selection also includes the idea that all changes to characteristics happen randomly.

New characteristics that best fit the environment are passed to future generations.

Some scientists use cress plants to study natural selection.

Their results show:

- some characteristics never change
- damage to genetic material for some characteristics repairs very quickly so these characteristics do **not** change.

(i) Tick (✓) to show if these results support the theory of natural selection.

yes ☐ no ☐

Give a reason for your answer.

.....

.....

[1]

(ii) Suggest how the scientists get further information to help their study.

.....

..... [1]

(a) Mia reacts a 0.20 g piece of magnesium ribbon with dilute hydrochloric acid.

She also reacts 0.20 g of magnesium powder with dilute hydrochloric acid.

Mia finds that the magnesium powder has a greater rate of reaction than the piece of magnesium ribbon.

Explain why.

.....

.....

.....

.....

..... [2]

(b) Mia reacts a 0.20 g piece of magnesium ribbon with cold dilute hydrochloric acid.

She also reacts a 0.20 g piece of magnesium ribbon with hot dilute hydrochloric acid.

Mia finds that the hot acid has a greater rate of reaction than the cold acid.

Explain why.

Use ideas about the particle model.

.....

.....

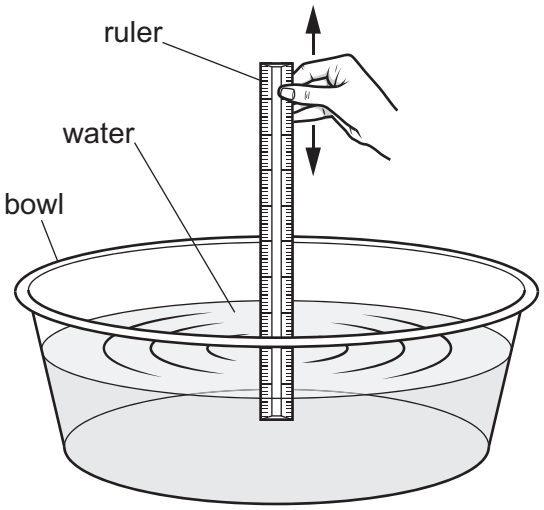
.....

.....

..... [2]

Blessy investigates waves.

Look at the diagram of the equipment she uses.



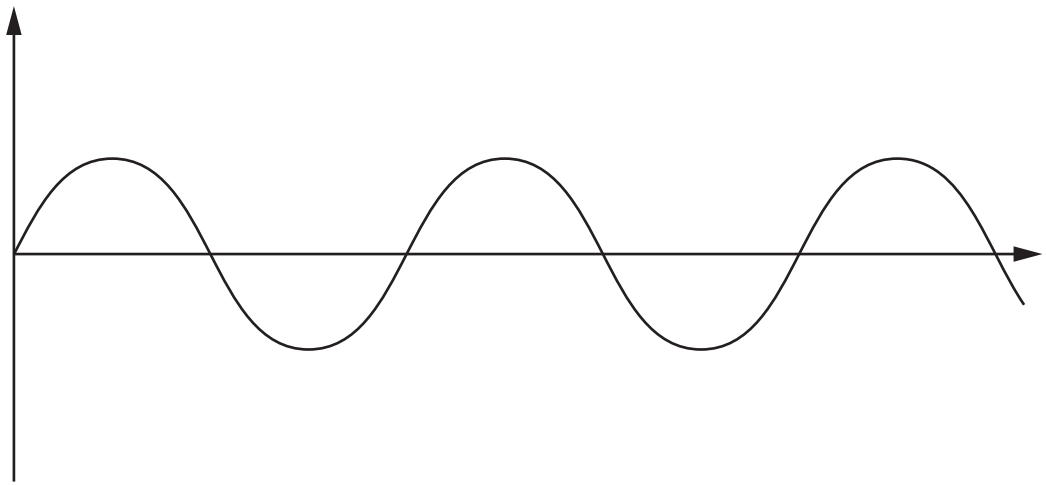
Blessy moves the ruler up and down in the water to make waves.

(a) Blessy increases the number of waves produced per second.

Write down what happens to the frequency of the waves.

..... [1]

(b) Blessy draws a diagram to represent the waves.



Draw a double-headed arrow (↔ or ↕) on the diagram to show the **amplitude** of the wave. [1]

This question is about the formation of the Moon.

(a) Yuri reads four theories on the internet about the formation of the Moon.

Tick (✓) the correct theory.

Pieces of the Earth broke away as the Earth rotated quickly. These pieces formed the Moon.	☐
The Earth collided with a smaller planet. The debris from the impact formed the Moon.	☐
The Moon and the Earth formed at the same time from the same material.	☐
The Moon and the Earth formed at different times. The Moon was captured by the Earth's gravity as the Moon travelled near to the Earth.	☐

[1]

(b) Analysis of rocks from the surface of the Moon has increased our understanding of the formation of the Moon.

Thousands of rocks were analysed.

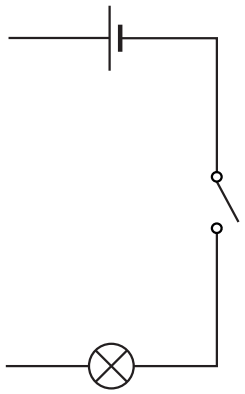
Suggest why a large number of moon rocks were analysed.

.....

..... [1]

Youssef investigates electrical circuits.

(a) Youssef draws this incomplete circuit diagram.



Youssef has an ammeter and a voltmeter.

Complete the circuit diagram to show how Youssef measures the:

- current through the lamp
- voltage across the lamp.

Use the correct standard electrical symbols. [2]

(b) Youssef observes that the lamp gets hot when a current passes through the lamp.

Suggest what Youssef does to make the investigation safe.

.....

..... [1]

(c) Youssef makes this hypothesis,

'The current through the lamp changes when the lamp gets hot.'

Suggest how Youssef investigates this hypothesis.

.....

.....

..... [1]

The Periodic Table of Elements

Group																	
1	2											3	4	5	6	7	8
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –