Cambridge Assessment International Education

Cambridge Lower Secondary Sample Test

For use with curriculum published in September 2020

Science Paper 1

Stage 9

45 minutes

Name .....

No additional materials are needed.

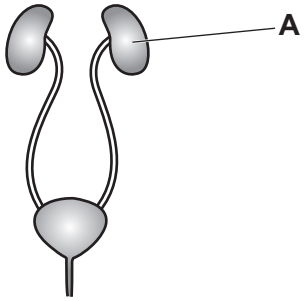
INSTRUCTIONS

- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.

INFORMATION

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

1 The diagram shows the human excretory (renal) system.



(a) (i) Name the organ labelled **A**.

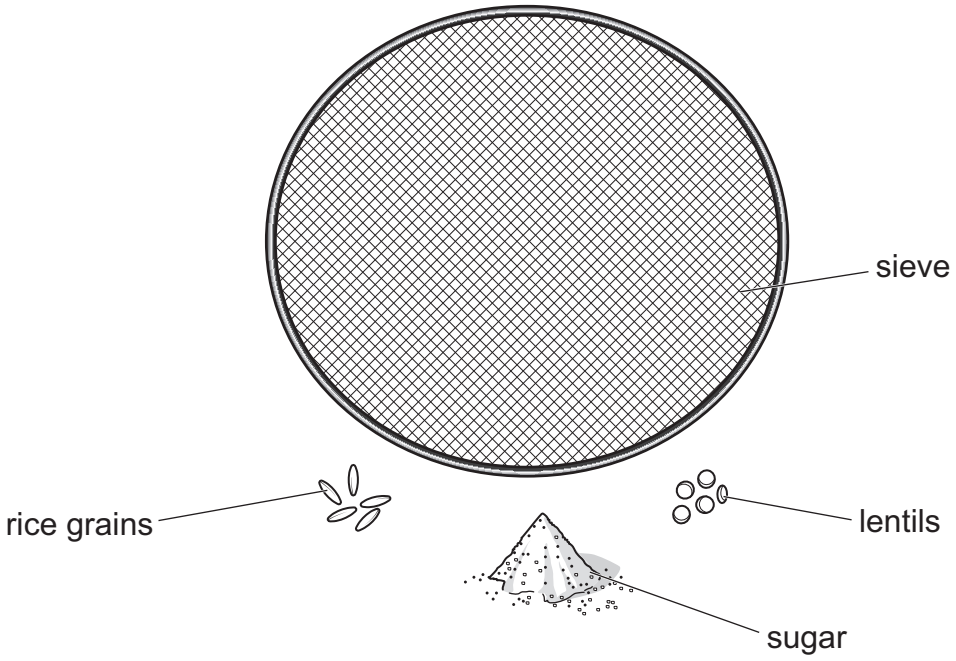
..... [1]

(ii) Name the waste product that organ **A** removes from the body.

..... [1]

(b) Scientists use models to explain how things work.

The diagram shows apparatus and materials used to model the excretory system.



The rice grains, lentils and sugar are added to a beaker of water and stirred.

The mixture is poured through the sieve.

(i) Draw a line from each **material** or **piece of apparatus** to the **part of the human excretory system** it represents.

Draw **only four** lines.

material or piece of apparatus	part of human excretory system
lentils	blood cells
rice grains	kidney
sieve	
sugar	waste product

[3]

(ii) Describe how this model shows the function of the human excretory system.

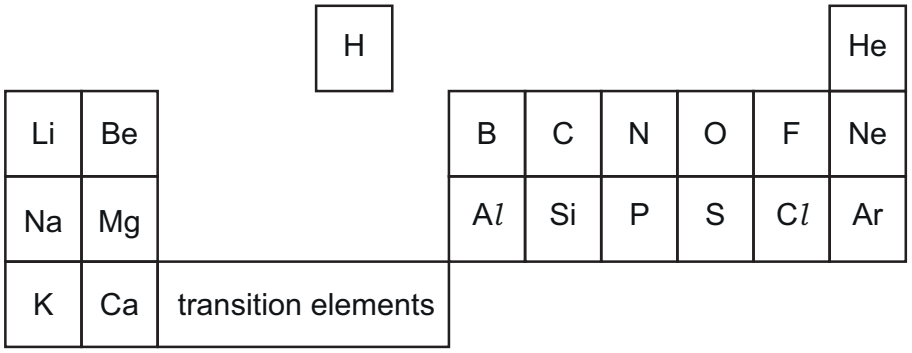
.....

.....

.....

..... [2]

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



(a) Use the Periodic Table to write the electronic structure of aluminium, Al.

..... [1]

(b) How many protons are in an atom of fluorine, F?

..... [1]

(c) A sodium atom, Na, forms a sodium ion, Na^+.

Describe, in terms of electrons, how a sodium ion is made from a sodium atom.

..... [1]

3 Look at the symbols used in electrical circuits.

A **B** **C** **D**

(a) Which symbol shows an ammeter?

Choose from **A**, **B**, **C** or **D**.

..... [1]

(b) What is the name of the component shown by symbol **C**?

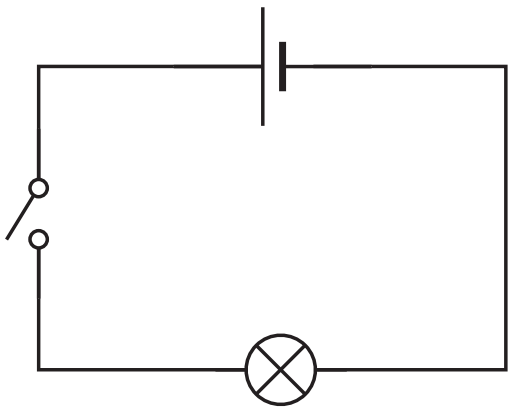
..... [1]

(c) Mia wants to measure the **voltage** across a lamp.

Complete the circuit diagram to show how Mia connects a voltmeter to measure the voltage across the lamp.

The symbol for a voltmeter is shown 

.



[1]

4 Plants need magnesium and nitrates for healthy growth.

(a) (i) What substance do plants make using magnesium?

.....

[1]

(ii) What type of substance do plants make using nitrates?

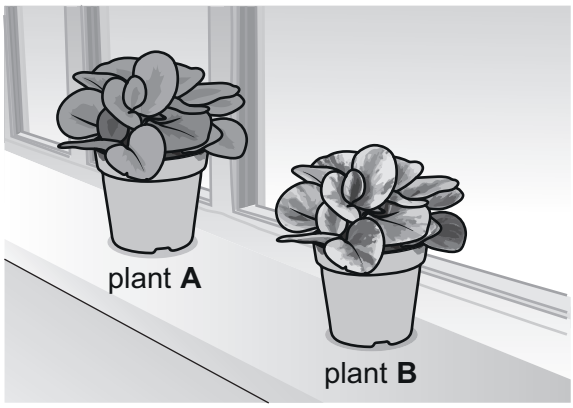
.....

[1]

(b) The diagram shows plant **A** and plant **B**.

Plant **A** has green leaves and plant **B** has green and yellow leaves.

The plants are both the same size and belong to the same species.



(i) Both plants receive the same amount of light and water.

After one week plant **A** is bigger than plant **B**.

Explain why.

.....

.....

[2]

(ii) Plants remove carbon dioxide from the air and replace it with another gas.

What is the name of this gas?

.....

[1]

(c) A farmer grows cabbage plants in his field.

There are spaces between each cabbage plant.

Suggest **one** reason why it is important to have spaces between each cabbage plant.

.....

[1]

5 Look at the table.

It shows information about some properties of the Group 1 elements.

element	melting point in °C	boiling point in °C	density in g / cm^3	atomic radius in arbitrary units
lithium	180	1342	0.53	145
sodium	98	883	0.97	180
potassium	63	759	0.89	220
rubidium		688	1.53	235

(a) Describe the trend in **boiling point** as you go down Group 1.

.....

[1]

(b) Which property does **not** show a clear trend?

.....

[1]

(c) Predict the **melting point** of rubidium.

The melting point of rubidium is ..... °C [1]

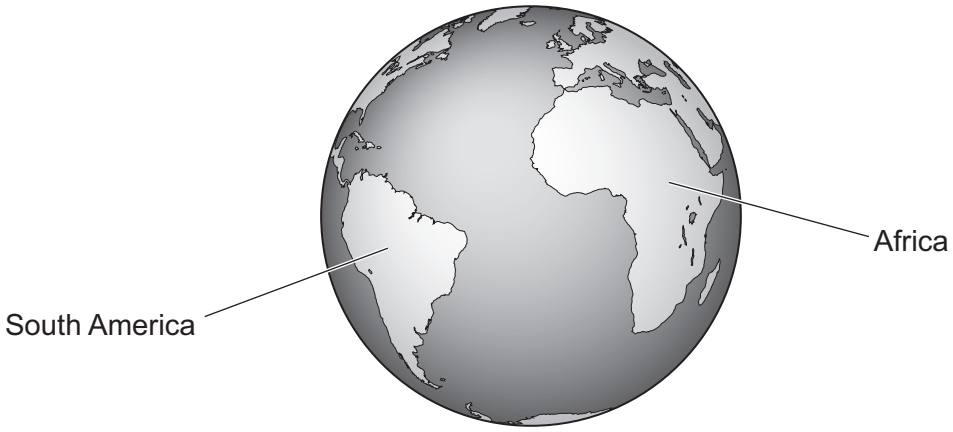
(d) Describe the change in reactivity of the elements as you go down Group 1.

.....

[1]

[Turn over

6 The drawing shows the positions of Africa and South America on the Earth.



(a) Scientists think that these two continents are on separate tectonic plates.

What is a tectonic plate?

.....

..... [2]

(b) Scientists also think that South America and Africa were once joined together many millions of years ago.

The diagram shows present-day South America and Africa drawn next to each other.

Use the diagram to explain why scientists think that the two continents were once joined.

.....

..... [1]

(c) Look at the table.

Which **two** kinds of evidence are most useful to show that South America and Africa were once joined?

Tick (✓) only **two** boxes.

evidence	
comparing their climates	
comparing their rocks	
comparing their sizes	
comparing their fossil records	
comparing their ecosystems	

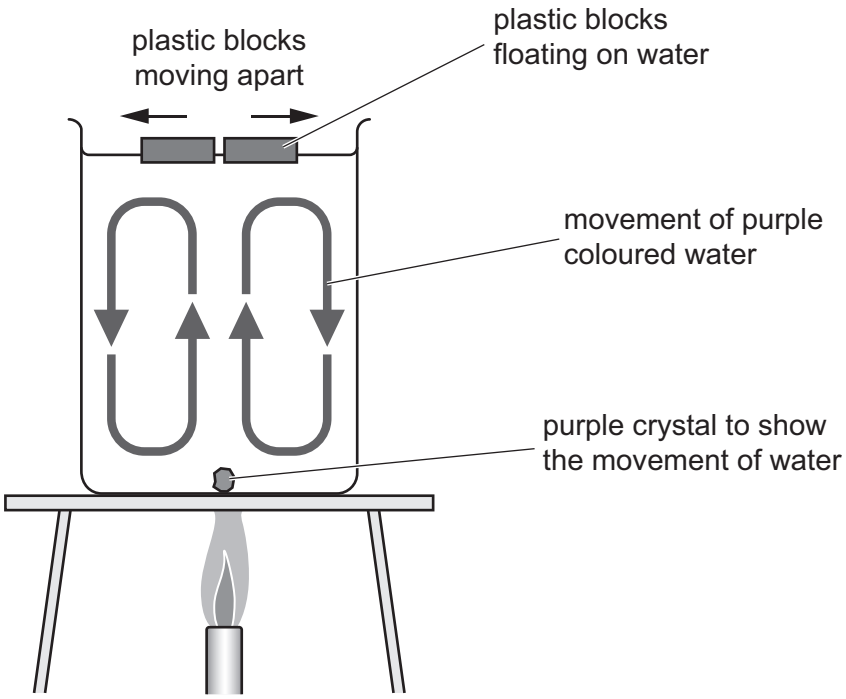
[2]

(d) Write down **one** event that happens where two tectonic plates meet.

..... [1]

(e) Blessy uses a model to explain how tectonic plates move apart.

Look at the diagram of Blessy's model.



Complete these sentences about Blessy's model.

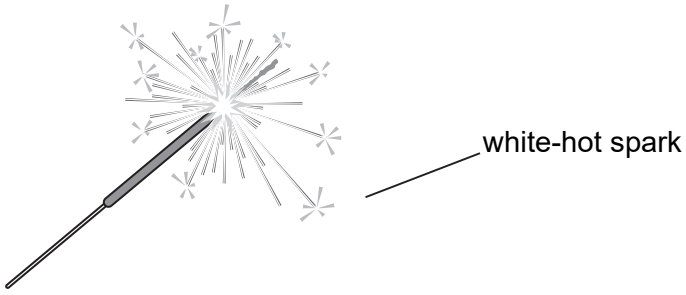
The tectonic plates are represented by the ..... .
The water represents the ..... .

The water moves in a cycle in a process called ..... .

The Bunsen burner represents the heat source from the ..... .

[4]

7 The diagram shows a white-hot spark.



Complete the sentences about a white-hot spark.

Choose from the list.

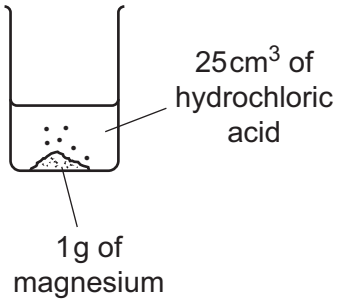
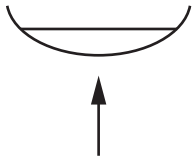
density	**heat energy**	**insulation**
particles	**pressure**	**sound energy**
structures	**temperature**	**vibrations**

A white-hot spark is at a very high ..... .

It does not contain much ..... because it does not contain many ..... . [3]

8 Aiko is making some magnesium chloride.

She reacts magnesium with dilute hydrochloric acid.

Step 1 Magnesium and dilute hydrochloric acid are reacted together until no more magnesium reacts.	**Step 2** The reaction mixture is separated to give magnesium chloride solution.	**Step 3** Magnesium chloride solution is heated.
		

(a) A gas is made during this reaction.

What is the name of this gas?

..... [1]

(b) Step **2** separates the magnesium chloride solution from unreacted magnesium metal.

What is the name of this process?

..... [1]

(c) Step **3** removes some of the water by heating the magnesium chloride solution.

What is the name of this process?

..... [1]

(d) Aiko also reacts zinc oxide with dilute sulfuric acid.

Zinc sulfate and water are made.

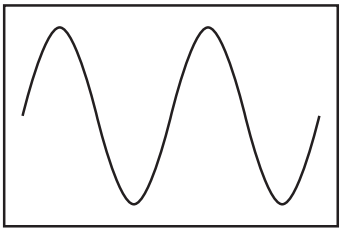
Write the **word** equation for this reaction.

..... [1]

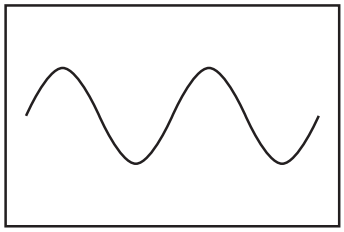
9 Jamila makes **five** sounds.

She looks at the trace each sound makes on an oscilloscope.

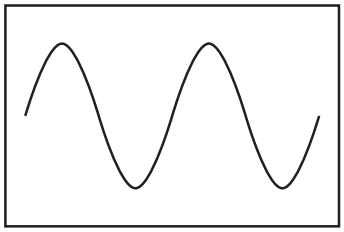
The traces are labelled **A**, **B**, **C**, **D** and **E**.



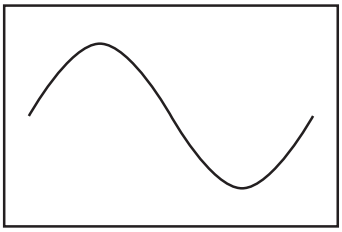
B



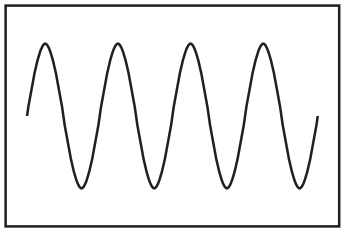
C



A



D



E

Look at trace **A**.

Complete the sentences.

Choose from **B**, **C**, **D** or **E**.

(a) Which sound is louder than **A**? ..... [1]

(b) Which sound has a higher frequency than **A**? ..... [1]

(c) Which **two** sounds have a different pitch to **A**?

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

(d) Which sound has a lower amplitude than **A**? ..... [1]

10 Hassan investigates the reaction between 0.5 g of sodium carbonate and 20 cm^3 of dilute hydrochloric acid.

Hassan:

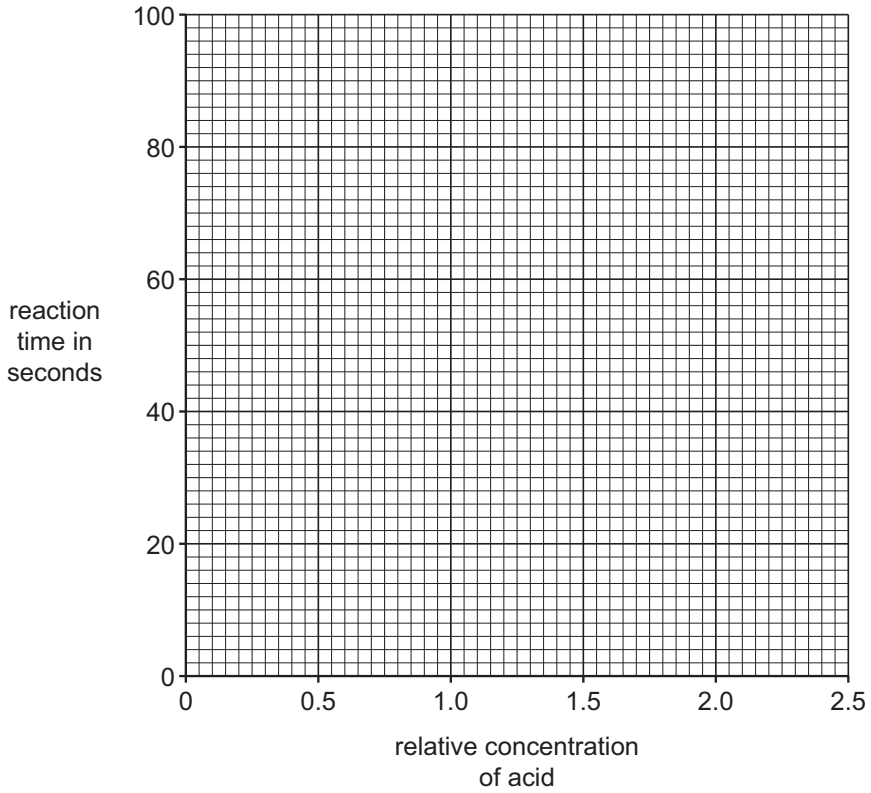
- measures the reaction time (the time it takes for the reaction to stop)
- does five different experiments
- uses a different concentration of acid in each experiment
- keeps the temperature the same in each experiment.

Look at the table of his results.

relative concentration of acid	reaction time in seconds
0.5	68
1.0	40
1.5	24
2.0	14
2.5	10

(a) Plot Hassan's results on the grid.

Draw the curve of best fit through the points.



[2]

(b) Describe the trend shown by these results.

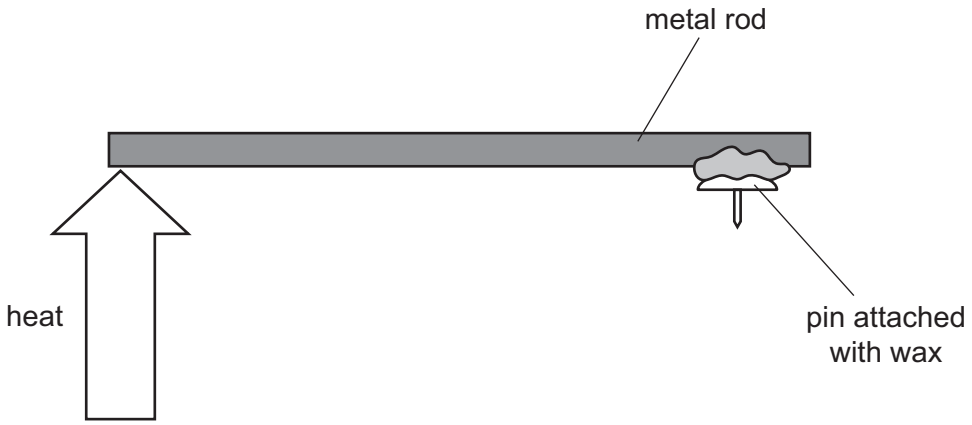
.....

..... [1]

11 Oliver investigates conduction of thermal (heat) energy.

He heats a metal rod.

The metal rod has a pin attached with wax.



Oliver measures the time it takes before the pin falls off the rod.

The pin takes 45 seconds before it falls.

(a) Describe how Oliver makes his result more reliable.

.....

[1]

(b) Oliver does a risk assessment for his investigation.

He considers the safety hazards.

Describe **two** of the safety hazards in Oliver's investigation.

1 .....

2 .....

[2]

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9		**Key** atomic number atomic symbol name relative atomic mass									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 A*l* aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 C*l* 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 T*l* 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 F*l* flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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 –

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).