



# Science

Stage 9

Paper 1

**2024**

## Cambridge Lower Secondary Progression Test

Name

Class

Date

**45 minutes**

No additional materials are needed.

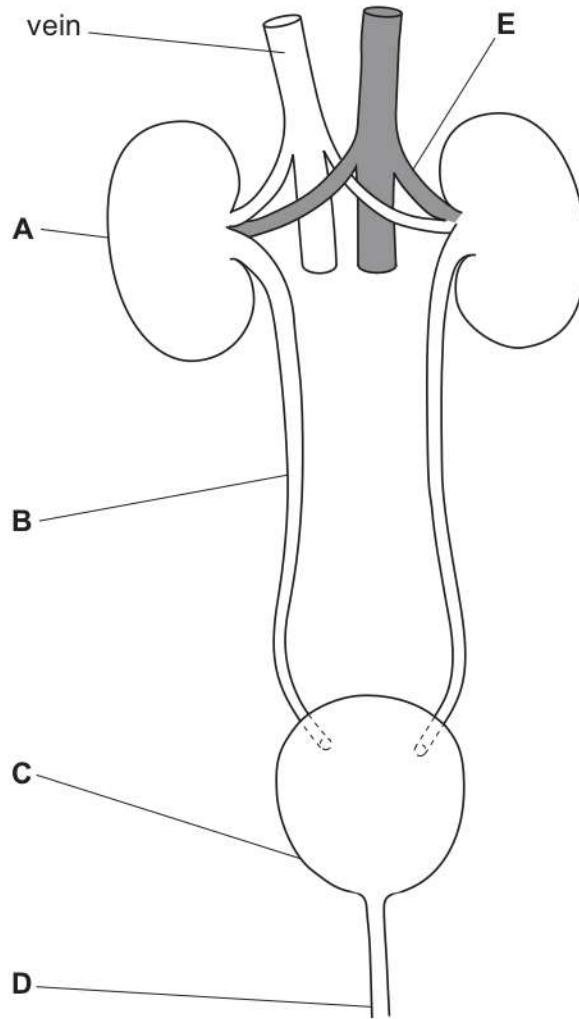
### INSTRUCTIONS

- 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 Look at the diagram of the human excretory (renal) system.



(a) Complete the table to name the parts labelled **A**, **B**, **C**, **D** and **E**.

part	name of part
<b>A</b>	.....
<b>B</b>	.....
<b>C</b>	.....
<b>D</b>	.....
<b>E</b>	.....

[3]

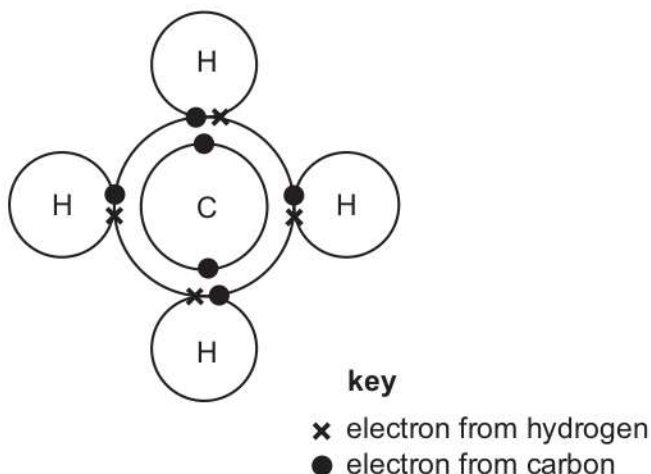
(b) Urea ammonium nitrate is an organic fertiliser.

What do plants make using nitrates?

..... [1]

2 Methane has a simple structure.

Look at the model of a molecule of methane.



(a) How many electrons are in a molecule of methane?

..... [1]

(b) Write down the type of bonding in a molecule of methane.

Explain your answer.

type of bonding .....

explanation .....

.....

[2]

(c) Methane has a simple structure.

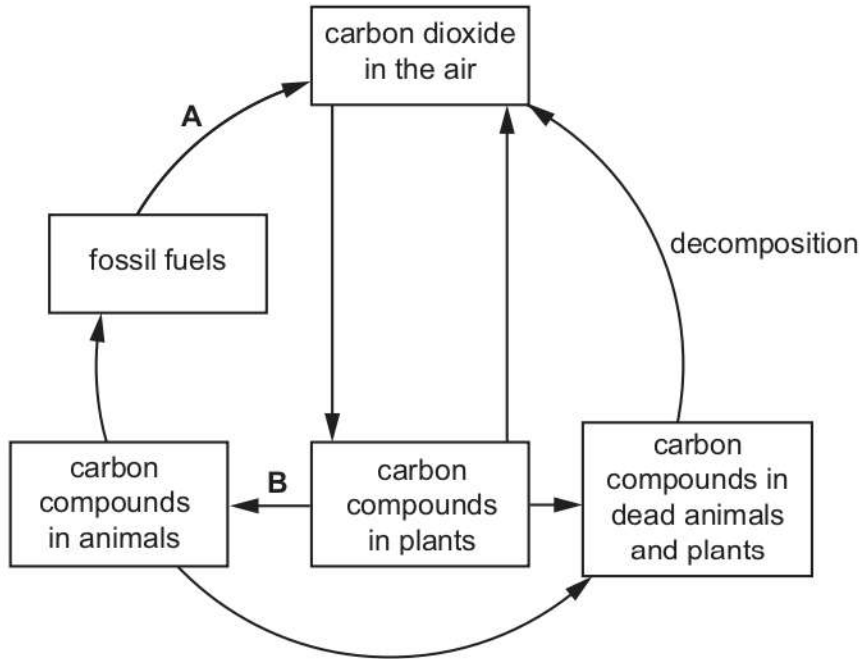
Predict **one physical** property of methane.

..... [1]

- 3 Jamila spills some liquid on the back of her hand.  
After a short time, Jamila's hand feels cold.  
Name the process that makes her hand feel cold.

..... [1]

- 4 Look at the diagram of part of the carbon cycle.



- (a) One of the arrows in the diagram shows photosynthesis.

Write the letter **P** on the arrow that shows photosynthesis.

[1]

- (b) Name process **A** and process **B**.

process **A** .....

process **B** .....

[2]

5 Lily reacts magnesium with copper sulfate solution.

(a) Name this type of reaction.

..... [1]

(b) Name the **two** products of this reaction.

..... and ..... [2]

(c) Lily adds zinc to magnesium sulfate solution.

There is **no** reaction.

Explain why there is **no** reaction.

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

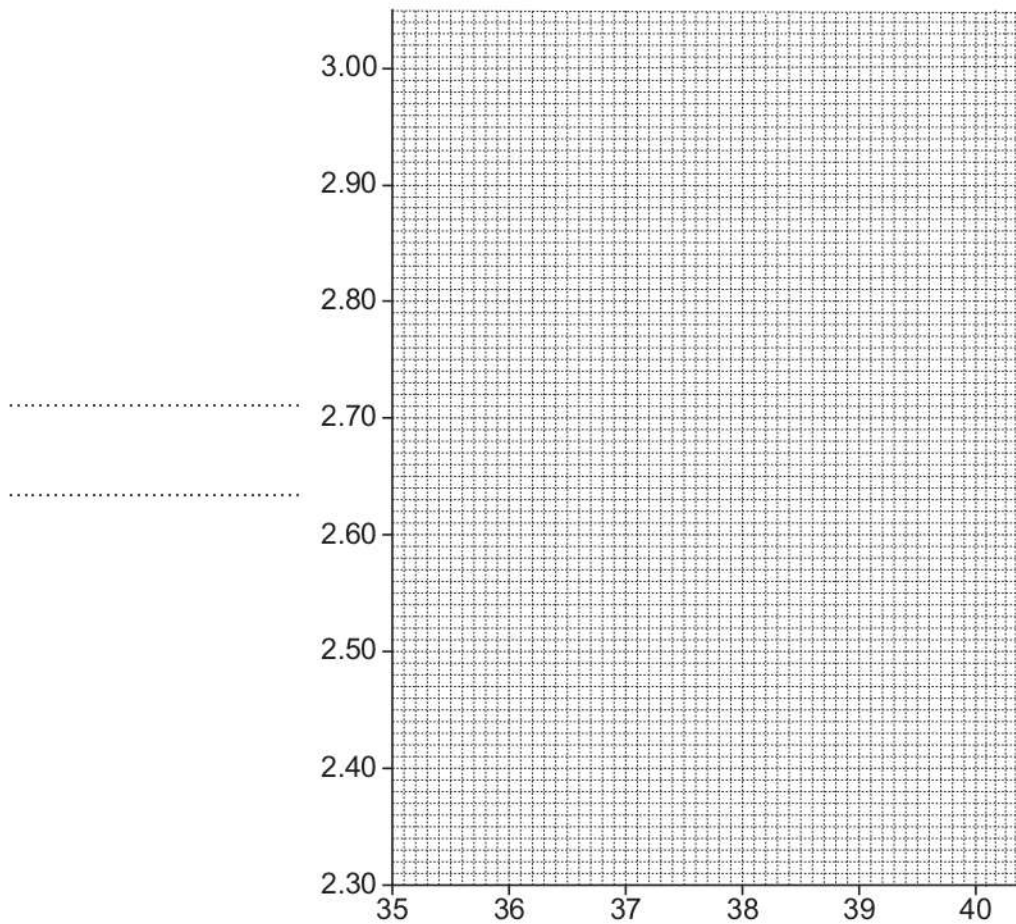
6 Fetal development is affected by the health of the mother.

The table shows information about the mass of a fetus during pregnancy for a mother who smokes.

age of the fetus in weeks	mass of the fetus in kg
36	2.40
37	2.55
38	2.60
39	2.85
40	3.00

(a) Draw the graph of this information:

- label the  $x$ -axis
- label the  $y$ -axis
- plot all the points from the table.



[2]

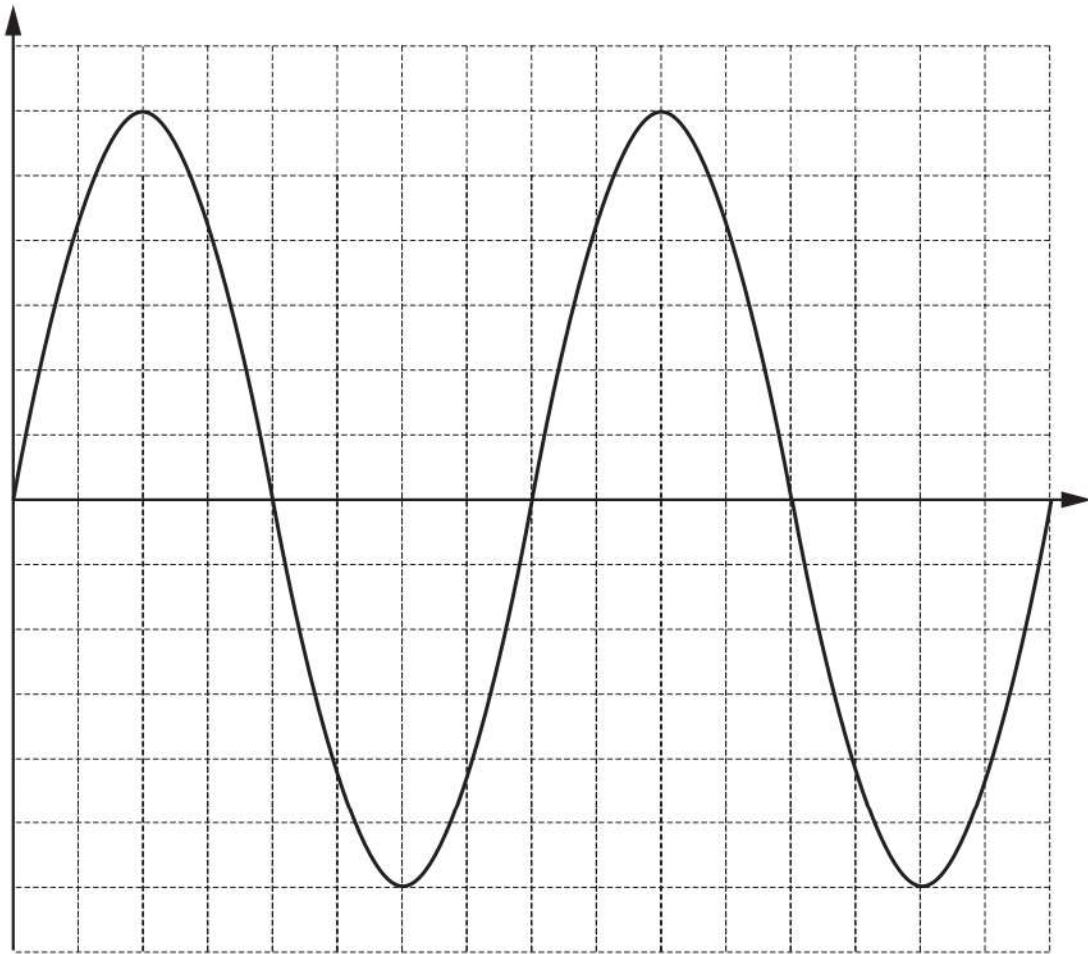
(b) There is **one** anomalous result.

Circle the anomalous result on the graph. [1]

(c) Draw a line of best fit on the graph. [1]

7 This question is about different waveforms and sounds.

(a) Look at the diagram of a waveform.



Draw a double-headed arrow ( $\leftrightarrow$  or  $\updownarrow$ ) on the diagram to show the amplitude of the waveform.

[1]

(b) Aiko hears a high pitch sound and then a low pitch sound.

Write a sentence to compare the frequencies of the two sounds.

.....  
 .....

[1]

(c) Aiko plays a sound on her phone.

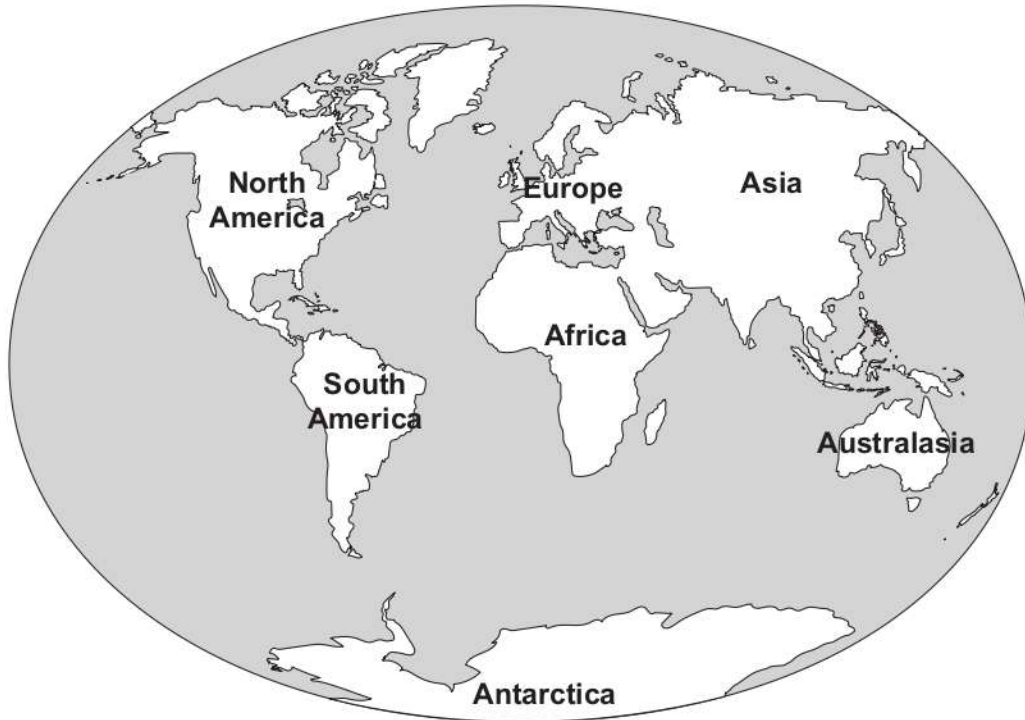
Complete the sentence.

The louder the sound the larger the .....

[1]



8 The map shows the Earth's continents.



Fossils of a plant species that grew 200 million years ago have been found in South America, Africa, Antarctica and Australasia.

Explain why fossils of this plant species are found on these four continents.

.....

.....

.....

..... [2]

9 Water travels through plants.

Look at the list of parts of a plant.

- A leaf xylem
- B stem xylem
- C stoma on the surface of leaf
- D root hair cell
- E root xylem

Write down parts **A** to **E** in the correct order to show the pathway of water through a plant.

One has been done for you.

.....	.....	<b>B</b>	.....	.....
-------	-------	----------	-------	-------

[2]

10 The table shows the melting points and boiling points of some Group 1 elements.

element	melting point in °C	boiling point in °C
lithium	181	1347
sodium		881
potassium	63	766
rubidium	39	688

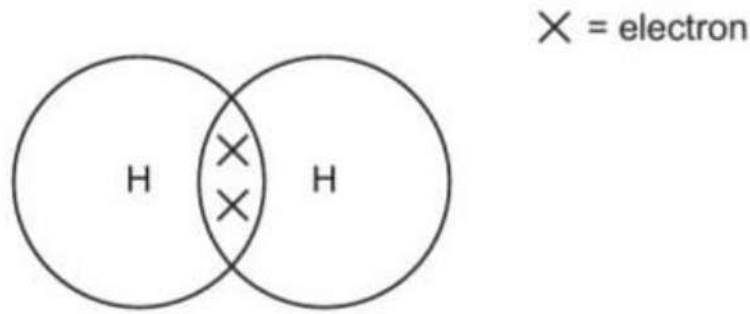
(a) Describe the trend in the boiling point from the top to the bottom of Group 1.

..... [1]

(b) Predict the melting point of sodium.

..... °C [1]

11. The diagram shows a model of a hydrogen molecule.



a. Name the type of bonding in a hydrogen molecule.

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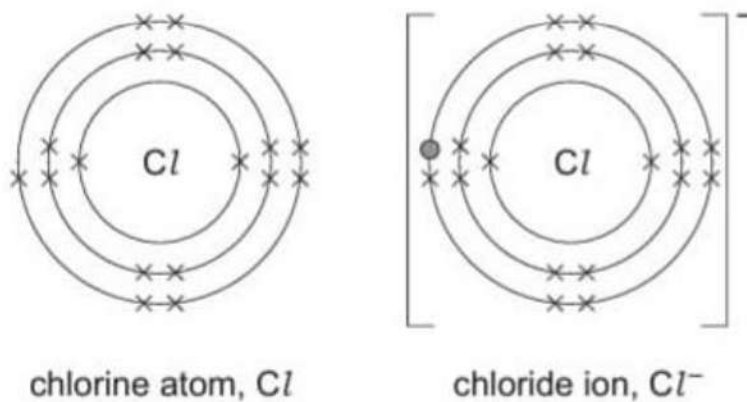
Explain how you can tell from the diagram.

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[2]

b. Look at the diagrams showing a chlorine atom and a chloride ion.



Describe how a chloride ion is made from a chlorine atom.

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[1]

c. Sodium chloride, NaCl, is made up of sodium ions, Na<sup>+</sup>, and chloride ions, Cl<sup>-</sup>.

Explain how the ions in sodium chloride are held together.

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[1]

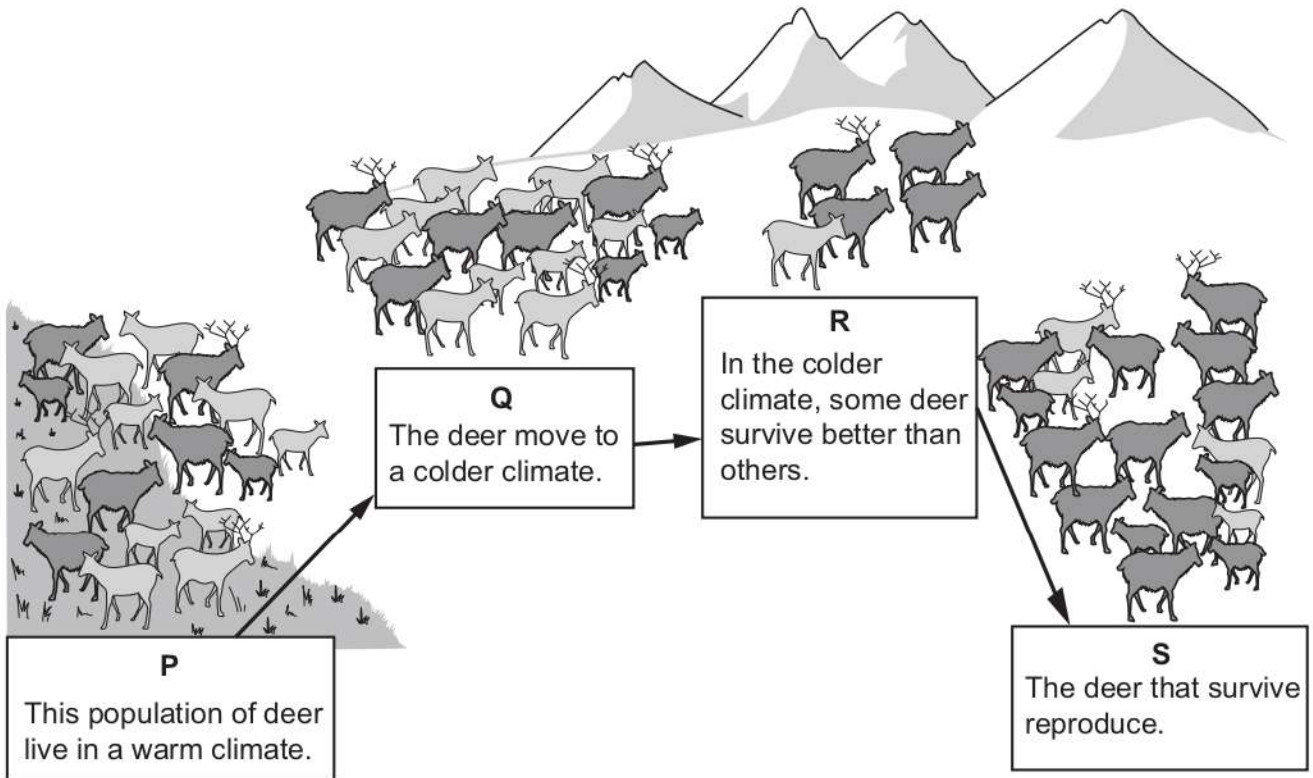
12 Complete the sentences about nebulae.

Nebulae are enormous clouds of ..... and .....

Some nebulae act as stellar nurseries for new .....

[3]

13 The diagram shows how the appearance of a deer population changes over time.



(a) Look at the diagram.

The deer show variation.

Describe **one** example of variation shown in the diagram.

..... [1]

(b) The appearance of the deer population changes over time from **P** to **S**.

The theory of natural selection explains this change in appearance.

Match each **statement about natural selection** to the correct **letter** in the diagram.

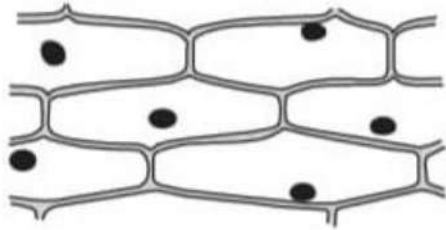
You may use each letter once, more than once or not at all.

statement about natural selection	letter
Some adaptations give advantages in one environment and <b>not</b> in another.	.....
Genes controlling features which help survival pass into offspring.	.....
Individuals with adaptations less advantageous to the environment die before they reproduce.	.....

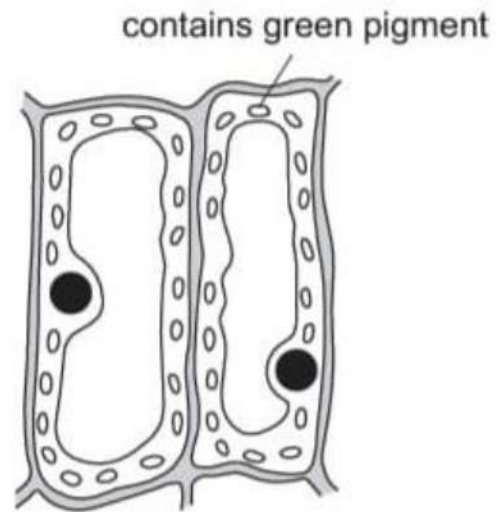
[2]

14. This is a question about photosynthesis and plant minerals.

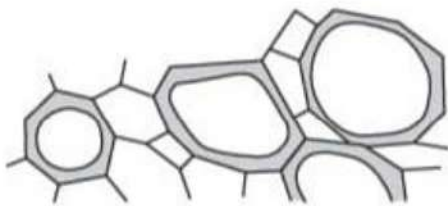
a. Look at the diagrams of different plant cells.



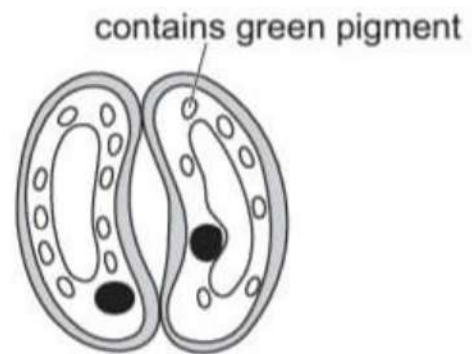
**A** onion epidermal cells



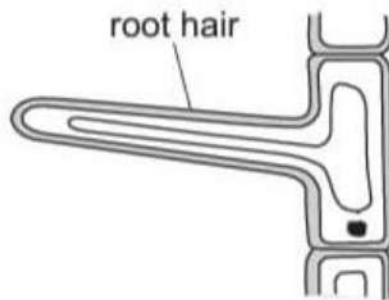
**B** palisade cells



**C** cells found in xylem



**D** guard cells



**E** epidermal cell in the root

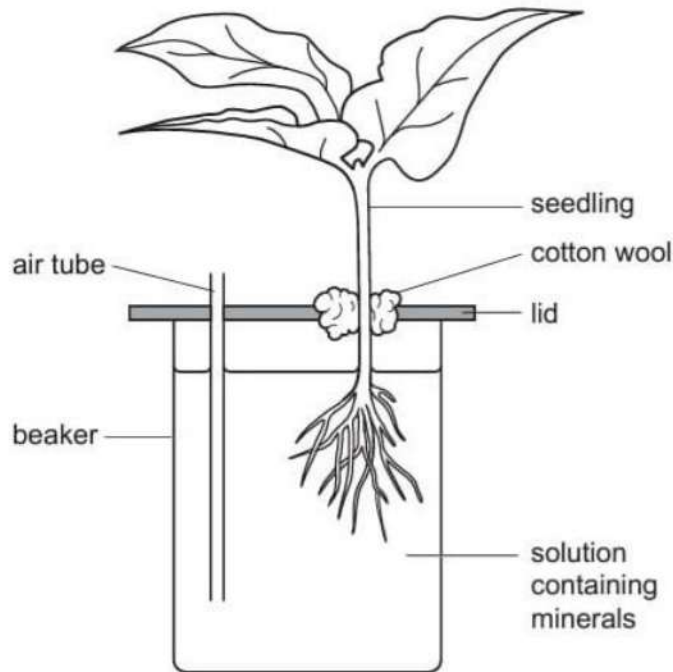
Which two diagrams show plant cells that photosynthesise?

Choose from A, B, C, D and E.

\_\_\_\_\_ and \_\_\_\_\_

[2]

- b. Carlos investigates the effect of magnesium on plant growth.  
Carlos makes a hypothesis about the effect of magnesium on plant growth.  
He uses the equipment in the diagram.



In his first experiment Carlos:

- fills a beaker with a solution containing all the minerals needed for healthy growth
- assembles the equipment and seedling as shown in the diagram
- records the appearance of the seedling after four weeks.

Carlos repeats the experiment.

In his second experiment, he uses a solution that contains all the minerals needed for healthy growth except magnesium.

1. Carlos makes a hypothesis about the effect of magnesium on plant growth.

Suggest a suitable hypothesis.

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[1]

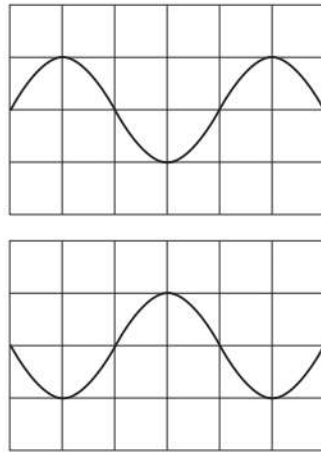
2. In his first experiment, Carlos uses a solution with all the minerals needed for healthy growth. Explain why this is important.

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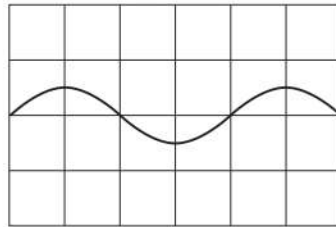
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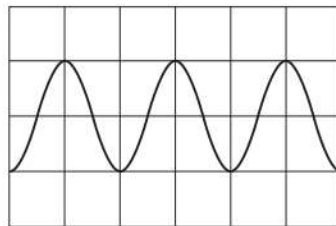
[1]

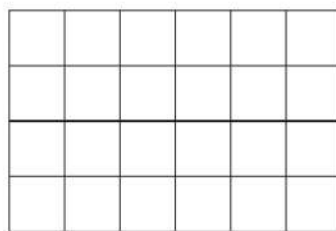
15 Look at the diagram of two waveforms.

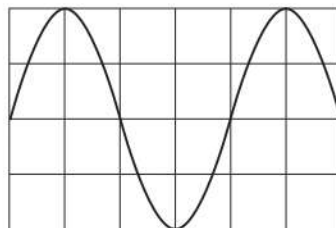


Tick (✓) the box which shows what happens when these two waveforms interact.










[1]



**16** This question is about the impact of climate change.

Write down **two** impacts of climate change.

1 .....

2 .....

[2]

17 This question is about floating and sinking.

(a) Look at the table of densities for different materials.

material	density in $\text{kg/m}^3$
concrete	2400
iron	7000
plastic	920
water	1000
wood	600

Which materials from the table float in water?

Explain your answer.

materials .....

explanation .....

.....

.....

[2]

(b) An object sinks in water but floats in sea water.

Predict a value for the density of sea water.

Circle the correct answer.

**100  $\text{kg/m}^3$**

**900  $\text{kg/m}^3$**

**1000  $\text{kg/m}^3$**

**1030  $\text{kg/m}^3$**

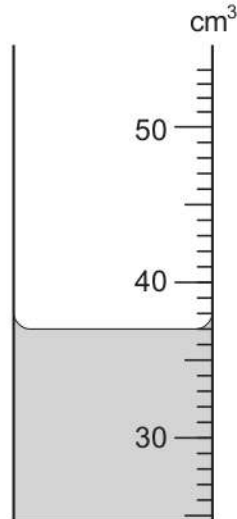
[1]

(c) An object is put into a container full of water.

The object floats and a volume of water comes out of the container.

The water is collected in a 100 cm<sup>3</sup> measuring cylinder.

Look at the diagram of part of the measuring cylinder.



What volume of water is collected?

..... cm<sup>3</sup> [1]

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The Periodic Table of Elements

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

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

lanthanoids

actinoids