



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/11

October/November 2015

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

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Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

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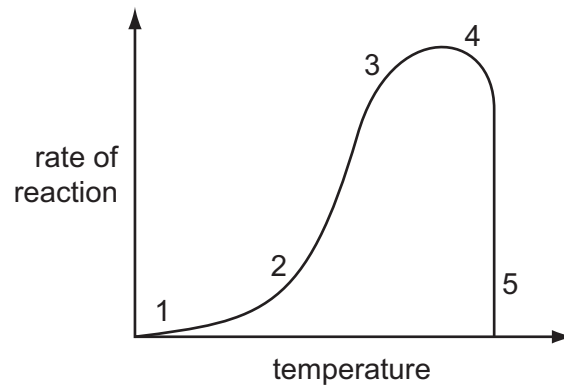
A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **16** printed pages.



- 1 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A** 1 **B** 2 and 3 **C** 3 and 4 **D** 5
- 2 Which statement describes nutrition and respiration in plants?
- A** Plants respire only when they are not undergoing nutrition.
B Plants respire using a process called photosynthesis.
C Plants undergo nutrition and respiration at the same time.
D Plants undergo nutrition only when they are not respiring.
- 3 A careless student has two microscope slides, one of animal cells and one of plant cells. He has lost the labels saying which slide is which.

Which feature in the cells that he can see through the microscope tells him that he is looking at the plant cells?

- A** cells all surrounded by membranes
B cytoplasm with granules in it
C green dots visible inside the cells
D many cells with a noticeable dark dot inside them

- 4 A sample of food is tested with Benedict's solution, biuret solution and iodine solution. The results are shown in the table.

test	final colour after test
Benedict's solution	blue
biuret solution	purple / lilac
iodine solution	blue / black

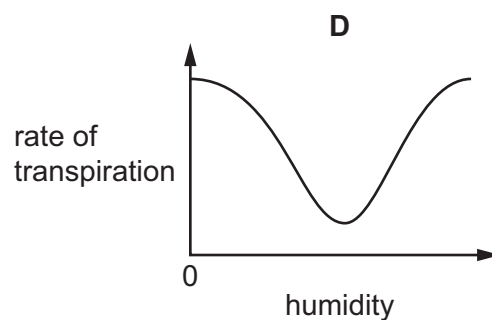
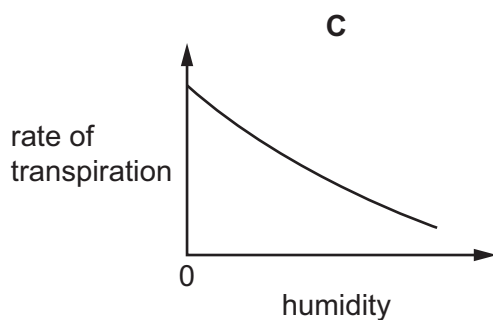
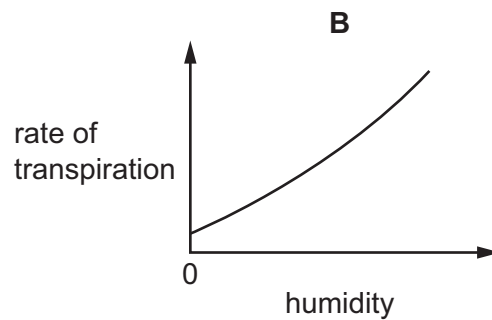
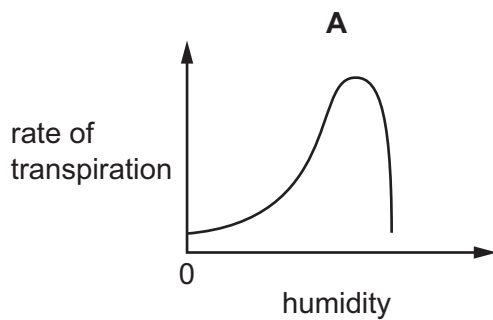
Which substances are present in the food sample tested?

	protein	reducing sugar	starch
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

- 5 Which chemical is produced from digestion of a fat?

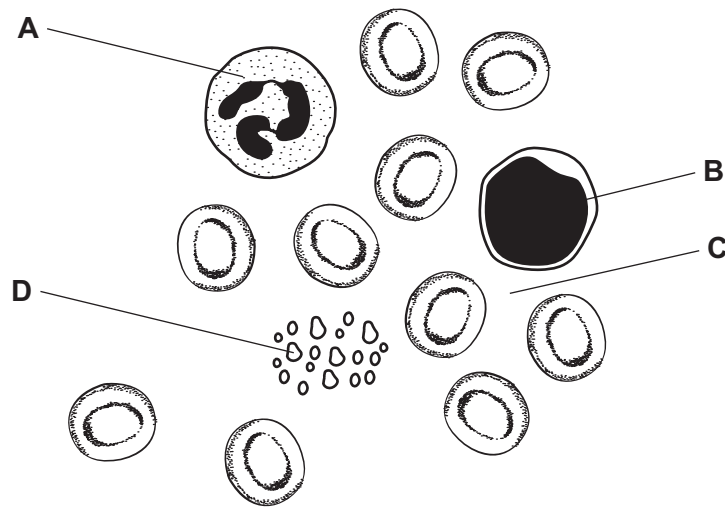
- A** amino acid
- B** glycerol
- C** glycogen
- D** sugar

- 6 Which graph shows how atmospheric humidity affects the rate of transpiration of a green plant?



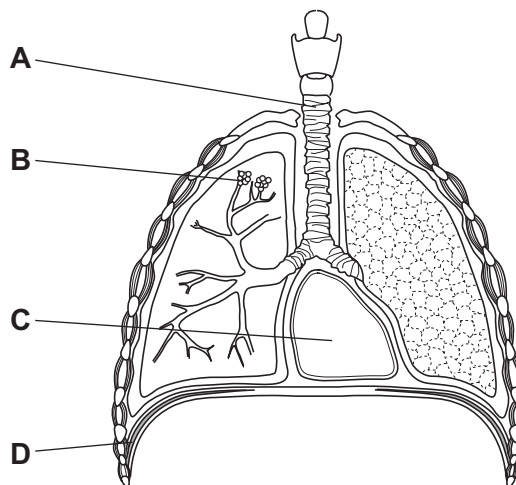
- 7 The drawing shows some blood, as it appears under the microscope.

Which part carries glucose to muscles?



- 8 The diagram shows some structures in the human thorax (chest).

Into which part does carbon dioxide pass immediately after leaving the blood?



- 9 Which row describes the stimulus and response in a plant process?

	name of process	stimulus	plant response
A	geotropism	gravity	root grows down
B	geotropism	light	shoot grows up
C	phototropism	gravity	shoot grows down
D	phototropism	light	root grows up

10 Which row is correct for the hormone adrenaline?

	effect on blood glucose concentration	effect on the pulse rate	organ where adrenaline is destroyed
A	lowered	decreased	kidney
B	lowered	decreased	liver
C	raised	increased	kidney
D	raised	increased	liver

11 Which structure in a flower produces pollen?

- A** sepal
- B** stamen
- C** stigma
- D** style

12 Where in the female human reproductive system is the hormone oestrogen produced?

- A** cervix
- B** ovary
- C** uterus
- D** vagina

13 Fresh sewage runs into a river. Why does this reduce the fish population in the river?

- A** It brings organisms that feed on fish.
- B** It carries bacteria that reduce oxygen concentration.
- C** It decreases the growth of algae.
- D** It makes the water too cloudy for fish to see.

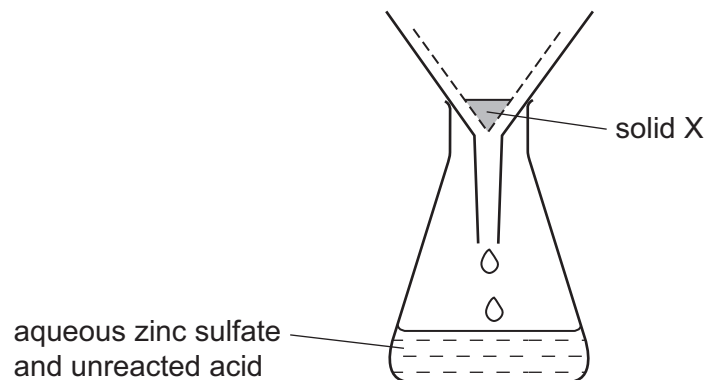
14 Which statement about atoms and molecules is correct?

- A** Atoms gain or lose electrons to become molecules.
- B** Atoms of the same element contain the same number of molecules.
- C** Molecules are the simplest unit of an atom.
- D** Molecules contain atoms which are covalently bonded.

- 15** In an experiment, a mixture of 0.5 g of copper and 3 g of zinc is added to an excess of dilute sulfuric acid.

The copper acts as a catalyst.

After all the zinc has dissolved, the resulting mixture is filtered.



What is solid X and what is its mass?

	solid X	mass of pure X
A	copper	less than 0.5 g
B	copper	0.5 g
C	copper(II) oxide	0.5 g
D	copper(II) oxide	greater than 0.5 g

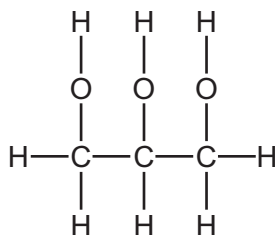
- 16** Element Y has a proton number of 18 and a nucleon number of 40.

Which statements about element Y are correct?

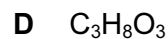
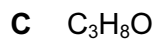
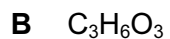
- 1 It has 40 neutrons in its nucleus.
- 2 It has 22 electrons.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

- A** 1 and 2 **B** 2 and 3 **C** 2 and 4 **D** 3 and 4

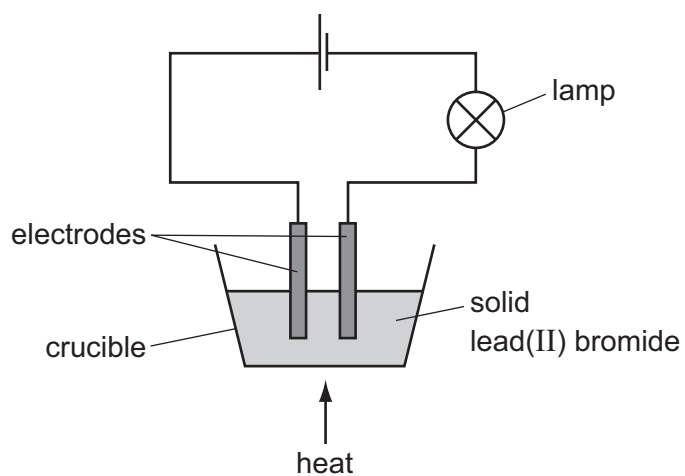
17 The structure of a compound is shown.



What is the formula of this compound?



18 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

Why is heat needed?

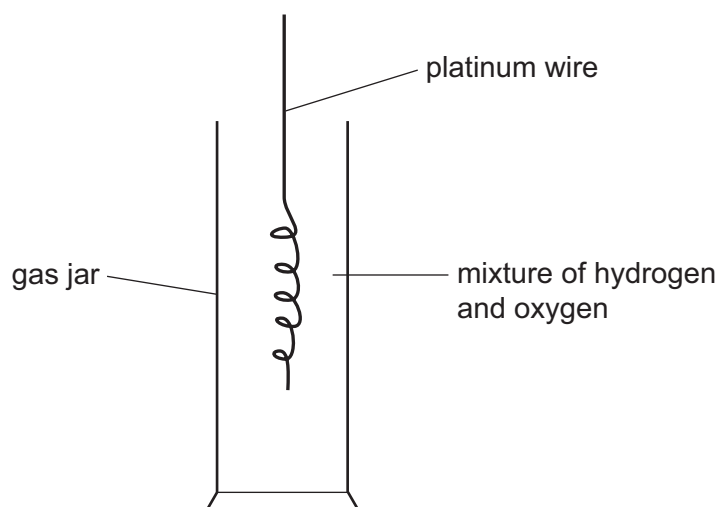
A An exothermic reaction takes place in the crucible.

B Electrodes only conduct electricity when hot.

C Heat causes the lead(II) bromide to react with air.

D The lead(II) bromide must be molten.

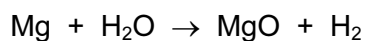
- 19 The diagram shows a platinum wire being used to catalyse the reaction between hydrogen and oxygen.



An explosive squeak is heard.

Which statement is correct?

- A An acidic gas is formed.
 - B Energy is released.
 - C Hydrogen is reduced.
 - D Platinum is oxidised.
- 20 Magnesium reacts with steam to form magnesium oxide and hydrogen gas.



Which statement is correct?

- A Hydrogen gas is reduced.
- B Magnesium is oxidised.
- C Magnesium is reduced.
- D Water is oxidised.

- A solution of compound X reacts with sodium hydroxide solution to form a pale blue precipitate.

A copper(II) carbonate

B copper(II) chloride

C iron(II) carbonate

D iron(II) chloride

- The gas ignites with a pop when tested with a lighted splint.

A copper

B copper(II) oxide

C magnesium

D magnesium carbonate

- Which element has a high melting point and forms coloured compounds?

A blank periodic table grid is shown. The grid is composed of squares representing elements. The first two columns are labeled C and D at the bottom. The first two rows are labeled A and B at the bottom. The grid is divided into four main sections: a small section on the far left (columns C and D, rows A and B), a large central section (columns 3-10, rows A and B), a small section on the far right (columns 11-12, rows A and B), and a single square at the top right (column 13, row B).

- Which trend is observed going down Group VII?

A Each element has the same physical state.

B The colour of the element becomes lighter.

C The reactivity of the element decreases.

D The state of the element changes from solid to liquid to gas.

25 Which element is less reactive than hydrogen?

- A** copper
- B** iron
- C** magnesium
- D** zinc

26 What are the approximate percentages by volume of nitrogen and oxygen in clean air?

	nitrogen	oxygen
A	1	99
B	20	80
C	80	20
D	99	1

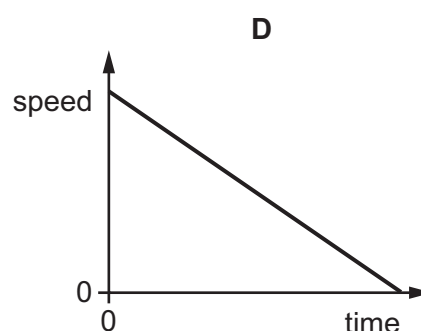
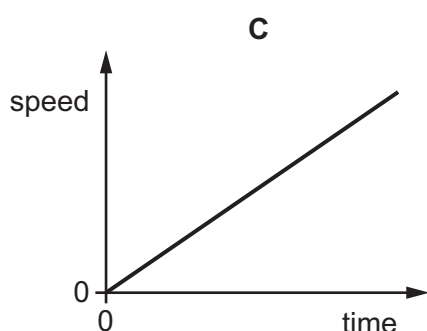
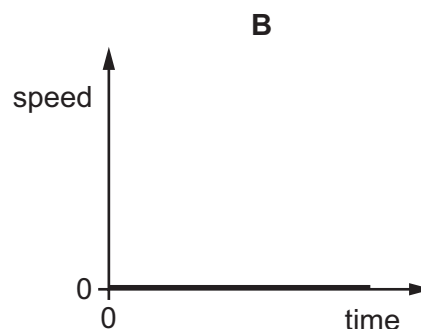
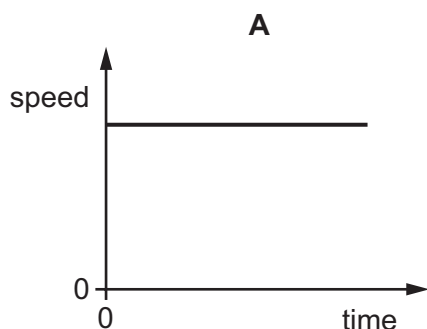
27 Petroleum is a mixture of hydrocarbons.

Which method is used to separate these hydrocarbons?

- A** crystallisation
- B** distillation
- C** filtration
- D** fractional distillation

28 A car is moving downhill along a road at a constant speed.

Which graph is the speed/time graph for the car?



29 Which statement about mass and weight is correct?

- A** Mass and weight are both forces.
- B** Mass is a force and weight is not.
- C** Neither mass nor weight is a force.
- D** Weight is a force and mass is not.

30 An object has a mass of 75 g and a volume of 15 cm³.

What is its density?

- A** 0.20 g/cm³
- B** 5.0 g/cm³
- C** 60 g/cm³
- D** 90 g/cm³

31 What is the unit for work and what is the unit for power?

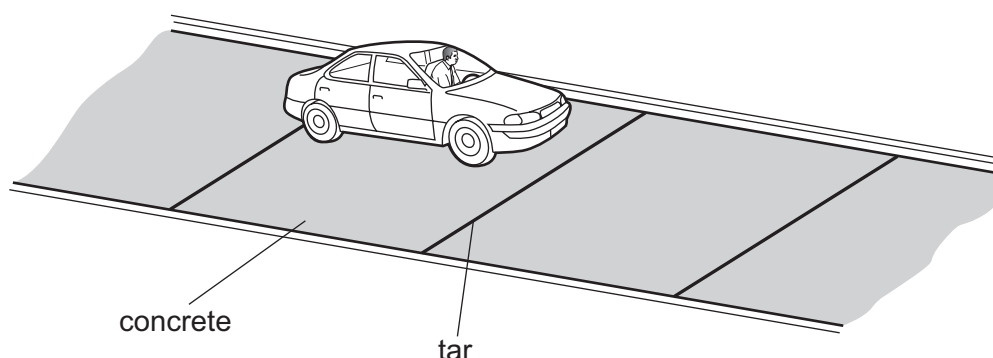
	work	power
A	J	N
B	J	W
C	N	W
D	W	J

- 32 Which energy change takes place when a block of wood slows down as it slides across a rough horizontal table?
- A chemical energy to kinetic energy
 - B gravitational energy to kinetic energy
 - C gravitational energy to thermal energy
 - D kinetic energy to thermal energy
- 33 A beaker of water is at room temperature. Some of the water changes from a liquid into a gas. As a result, the temperature of the remaining water changes.

What is the name for this change of state and how does the temperature change?

	change of state	how temperature changes
A	condensation	decreases
B	condensation	increases
C	evaporation	decreases
D	evaporation	increases

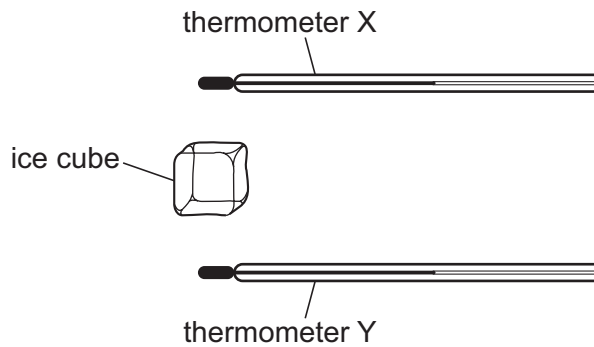
- 34 Concrete roads are laid in sections and the gaps between sections are filled with soft tar.



Why is this done?

- A to allow for expansion and contraction of the concrete
- B to allow the tar to radiate heat from the road
- C to increase the density of the concrete used
- D to reduce the mass of concrete used

- 35 Thermometer X is held above an ice cube and thermometer Y is held an equal distance below the ice cube. After several minutes, the reading on one thermometer changes. The ice cube has not melted.

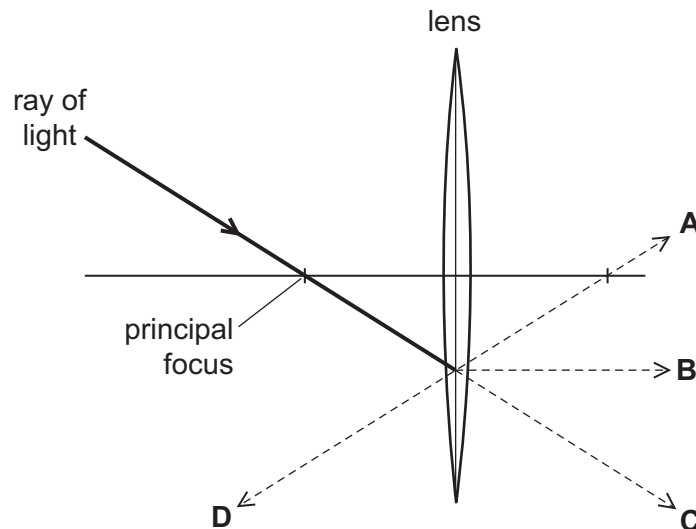


The reading of which thermometer changes, and why?

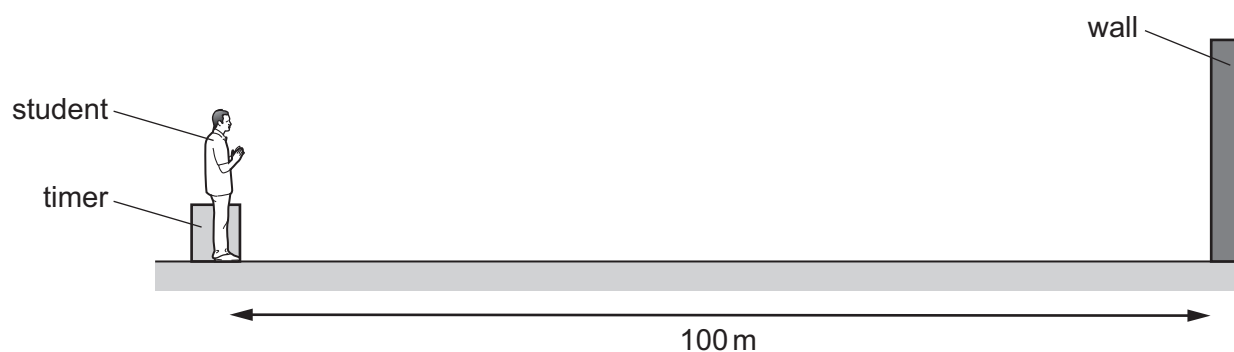
	thermometer	reason
A	X	cool air rises from the ice cube
B	X	warm air rises from the ice cube
C	Y	cool air falls from the ice cube
D	Y	warm air falls from the ice cube

- 36 The diagram shows the path of a ray of light passing through a principal focus of a lens.

Which labelled line shows the direction of the ray after it leaves the lens?



- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.

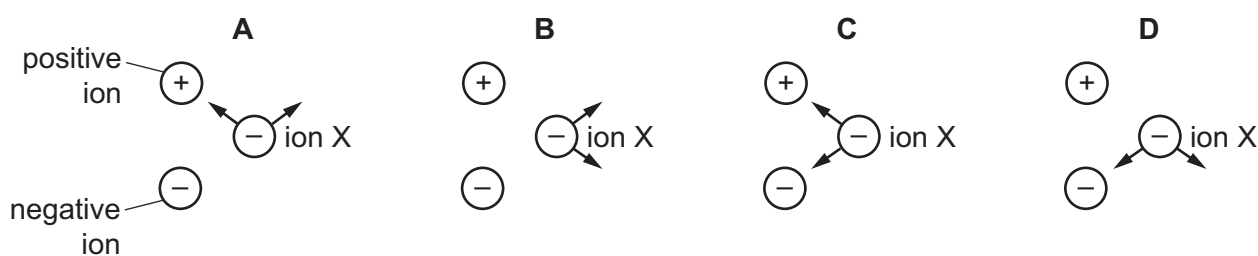


An electronic timer detects the echo of the sound 0.60 s after it is made.

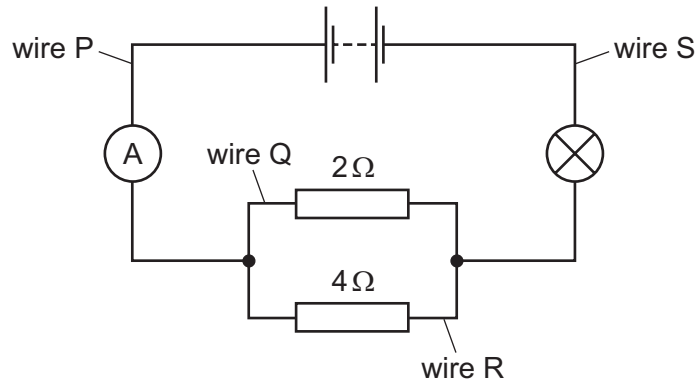
Which calculation should the student use to determine the speed of sound?

- A $\frac{100}{0.60}$ m/s B $\frac{100}{1.2}$ m/s C $\frac{200}{0.30}$ m/s D $\frac{200}{0.60}$ m/s
- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?

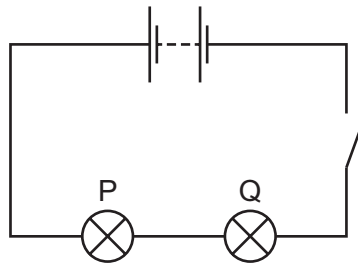


- 39 The circuit diagram includes two resistors connected in parallel.



Which statement is correct?

- A The current in wire P is equal to the current in wire Q.
 - B The current in wire P is greater than the current in wire R.
 - C The current in wire Q is greater than the current in wire S.
 - D The current in wire R is equal to the current in wire S.
- 40 Two identical lamps P and Q are connected in a circuit as shown in the diagram.



The circuit is now switched on.

Which statement is correct?

- A Each lamp can be switched off independently.
- B If lamp Q breaks, lamp P stays alight.
- C Lamp P is brighter than lamp Q.
- D The current is the same in both lamps.

DATA SHEET
The Periodic Table of the Elements

Group																							
I	II											III	IV	V	VI	VII	0						
												1 H Hydrogen 1											
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5						12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13						28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36						
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	101 Rh Rhodium 45	103 Pd Palladium 46	106 Ag Silver 47	108 Cd Cadmium 48	112 In Indium 49	115 Sn Tin 50	119 Sb Antimony 51	122 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54							
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	222 Rn Radon 86							
223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																					
58-71 Lanthanoid series																							
90-103 Actinoid series																							
a = relative atomic mass																							
X = atomic symbol																							
b = proton (atomic) number																							
Key	X	a																					

Key

a	X	a = relative atomic mass
b	X	X = atomic symbol
	b	b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



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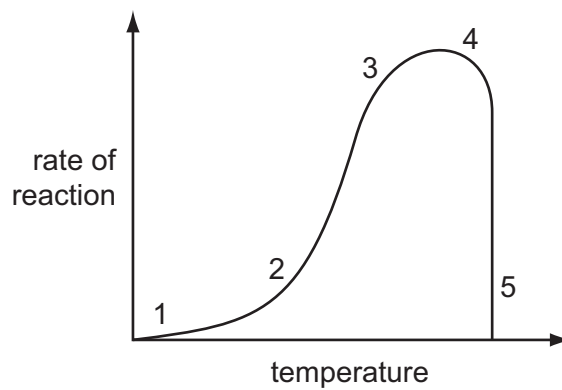
1 Which is a characteristic of all living organisms?

- A breathing
- B eating
- C egestion
- D movement

2 Which process depends on diffusion?

- A circulation
- B digestion
- C gaseous exchange
- D phagocytosis

3 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A 1
- B 2 and 3
- C 3 and 4
- D 5

4 What is the main use in the human body of carbohydrate?

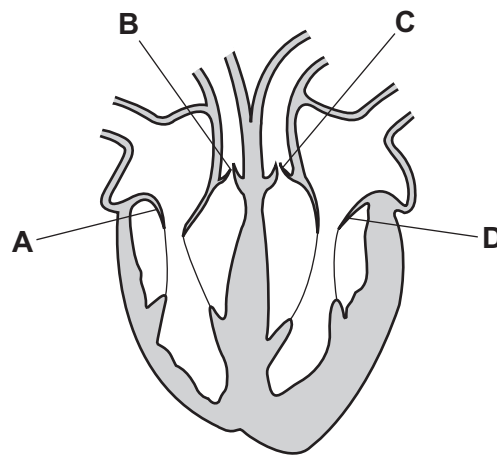
- A insulating against cold
- B making growth possible
- C providing energy
- D rebuilding damaged tissues

- 5 Which mineral salt and which vitamin does a child need to produce strong bones?

	mineral salt	vitamin
A	calcium	C
B	calcium	D
C	iron	C
D	iron	D

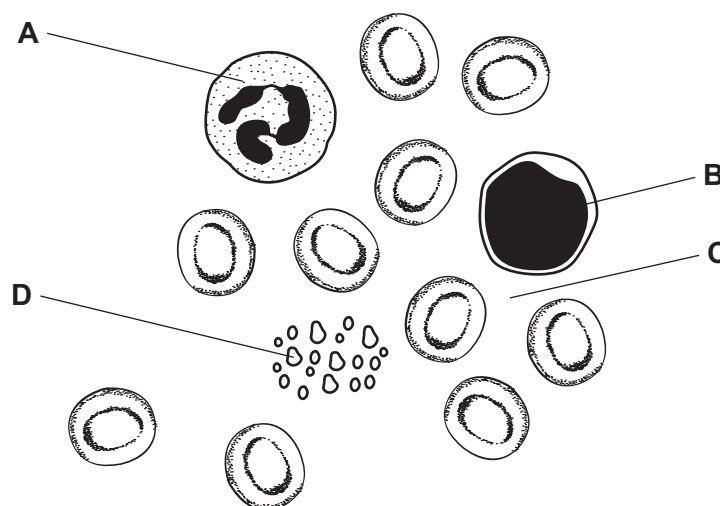
- 6 The diagram shows a section through the heart.

To ensure that blood will flow to the lungs, which valve must be closed?



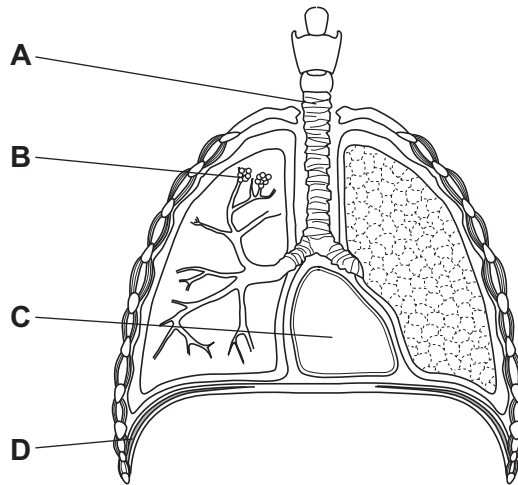
- 7 The drawing shows some blood, as it appears under the microscope.

Which part carries glucose to muscles?

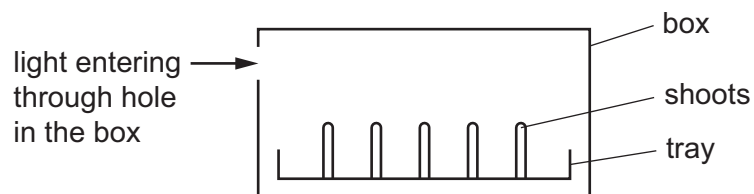


- 8 The diagram shows some structures in the human thorax (chest).

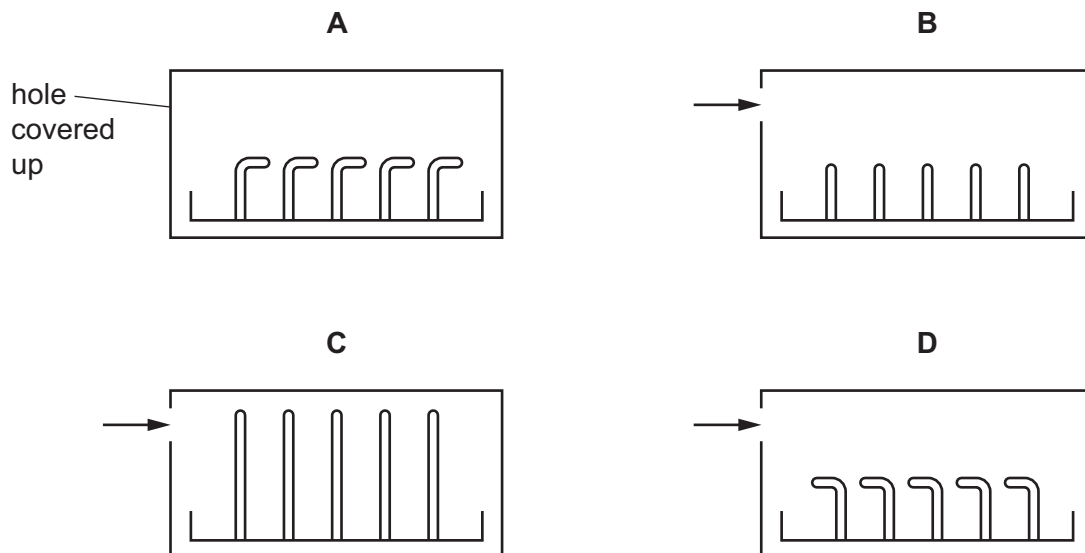
Into which part does carbon dioxide pass immediately after leaving the blood?



- 9 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?



- 10** When an athlete prepares for the start of a sprint race, excitement causes the concentration of a hormone in the blood to increase.

What effects does the hormone have on the blood glucose concentration and the heart rate of the athlete?

	blood glucose concentration	heart rate
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

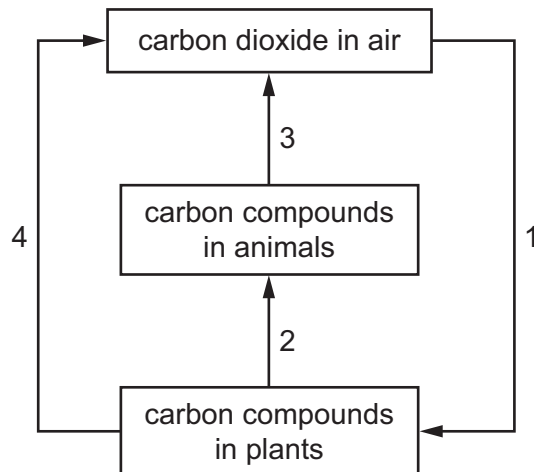
- 11** Which structure in a flower produces pollen?

- A** sepal
- B** stamen
- C** stigma
- D** style

- 12** When does the development of a baby begin?

- A** ejaculation of semen
- B** fertilisation of the ovum
- C** implantation in the wall of the uterus
- D** start of the mother's menstrual cycle

13 The diagram shows part of the carbon cycle.

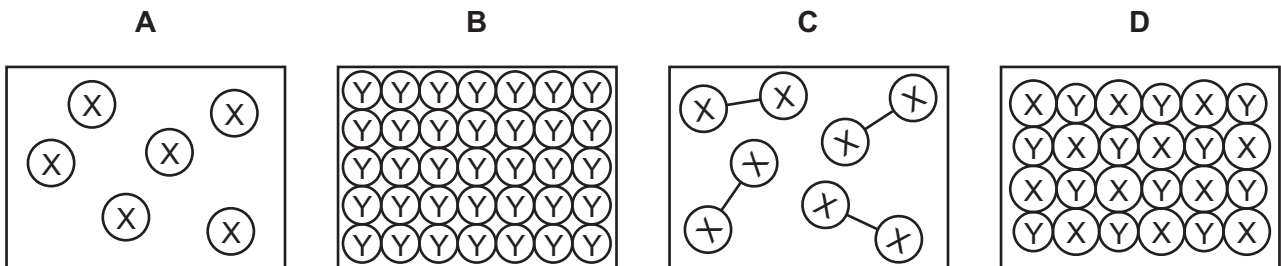


Where does respiration occur?

- A** 1 only **B** 2 and 3 **C** 3 and 4 **D** 3 only

14 (X) and (Y) represent atoms of two different elements.

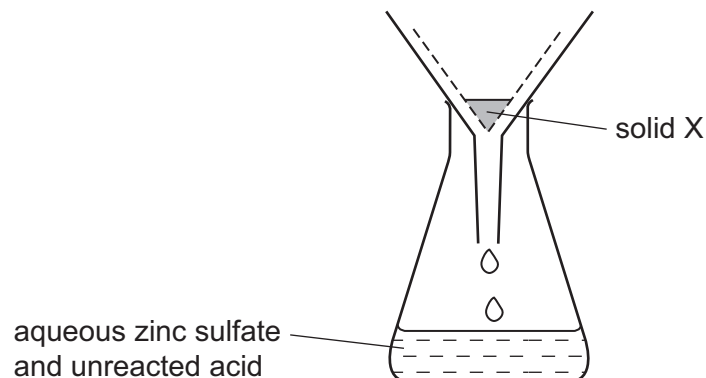
Which diagram represents molecules?



- 15** In an experiment, a mixture of 0.5 g of copper and 3 g of zinc is added to an excess of dilute sulfuric acid.

The copper acts as a catalyst.

After all the zinc has dissolved, the resulting mixture is filtered.



What is solid X and what is its mass?

	solid X	mass of pure X
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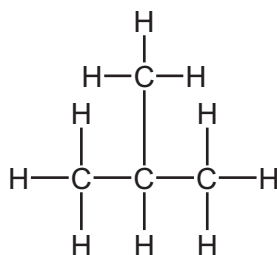
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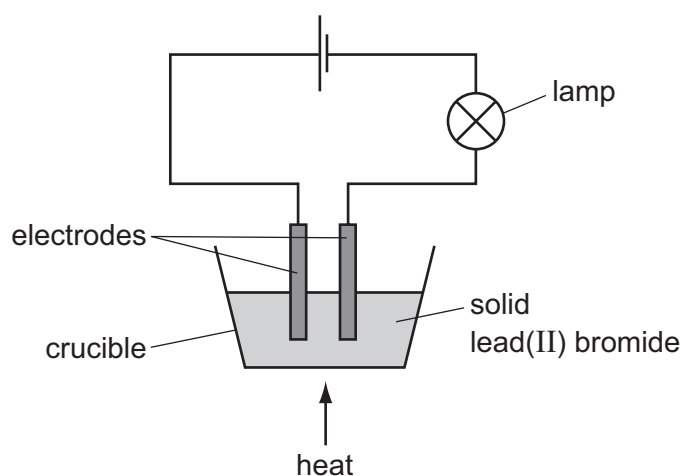
17 The structure of a hydrocarbon is shown.



What is the formula of the hydrocarbon?

- A** C_2H_5 **B** C_3H_8 **C** C_4H_9 **D** C_4H_{10}

18 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

Why is heat needed?

- A** An exothermic reaction takes place in the crucible.
B Electrodes only conduct electricity when hot.
C Heat causes the lead(II) bromide to react with air.
D The lead(II) bromide must be molten.

- 19 Four different solids are added to water. The initial and final temperatures are recorded.

Which change is the **most** exothermic?

	initial temperature /°C	final temperature /°C
A	19	30
B	20	25
C	22	18
D	25	14

- 20 Which method **cannot** be used to investigate the rate of a chemical reaction?

- A** Measuring the change in the mass of catalyst.
- B** Measuring the change in the mass of the reaction mixture.
- C** Measuring the time taken for the reaction to complete.
- D** Measuring the volume of gas produced.

- 21 Sulfuric acid reacts with potassium hydroxide.

What are the products of this reaction?

	potassium hydroxide	potassium sulfate	carbon dioxide	water
A	✓	x	✓	✓
B	x	✓	x	✓
C	x	✓	✓	✓
D	x	✓	x	x

key
✓ = yes
x = no

- 22 A substance reacts with dilute acid, producing a gas.

The gas ignites with a pop when tested with a lighted splint.

What is the substance?

- A** copper
- B** copper(II) oxide
- C** magnesium
- D** magnesium carbonate

27 Methane, ethane and propane are all alkanes. Their formulae are shown below.

methane, CH_4

ethane, C_2H_6

propane, C_3H_8

Which statement is **not** correct?

- A All three of these compounds are hydrocarbons.
- B All three of these compounds burn.
- C Methane is the main constituent of natural gas.
- D Propane burns completely to form carbon dioxide and hydrogen.

28 In a race, a car travels 60 times around a 3.6 km track. This takes 2.4 hours.

What is the average speed of the car?

- A 1.5 km/h B 90 km/h C 144 km/h D 216 km/h

29 Which quantity is measured in newtons?

- A density
- B energy
- C potential difference
- D weight

30 A student tries to determine the density of a metal block. First he measures the mass of the block and finds its weight. Next he measures the length of the sides of the block and calculates its volume. Finally he divides the weight by the volume.

The student has made a mistake.

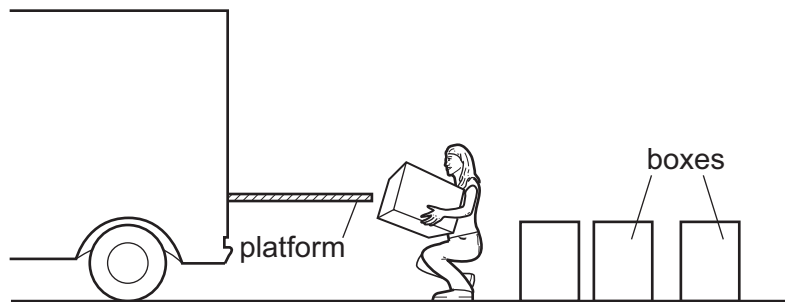
What should he do to determine the density?

- A divide mass by volume
- B divide mass by weight
- C divide volume by mass
- D divide volume by weight

31 What is the unit for work and what is the unit for power?

	work	power
A	J	N
B	J	W
C	N	W
D	W	J

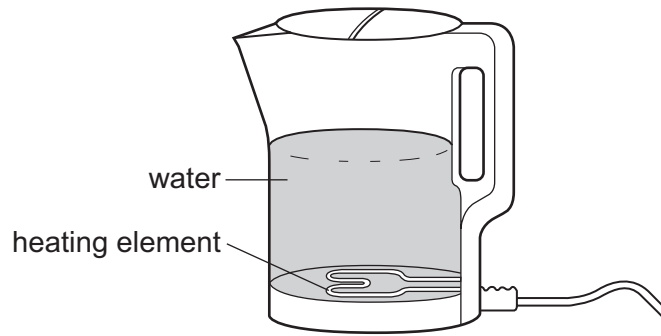
32 A person lifts boxes of equal weight on to a platform.



Which quantity will **not** affect the work done by the person?

- A** the height of the platform above the ground
 - B** the number of boxes lifted
 - C** the time taken to lift the boxes
 - D** the weight of the boxes
- 33 Which statement about the molecules of a gas at 0°C is correct?
- A** They do not move.
 - B** They move about randomly.
 - C** They move around each other in circular orbits.
 - D** They vibrate about fixed positions.

- 34 An electric kettle contains a metal heating element.

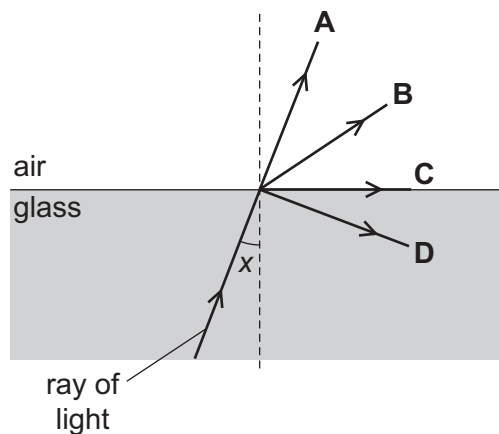


What are the main processes by which heat energy is transferred from the element to the water, and throughout the water?

	heat transfer process	
	element to water	throughout water
A	conduction	convection
B	conduction	radiation
C	convection	radiation
D	radiation	conduction

- 35 A ray of light in glass is incident on a boundary with air.

Which path does the light take when the angle of incidence x is significantly less than the critical angle?



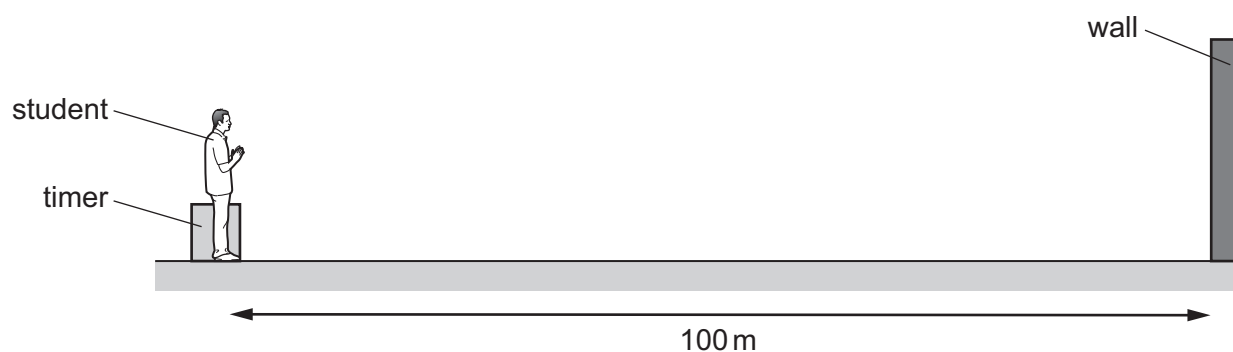
- 36 The diagram represents the electromagnetic spectrum. Sections P and Q are not named.

gamma rays	P	ultraviolet waves	visible light	infra-red waves	Q	radio waves
------------	---	-------------------	---------------	-----------------	---	-------------

Which type of wave does P represent, and which type of wave does Q represent?

	P	Q
A	microwaves	sound waves
B	microwaves	X-rays
C	sound waves	microwaves
D	X-rays	microwaves

- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.



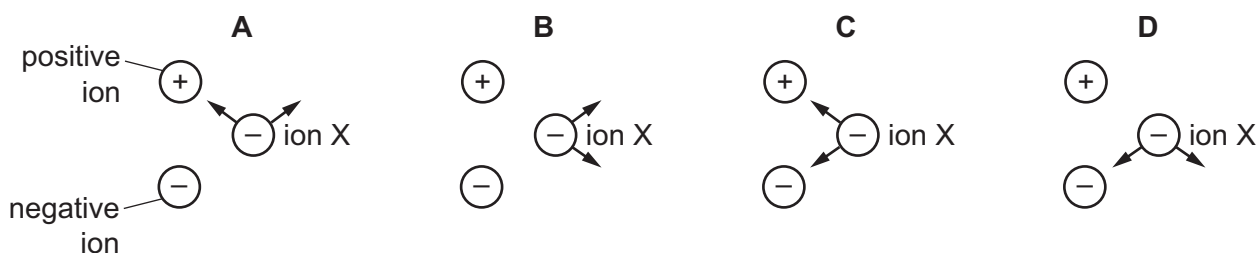
An electronic timer detects the echo of the sound 0.60 s after it is made.

Which calculation should the student use to determine the speed of sound?

- A** $\frac{100}{0.60}$ m/s **B** $\frac{100}{1.2}$ m/s **C** $\frac{200}{0.30}$ m/s **D** $\frac{200}{0.60}$ m/s

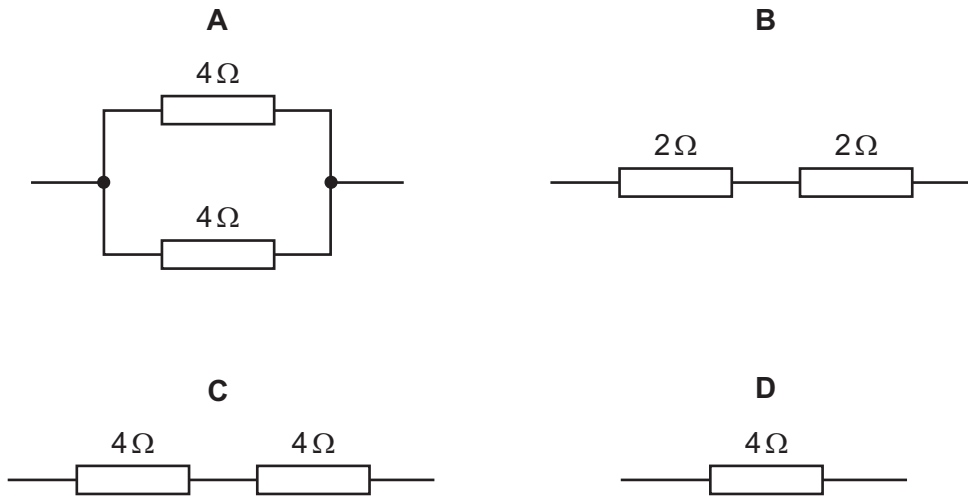
- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?

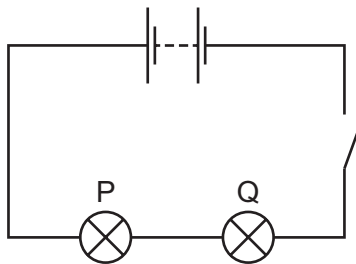


39 The diagrams show four arrangements of resistors.

Which arrangement has the **smallest** total resistance?



40 Two identical lamps P and Q are connected in a circuit as shown in the diagram.



The circuit is now switched on.

Which statement is correct?

- A** Each lamp can be switched off independently.
- B** If lamp Q breaks, lamp P stays alight.
- C** Lamp P is brighter than lamp Q.
- D** The current is the same in both lamps.

DATA SHEET
The Periodic Table of the Elements

Group																			
I	II											III	IV	V	VI	VII	0		
		1 H Hydrogen 1																	
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10		
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18		
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36		
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54		
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86			
223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																	
58-71 Lanthanoid series																175 Lu Lutetium 71			
90-103 Actinoid series																169 Tm Thulium 69	173 Yb Ytterbium 70	259 No Nobelium 102	260 Lr Lawrencium 103
		a		X		a = relative atomic mass													
		b		X		X = atomic symbol													
						b = proton (atomic) number													

a

X

b

Key

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice

0653/13

October/November 2015

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

DO NOT WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

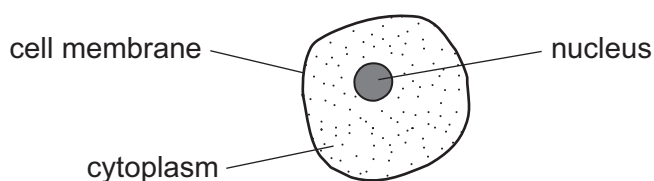
This document consists of **18** printed pages and **2** blank pages.



1 What are three characteristics of living organisms?

	characteristic 1	characteristic 2	characteristic 3
A	breathing	reproduction	sensitivity
B	digestion	growth	movement
C	excretion	nutrition	transpiration
D	nutrition	reproduction	sensitivity

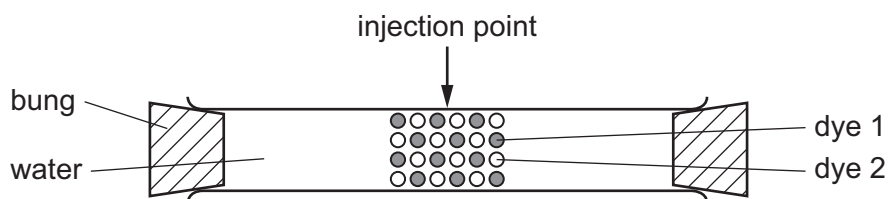
2 The diagram shows a liver cell, as seen using a light microscope.



Which of the labelled structures would also be present in a palisade cell?

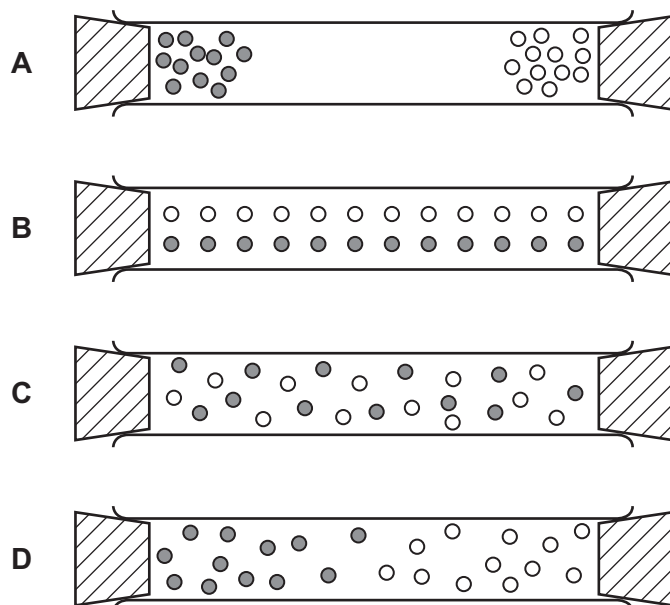
- A** all of them
- B** cell membrane only
- C** cell membrane and cytoplasm only
- D** cytoplasm and nucleus only

- 3 A student carries out an experiment to investigate diffusion. Two dyes are injected into the middle of a sealed tube of water. The diagram shows the particles of dye in the tube just after the dyes are injected.

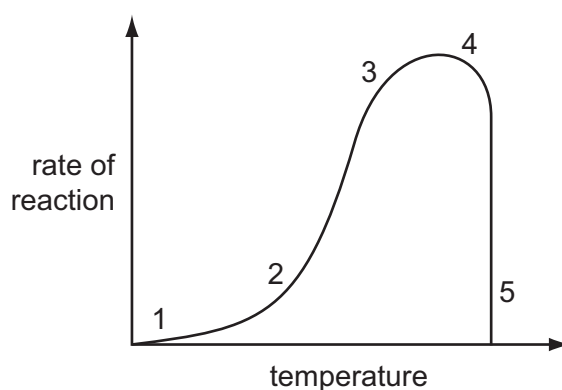


The tube is left for an hour.

Which diagram shows the distribution of the particles of dye after this time?



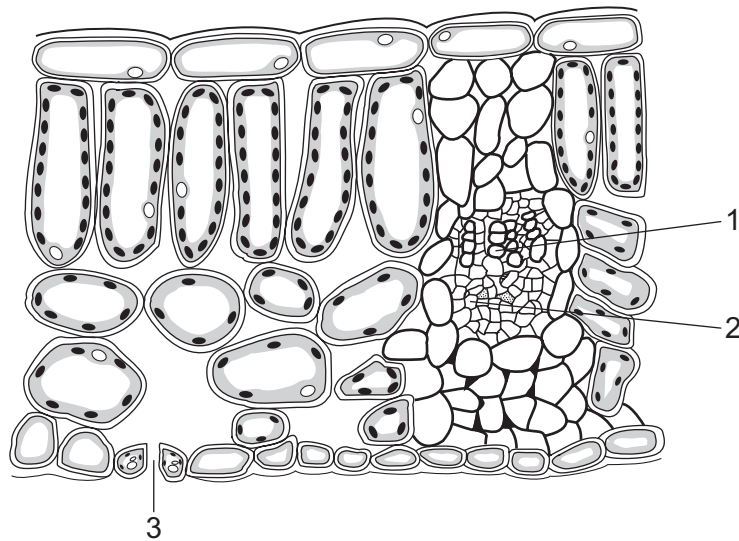
- 4 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

- A 1 B 2 and 3 C 3 and 4 D 5

- 5 The diagram shows a section through a leaf.

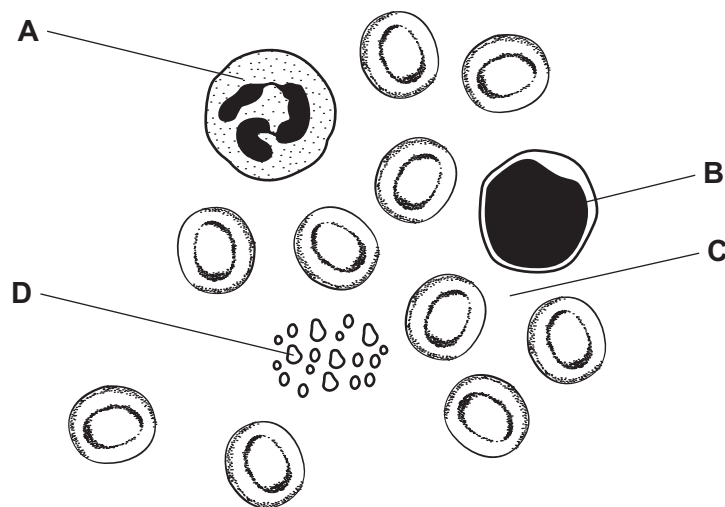


Where does carbon dioxide enter the leaf and where does water leave?

	carbon dioxide enters	water leaves
A	1	2
B	1	3
C	3	1
D	3	3

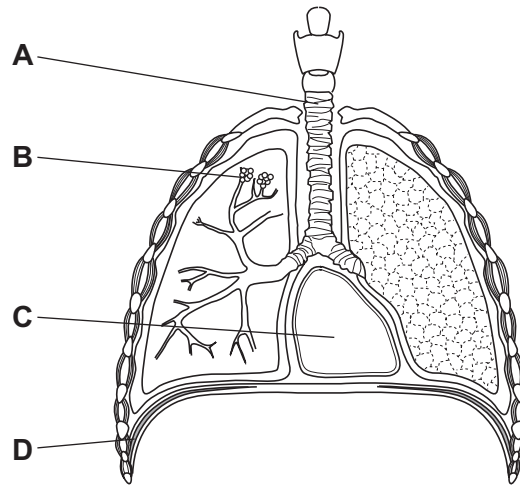
- 6 The drawing shows some blood, as it appears under the microscope.

Which part carries glucose to muscles?



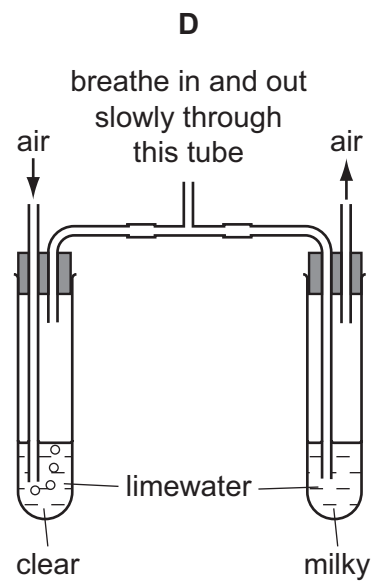
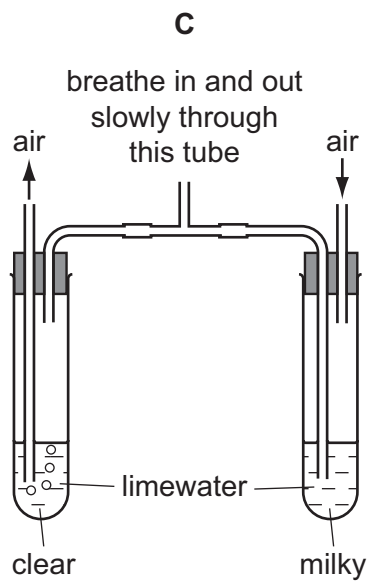
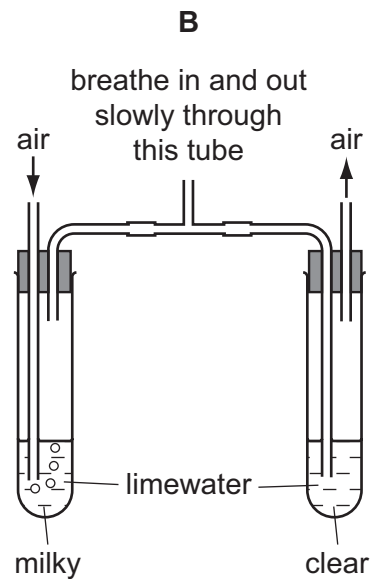
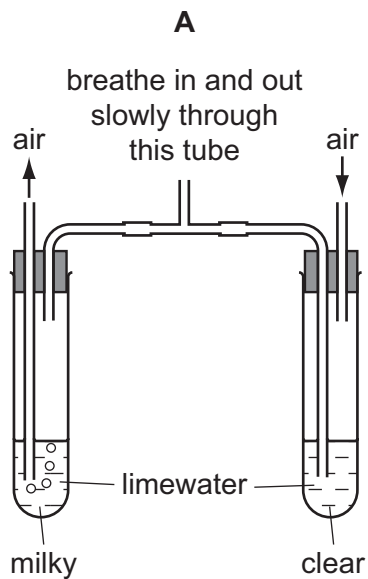
7 The diagram shows some structures in the human thorax (chest).

Into which part does carbon dioxide pass immediately after leaving the blood?



8 Carbon dioxide turns limewater milky (cloudy).

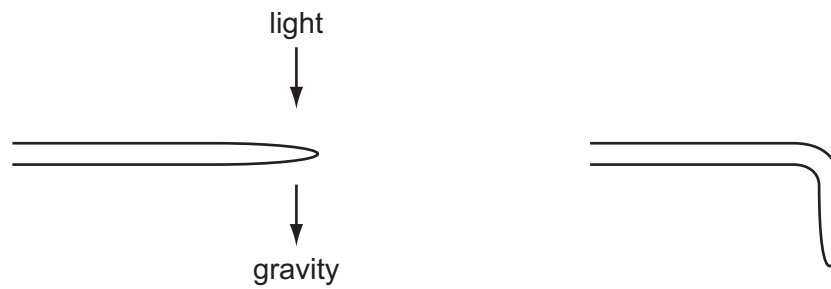
Which diagram shows apparatus being used to demonstrate that expired air contains more carbon dioxide than inspired air?



9 Which are effects of the hormone adrenaline?

	increase in blood glucose concentration	decrease in pulse rate
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 10 The diagram shows the root of a plant exposed to light and gravity, and the same root a day later.



Light does **not** influence the growth of roots in this plant.

Which row shows how the root has responded?

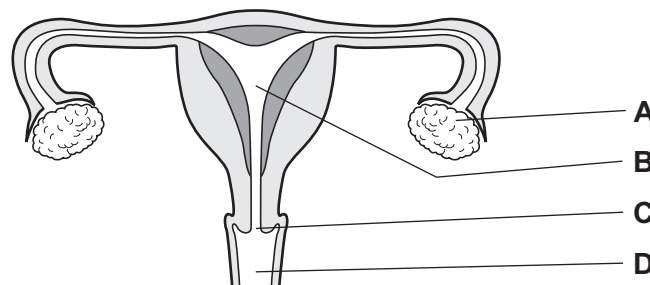
	geotropism	phototropism
A	grows away from the stimulus	no response
B	grows towards the stimulus	no response
C	no response	grows away from the stimulus
D	no response	grows towards the stimulus

- 11 Which structure in a flower produces pollen?

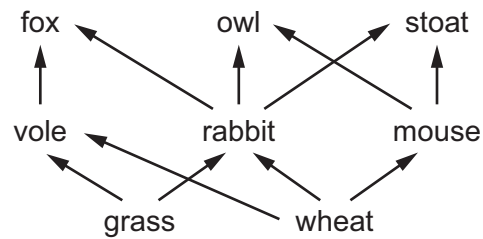
- A** sepal
- B** stamen
- C** stigma
- D** style

- 12 The diagram shows the female reproductive system.

Which labelled structure is the cervix?



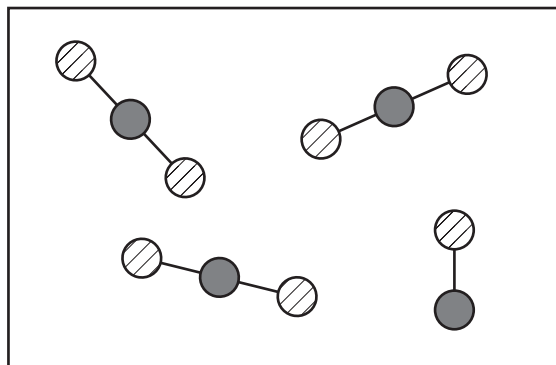
13 The diagram shows a food web.



Which food chain is part of this food web?

- A grass → mouse → owl
- B grass → vole → stoat
- C wheat → mouse → owl
- D wheat → vole → stoat

14 The diagram represents a mixture of carbon dioxide, CO₂, and carbon monoxide, CO.



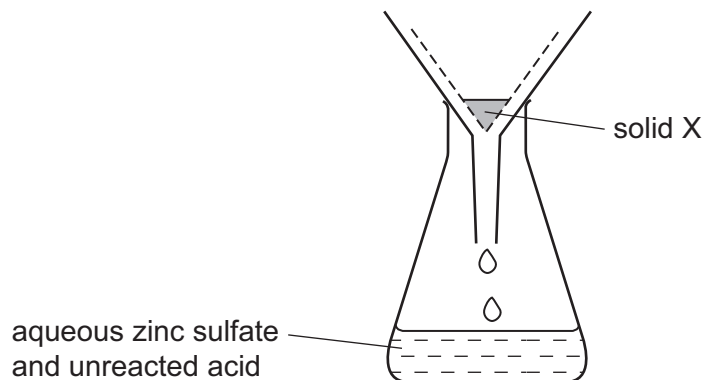
Which statement is correct?

- A The mixture contains 4 elements.
- B The mixture contains 4 molecules.
- C The mixture contains 11 elements.
- D The mixture contains 11 molecules.

- 15** In an experiment, a mixture of 0.5 g of copper and 3 g of zinc is added to an excess of dilute sulfuric acid.

The copper acts as a catalyst.

After all the zinc has dissolved, the resulting mixture is filtered.



What is solid X and what is its mass?

	solid X	mass of pure X
A	copper	less than 0.5 g
B	copper	0.5 g
C	copper(II) oxide	0.5 g
D	copper(II) oxide	greater than 0.5 g

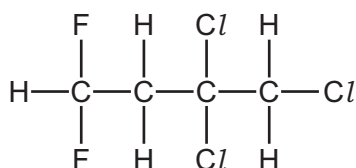
- 16** Element Y has a proton number of 18 and a nucleon number of 40.

Which statements about element Y are correct?

- 1 It has 40 neutrons in its nucleus.
- 2 It has 22 electrons.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

A 1 and 2 **B** 2 and 3 **C** 2 and 4 **D** 3 and 4

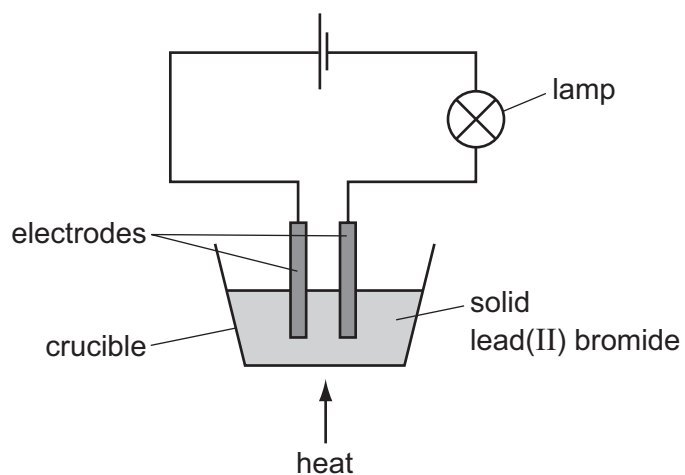
- 17** The structure of a compound is shown.



What is the formula of the compound?

A CHClF **B** C₄H₅Cl₂F₂ **C** C₄H₅Cl₃F₂ **D** C₄H₅Cl₃F

18 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

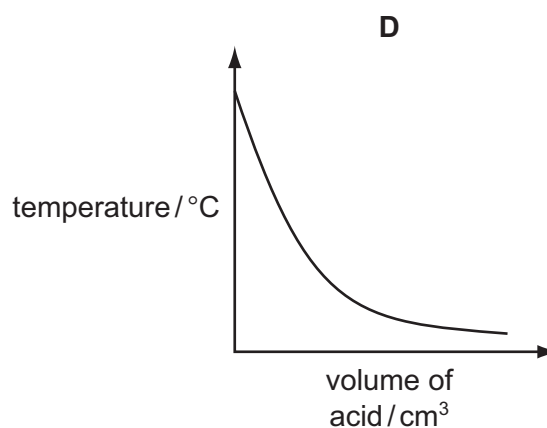
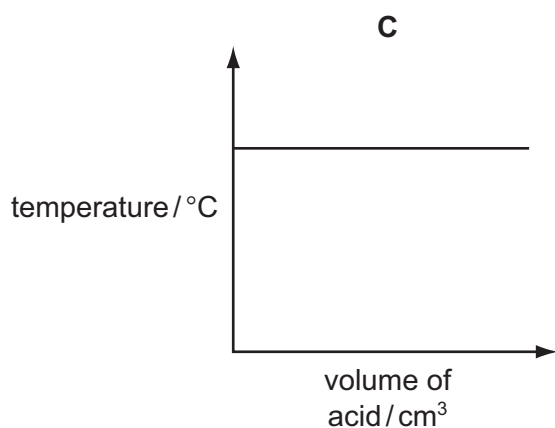
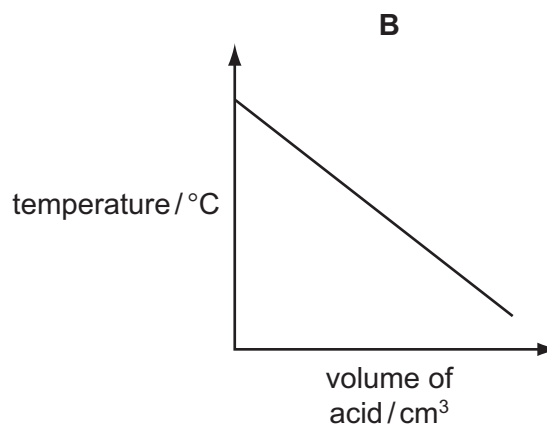
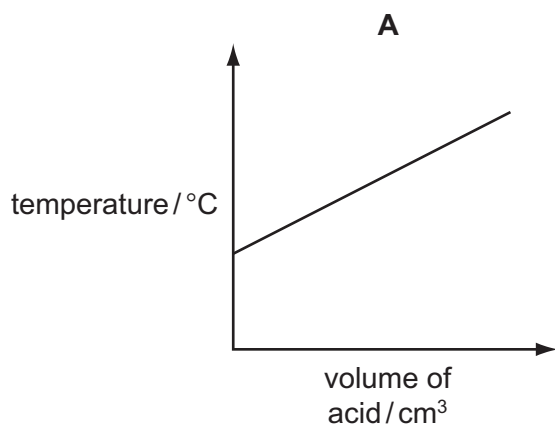
Why is heat needed?

- A** An exothermic reaction takes place in the crucible.
- B** Electrodes only conduct electricity when hot.
- C** Heat causes the lead(II) bromide to react with air.
- D** The lead(II) bromide must be molten.

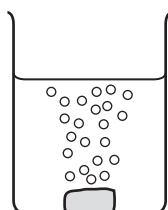
- 19 Hydrochloric acid is slowly added to sodium hydroxide in an insulated beaker.

The reaction is exothermic.

Which graph shows how the temperature changes during the reaction?



- 20 When a solid lump of calcium carbonate is added to excess hydrochloric acid, it reacts and bubbles can be seen.



Which change does **not** increase the rate of reaction?

- A** Increase the concentration of the acid.
- B** Increase the surface area of the solid.
- C** Increase the temperature.
- D** Increase the volume of the acid.

- 21** Copper sulfate crystals are prepared by reacting copper oxide with sulfuric acid.

Which process is **not** used in the preparation of copper sulfate crystals?

- A** chromatography
B crystallisation
C evaporation
D filtration

- 22** A substance reacts with dilute acid, producing a gas.

The gas ignites with a pop when tested with a lighted splint.

What is the substance?

- A** copper
- B** copper(II) oxide
- C** magnesium
- D** magnesium carbonate

- 23** The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?

A simplified periodic table grid with 18 columns and 4 rows. The first two columns are on the left, and the last two are on the right, with a gap in between. The grid is divided into four quadrants by a horizontal line between the second and third rows. The label 'A' is in the third row, eighth column. The label 'B' is in the third row, 17th column. The label 'C' is in the bottom-left corner (row 4, column 1). The label 'D' is in the bottom-left corner (row 4, column 2).

- 24** Element X has a high density and is used as a catalyst.

What is X?

- A** carbon
B sodium
C sulfur
D vanadium

- 25 A metal is added to water. It floats and reacts vigorously.

What is the pH of the resulting solution?

- A 1 B 5 C 7 D 14

- 26 What is a chemical test for water?

- A Blue cobalt chloride paper turns pink.
B Measure its boiling point which is 100 °C.
C Measure its melting point which is 0 °C.
D Pink cobalt chloride paper turns blue.

- 27 Gas oil is a fraction formed when petroleum is fractionally distilled.

What is a use of gas oil?

- A bottled gas
B cooking
C diesel engine fuel
D heating

- 28 A tunnel is 50 km long. A train takes 20 min to travel between the two ends of the tunnel.

What is the average speed of the train in the tunnel?

- A 2.5 km/hour
B 16.6 km/hour
C 150 km/hour
D 1000 km/hour

- 29 Which of the following has the same unit as weight?

- A density
B energy
C force
D mass

30 Which items of apparatus are used to determine the density of a liquid?

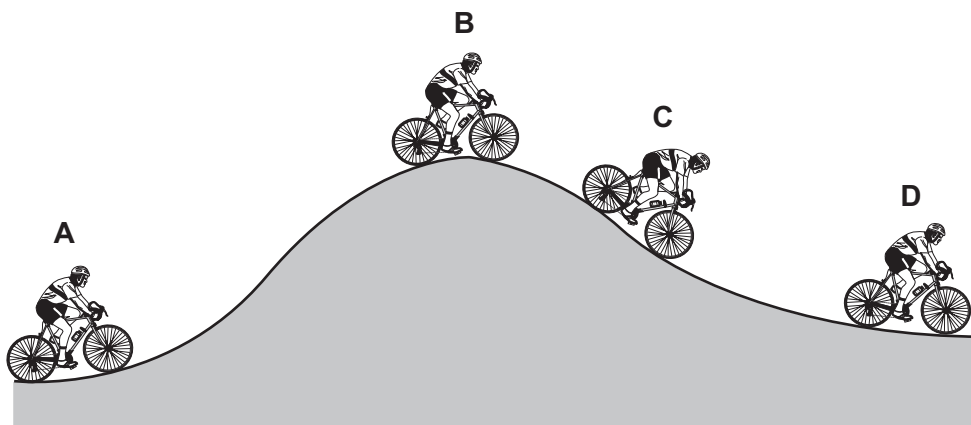
- A balance and measuring cylinder
- B balance and thermometer
- C metre rule and measuring cylinder
- D metre rule and thermometer

31 What is the unit for work and what is the unit for power?

	work	power
A	J	N
B	J	W
C	N	W
D	W	J

32 The diagram shows a cyclist riding along a hilly road.

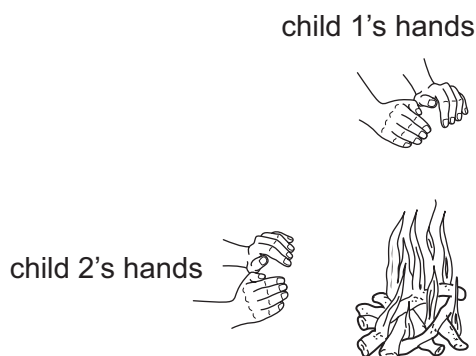
At which position does the cyclist have the least gravitational (potential) energy?



33 Which statement describes the molecules in a gas?

- A They are close together and move about quickly.
- B They are close together and move about slowly.
- C They are far apart and move about quickly.
- D They are far apart and move about slowly.

- 34 On a cold night, two children sit next to a camp fire to warm their hands. Their hands are the same distance from the fire. Child 1 holds his hands over the fire and child 2 holds her hands in front of the fire.



How does the heat from the fire reach each child's hands?

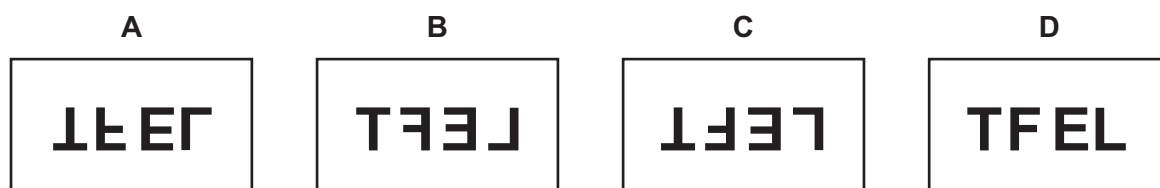
	child 1	child 2
A	convection only	radiation only
B	convection and radiation	radiation only
C	radiation only	convection and radiation
D	radiation only	convection only

- 35 A girl writes the word **LEFT** on a piece of card.



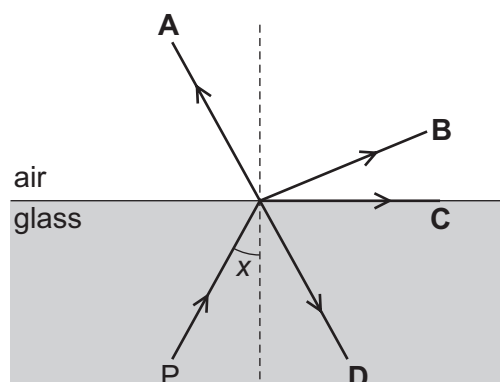
She looks at the image of this card, made by reflection by a plane mirror.

What does she see?

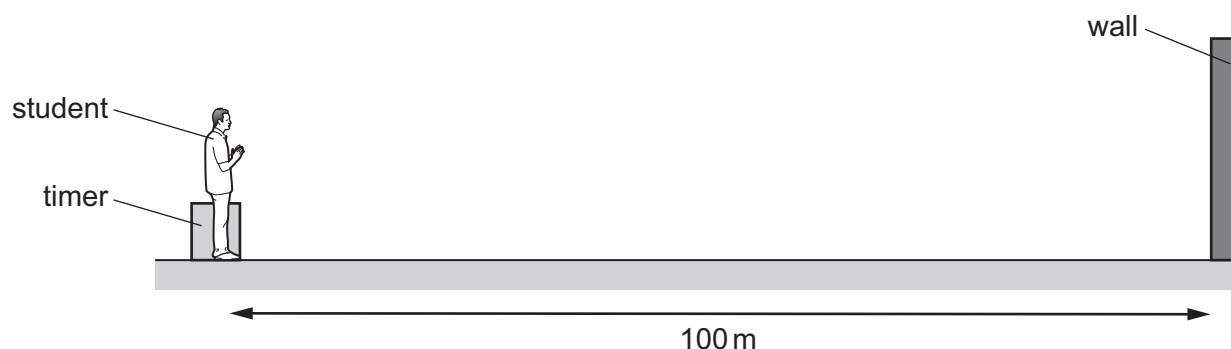


- 36 The diagram shows a ray of light travelling in glass from point P. Angle x is greater than the critical angle.

In which labelled direction does the ray continue?



- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.



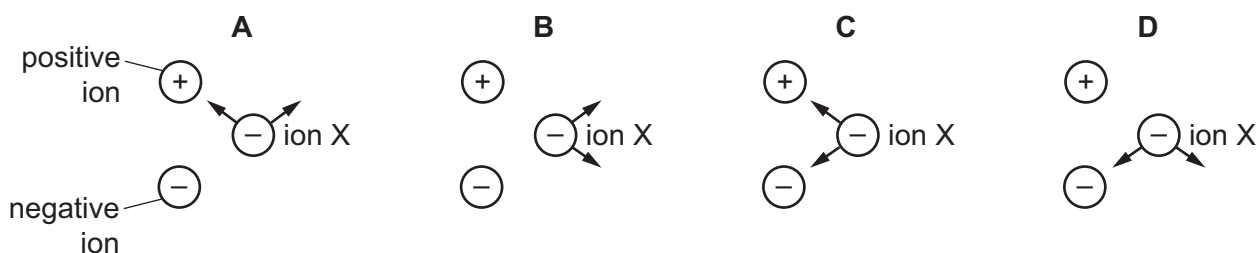
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Which calculation should the student use to determine the speed of sound?

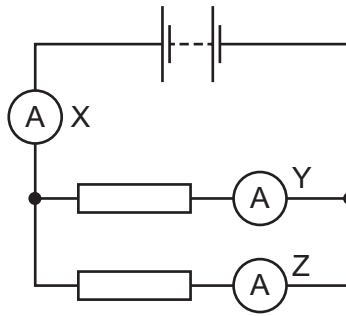
- A $\frac{100}{0.60}$ m/s B $\frac{100}{1.2}$ m/s C $\frac{200}{0.30}$ m/s D $\frac{200}{0.60}$ m/s

- 38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?



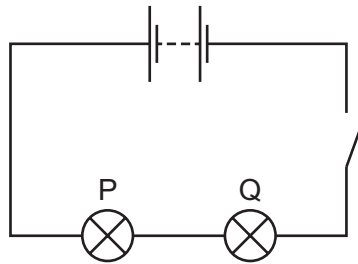
39 The diagram shows a circuit with three ammeters X, Y and Z.



Which set of readings on the ammeters is possible?

	X	Y	Z
A	2 A	3 A	5 A
B	3 A	2 A	5 A
C	3 A	3 A	3 A
D	5 A	2 A	3 A

40 Two identical lamps P and Q are connected in a circuit as shown in the diagram.



The circuit is now switched on.

Which statement is correct?

- A** Each lamp can be switched off independently.
- B** If lamp Q breaks, lamp P stays alight.
- C** Lamp P is brighter than lamp Q.
- D** The current is the same in both lamps.

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												1 H Hydrogen 1																		
7 Li Lithium 3	9 Be Beryllium 4																	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10							
23 Na Sodium 11	24 Mg Magnesium 12																	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18							
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36													
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	98 Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54													
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86													
223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89																												
58-71 Lanthanoid series																														
90-103 Actinoid series																														
																	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
																	232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	247 Bk Berkelium 97	251 Cf Californium 98	252 Es Einsteinium 99	257 Fm Fermium 100	258 Md Mendelevium 101	259 No Nobelium 102	260 Lr Lawrencium 103
																	a = relative atomic mass X = atomic symbol b = proton (atomic) number													
																	Key X													

Key

a	X	b
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a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).