



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/13**

Paper 1 Multiple Choice

**May/June 2013**

**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, highlighters, 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.

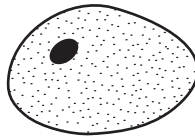
Electronic calculators may be used.

This document consists of **17** printed pages and **3** blank pages.



2

- 1 The diagram shows an animal cell. The maximum diameter of the diagram is 25 mm.



The actual cell was 0.02 mm maximum diameter.

What is the magnification of the drawing?

- A** ×25                    **B** ×200                    **C** ×1250                    **D** ×2500
- 2 Which substance can enter a plant cell by diffusion?
- A** carbon dioxide  
**B** cellulose  
**C** protein  
**D** starch
- 3 Which two chemical substances are required for photosynthesis?
- A** carbon dioxide and glucose  
**B** glucose and oxygen  
**C** oxygen and water  
**D** water and carbon dioxide
- 4 A test-tube contains a solution of an enzyme.
- Which colour is obtained when the biuret test is carried out on this solution?
- A** blue  
**B** blue-black  
**C** orange  
**D** purple
- 5 What is the word equation for aerobic respiration?
- A** carbon dioxide + glucose → oxygen + water  
**B** carbon dioxide + water → glucose + oxygen  
**C** glucose + oxygen → carbon dioxide + water  
**D** oxygen + water → carbon dioxide + glucose

- 6 Mixtures were made from  $5\text{ cm}^3$  of a starch solution and  $2\text{ cm}^3$  of a solution of an enzyme that digests starch. The mixtures were all kept at the same temperature.

The table shows the different concentrations of the starch and starch-digesting enzyme solutions in each mixture.

In which mixture would it take the **longest** time for all the starch to disappear?

	concentration of starch solution / %	concentration of starch-digesting enzyme / %
<b>A</b>	4	8
<b>B</b>	4	4
<b>C</b>	2	8
<b>D</b>	2	4

- 7 In what form is water as it enters and is lost from a plant?

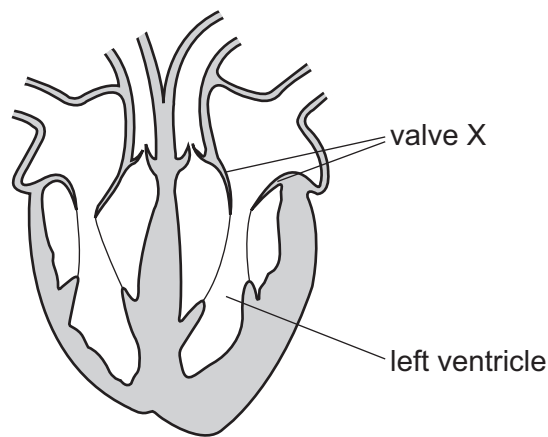
	as it enters	as it is lost
<b>A</b>	liquid	liquid
<b>B</b>	liquid	vapour
<b>C</b>	vapour	liquid
<b>D</b>	vapour	vapour

- 8 What is the effect of adrenaline in the control of metabolic activity?

	blood glucose concentration	rate of heart beat
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

4

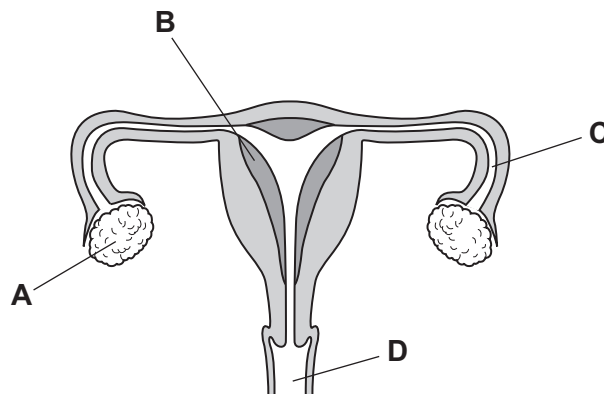
- 9 The diagram shows a section through the heart.



Which events occur as the left ventricle contracts?

- A atrial wall contracts and valve X closes
  - B atrial wall contracts and valve X opens
  - C atrial wall relaxes and valve X closes
  - D atrial wall relaxes and valve X opens
- 10 What occurs about two weeks after menstruation?
- A the release of a gamete from an ovary
  - B the release of a gamete from the uterus
  - C the release of a zygote from an ovary
  - D the release of a zygote from the uterus
- 11 The diagram shows a section through the female reproductive system.

Where is the fertilised egg implanted?



12 What describes asexual reproduction?

	number of parents	a zygote is produced	offspring identical to the parent
<b>A</b>	1	no	yes
<b>B</b>	1	yes	no
<b>C</b>	2	no	yes
<b>D</b>	2	yes	no

13 The diagram shows five organisms in a food chain.

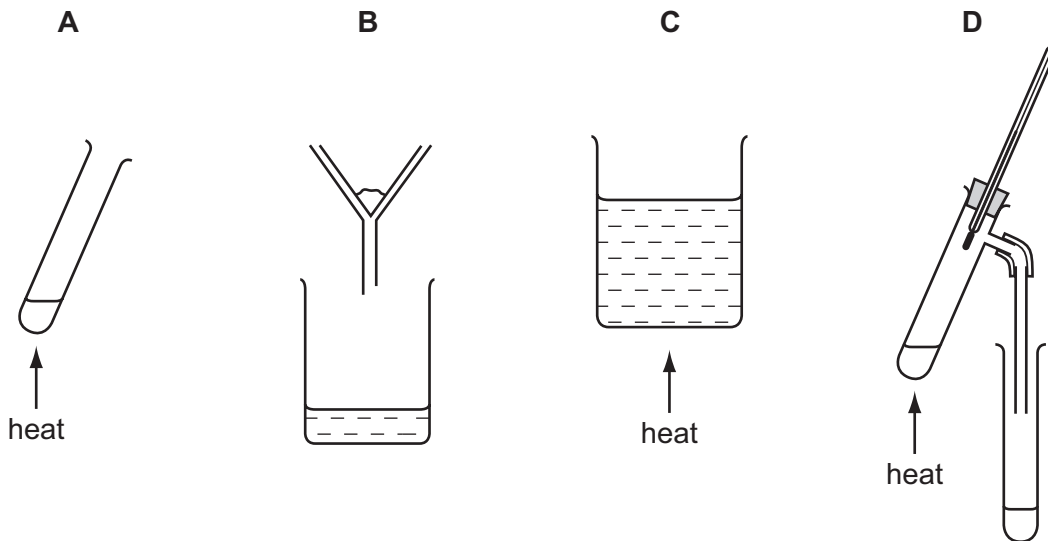
T → U → V → W → X

Which organisms are consumers?

- A** T, U and V    **B** T, W and X    **C** T, V and X    **D** U, V and W

14 Aqueous copper(II) sulfate consists of copper(II) sulfate dissolved in water.

Which apparatus could **not** be used to remove water from this solution?



15 The reaction of zinc and sulfur to form zinc sulfide is exothermic.

Which information in the table is correct?

	elements in zinc sulfide	energy change during the formation of zinc sulfide
<b>A</b>	difficult to separate	heat given out
<b>B</b>	difficult to separate	heat taken in
<b>C</b>	easy to separate	heat given out
<b>D</b>	easy to separate	heat taken in

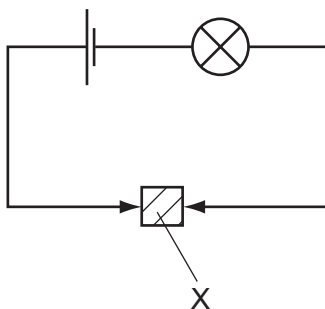
16 A student carries out experiments with zinc and dilute hydrochloric acid.

Which change in conditions makes the reaction slower?

- A** adding a suitable catalyst
- B** increasing the concentration of the acid
- C** increasing the particle size of the zinc
- D** increasing the temperature

17 A solid X is placed in the circuit shown.

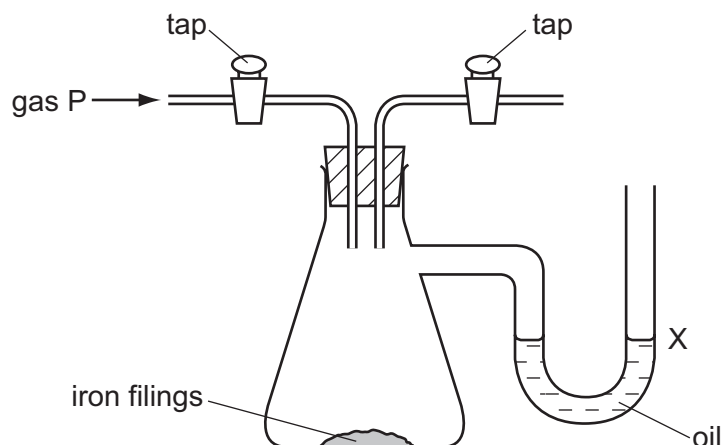
The lamp lights.



What is X?

- A** an alloy
- B** a compound
- C** an electrolyte
- D** a salt

18 The diagram shows an experiment on the rusting of iron.



The flask is filled with gas P. The taps are closed and the apparatus is left for a week.

The experiment is repeated with four different gases.

What happens to the oil level at X?

	gas P	oil level at X
<b>A</b>	damp nitrogen	rises
<b>B</b>	damp oxygen	falls
<b>C</b>	dry nitrogen	falls
<b>D</b>	dry oxygen	rises

19 Which statements about air are correct?

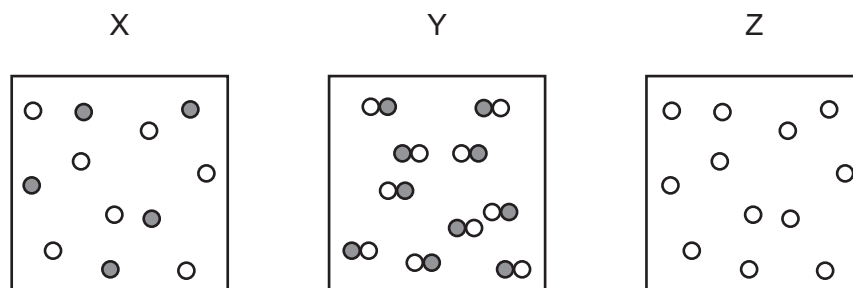
- 1 Air contains a small amount of argon which is a noble gas.
- 2 Air is made up of 78% oxygen and 21% nitrogen.
- 3 Air contains carbon dioxide which is a product of both respiration and the combustion of natural gas.

**A** 1, 2 and 3      **B** 1 and 2 only      **C** 1 and 3 only      **D** 2 and 3 only

20 Which mixture **cannot** be separated by distillation?

- A** air
- B** petroleum
- C** salt water
- D** sulfur and iron

21 The diagrams represent the particles in substances X, Y and Z.



Which row correctly identifies X, Y and Z as an element, a compound or a mixture?

	element	compound	mixture
<b>A</b>	X	Y	Z
<b>B</b>	Y	Z	X
<b>C</b>	Z	X	Y
<b>D</b>	Z	Y	X

22 Which substance conducts electricity?

- A**  $\text{CO}_2(\text{g})$       **B**  $\text{NaCl}(\text{s})$       **C**  $\text{NaOH}(\text{aq})$       **D**  $\text{S}(\text{s})$

23 The diagram shows an outline of part of the Periodic Table.

									X	Y									

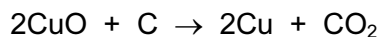
What do elements X and Y have in common?

- 1 They form coloured compounds.
- 2 They can be used as catalysts.
- 3 They have low melting points.

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



24 The equation shows the reaction of copper oxide with carbon.



In the reaction, the carbon is the .....1..... agent and is .....2..... during the reaction.

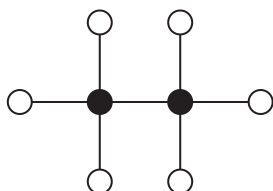
Which words complete gaps 1 and 2?

	1	2
<b>A</b>	oxidising	oxidised
<b>B</b>	oxidising	reduced
<b>C</b>	reducing	oxidised
<b>D</b>	reducing	reduced

25 Which pair of gases can be identified using limewater and damp litmus paper?

- A** carbon dioxide and chlorine
- B** carbon dioxide and hydrogen
- C** chlorine and oxygen
- D** hydrogen and chlorine

26 The diagram shows a molecule of ethane.



key

● carbon atom

○ hydrogen atom

What is the molecular formula of ethane?

- A** CH<sub>6</sub>
- B** CH<sub>3</sub>
- C** C<sub>2</sub>H<sub>4</sub>
- D** C<sub>2</sub>H<sub>6</sub>

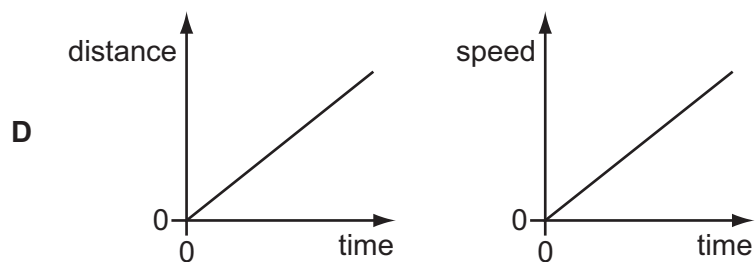
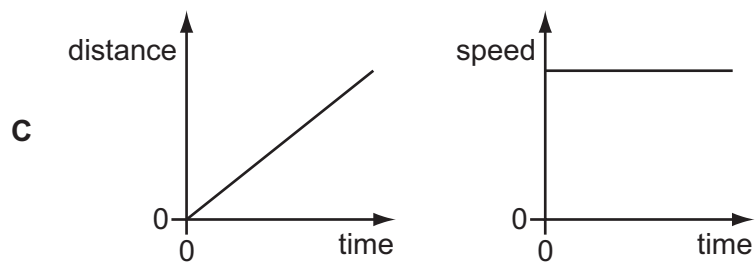
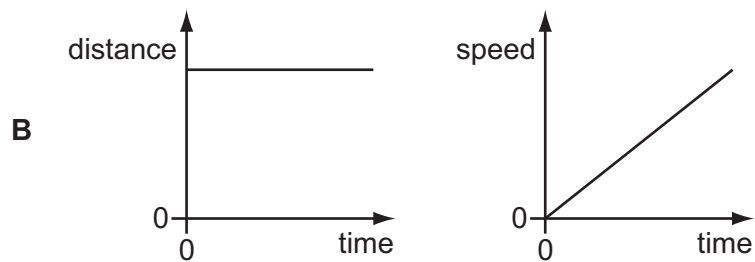
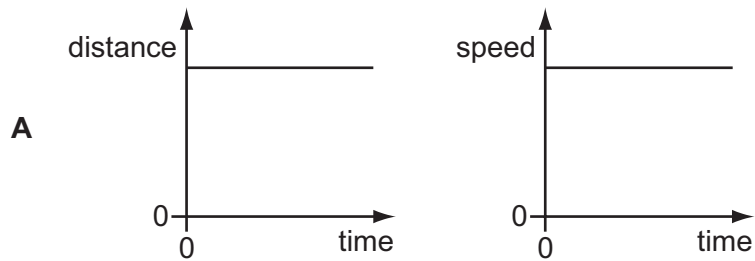
27 Three boiling tubes are each filled with a gas from Group VII in the Periodic Table.

Gas 1 is brown. Gas 2 is purple. Gas 3 is green.

Which gases are in the tubes?

	gas 1	gas 2	gas 3
<b>A</b>	Cl	I	Br
<b>B</b>	Br	Cl	I
<b>C</b>	Br	I	Cl
<b>D</b>	I	Br	Cl

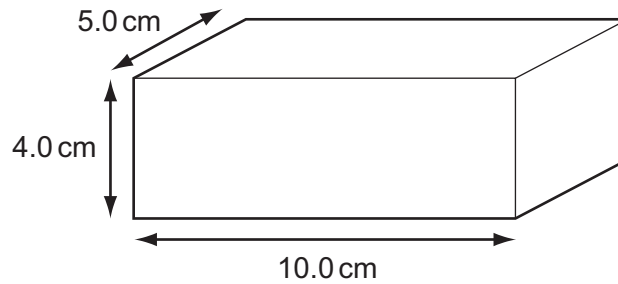
28 Which pair of distance/time and speed/time graphs represents an object which is moving with constant speed?



29 When sweat evaporates, which change of state takes place?

- A gas to liquid
- B liquid to gas
- C liquid to solid
- D solid to gas

- 30 A rectangular metal block has the dimensions shown. The density of the metal is  $8.0 \text{ g/cm}^3$ .

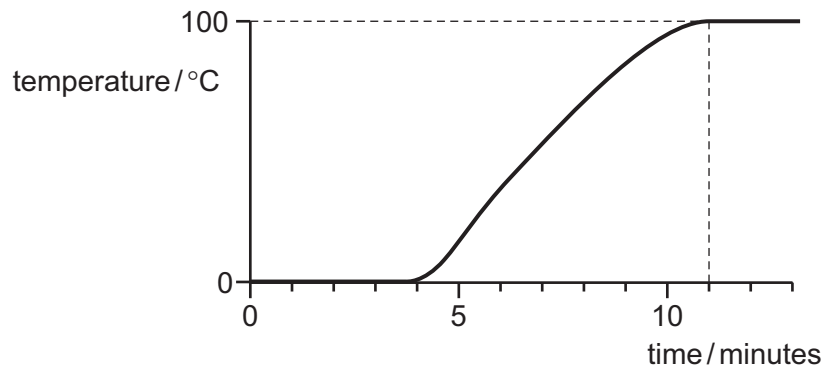


What is the mass of the metal block?

- A** 160 g      **B** 320 g      **C** 400 g      **D** 1600 g
- 31 Which energy resource is non-renewable?
- A** geothermal energy  
**B** hydroelectric energy  
**C** nuclear energy  
**D** wave energy
- 32 The International Space Station orbits the Earth in the vacuum above the atmosphere.  
The electrical systems in the Space Station produce heat.  
How is this heat transferred from the external surfaces of the Space Station into space?
- A** conduction only  
**B** convection only  
**C** radiation only  
**D** conduction, convection and radiation

33 A block of ice is supplied with heat at a constant rate. Eventually, the melted ice boils.

The graph shows how the temperature changes with time.



How long does it take to melt all the ice?

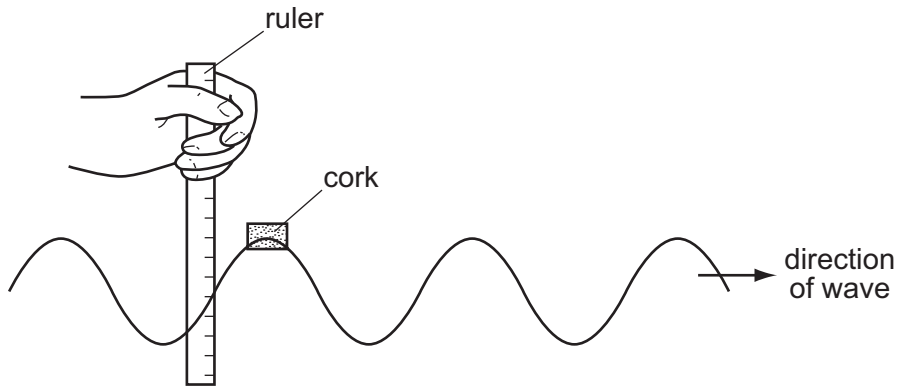
- A** 4 minutes      **B** 7 minutes      **C** 11 minutes      **D** 13 minutes

34 Electromagnetic waves have many different applications.

Which row identifies the type of electromagnetic wave used in each application?

	satellite television	terrestrial television (not satellite)	television remote controllers
<b>A</b>	microwaves	radio waves	infrared waves
<b>B</b>	microwaves	radio waves	microwaves
<b>C</b>	radio waves	infrared waves	infrared waves
<b>D</b>	radio waves	infrared waves	microwaves

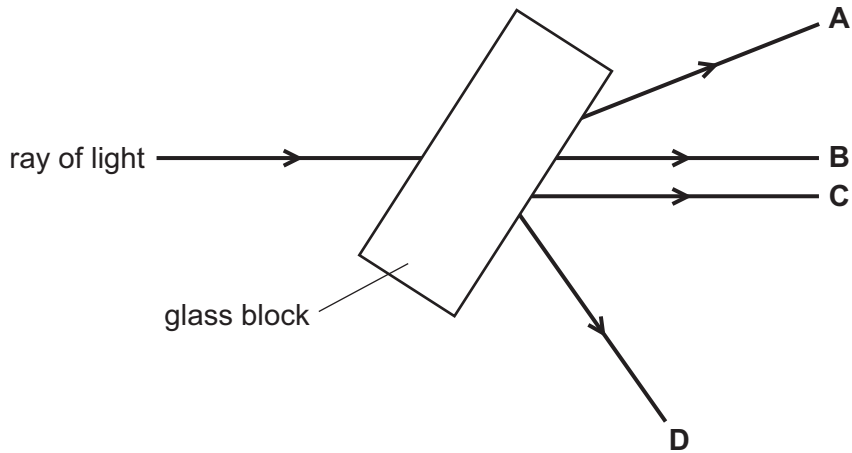
35 A student measures the distance a cork moves up and down on a wave in a tank of water.



Which quantity can she obtain from this measurement?

- A amplitude
- B frequency
- C speed
- D wavelength

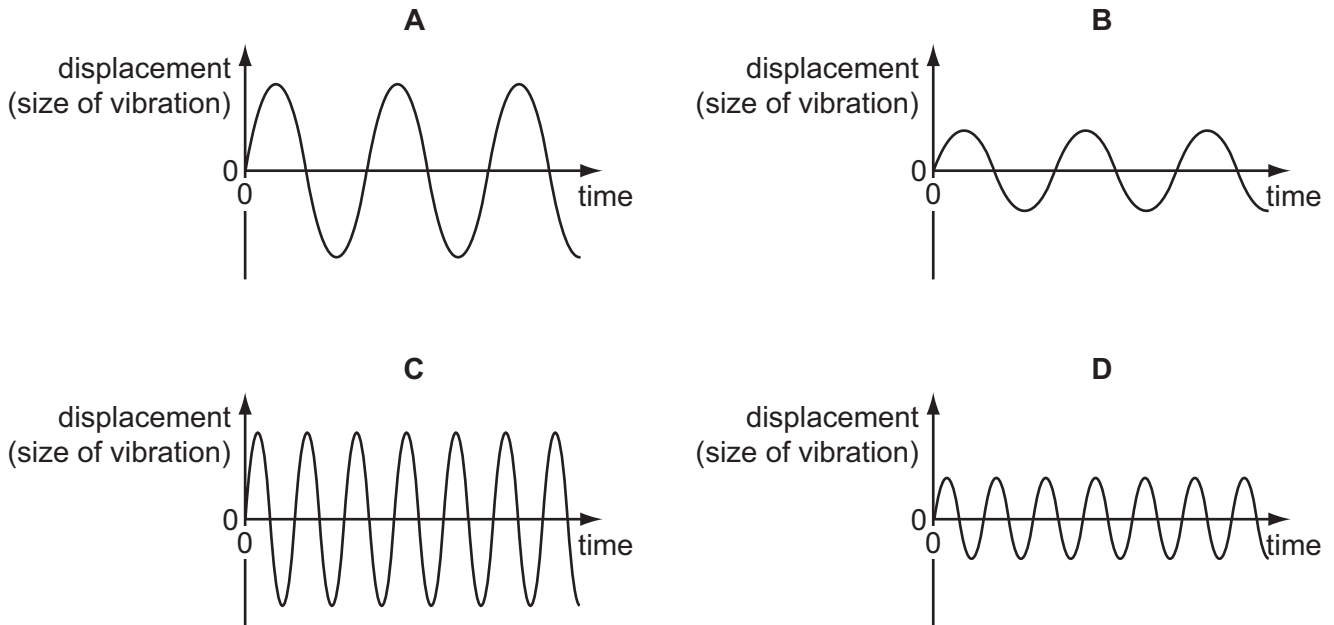
36 Which labelled ray shows the path of the ray of light after it has passed through the glass block?



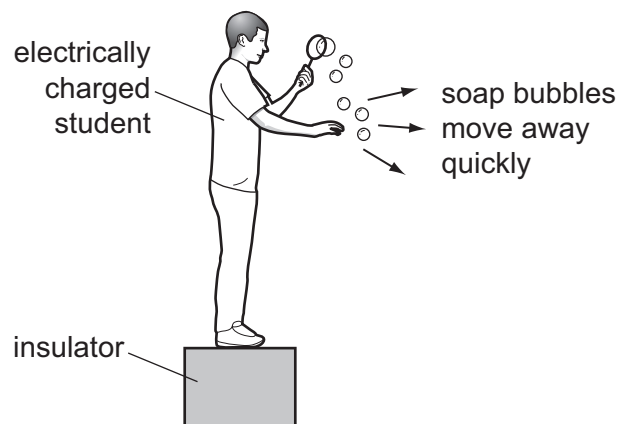
- 37 A microphone is connected to an oscilloscope. The oscilloscope produces graphs of displacement against time for different sounds.

The scales for the graphs are the same.

Which graph shows the quietest sound with the highest pitch?



- 38 An electrically charged student produces soap bubbles. When he holds his hand near the bubbles, they move away quickly from his hand.



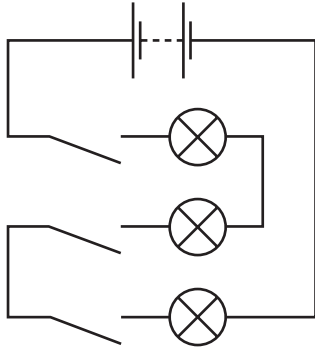
For this movement of the bubbles to happen, which statement is correct?

- A The bubbles must be negatively charged.
- B The bubbles must be positively charged.
- C The bubbles must have the opposite charge to the charge on the student.
- D The bubbles must have the same charge as the charge on the student.

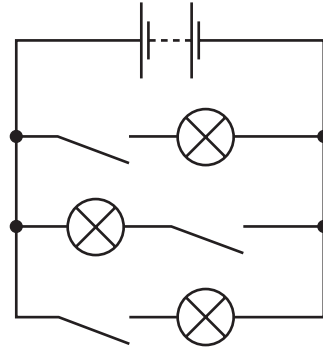
39 An electrician wishes to connect three lamps in a circuit so that each lamp can be on and off separately.

Which circuit should be used?

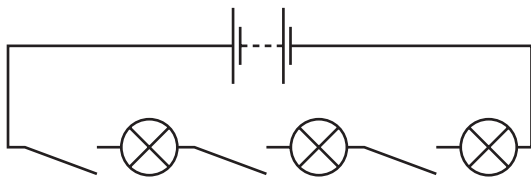
A



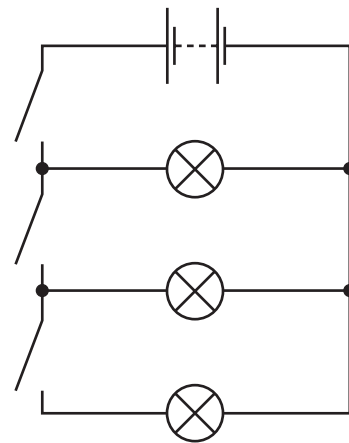
B



C



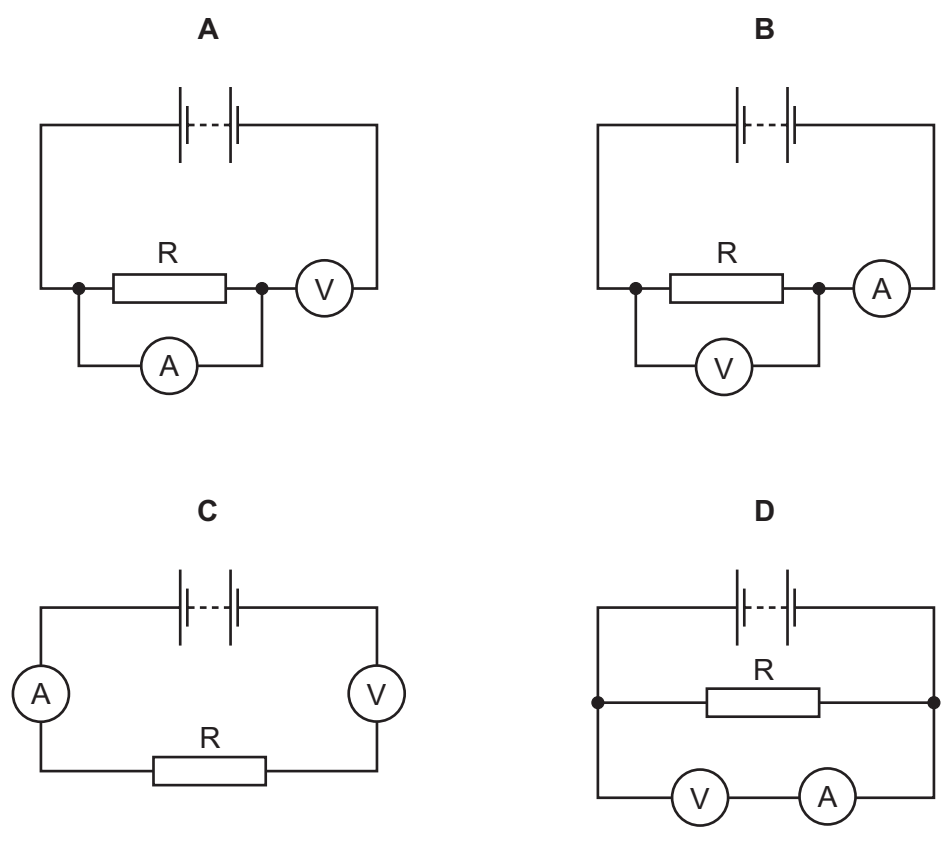
D



40 A student wishes to find the resistance of resistor R.

The diagrams show four possible circuits which the student could use.

Which circuit can be used to find the resistance of resistor R?











**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																											
		I	II	III	IV	V	VI	VII	0																				
		1 <b>H</b> Hydrogen 1																											
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4																												
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12																												
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36												
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	131 <b>Xe</b> Xenon 54	133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																												
		*58-71 Lanthanoid series																											
		†90-103 Actinoid series																											
		140 <b>Ce</b> Cerium 58																											
		141 <b>Pr</b> Praseodymium 59																											
		144 <b>Nd</b> Neodymium 60																											
		150 <b>Sm</b> Samarium 62																											
		152 <b>Eu</b> Europium 63																											
		157 <b>Gd</b> Gadolinium 64																											
		159 <b>Tb</b> Terbium 65																											
		162 <b>Dy</b> Dysprosium 66																											
		165 <b>Ho</b> Holmium 67																											
		167 <b>Er</b> Erbium 68																											
		169 <b>Tm</b> Thulium 69																											
		173 <b>Yb</b> Ytterbium 70																											
		175 <b>Lu</b> Lutetium 71																											
		232 <b>Th</b> Thorium 90																											
		238 <b>U</b> Uranium 92																											
		238 <b>Pa</b> Protactinium 91																											
		238 <b>Np</b> Neptunium 93																											
		238 <b>Am</b> Americium 95																											
		238 <b>Cm</b> Curium 96																											
		238 <b>Bk</b> Berkelium 97																											
		238 <b>Cf</b> Californium 98																											
		238 <b>Es</b> Einsteinium 99																											
		238 <b>Fm</b> Fermium 100																											
		238 <b>Md</b> Mendelevium 101																											
		238 <b>No</b> Nobelium 102																											
		238 <b>Lr</b> Lawrencium 103																											

	a	<b>X</b>	b
<b>Key</b>	a = relative atomic mass		
	X = atomic symbol		
	b = proton (atomic) number		

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.