



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.

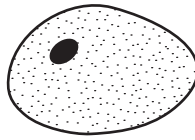
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

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



- 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 cm^3 of a starch solution and 2 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 / %
A	4	8
B	4	4
C	2	8
D	2	4

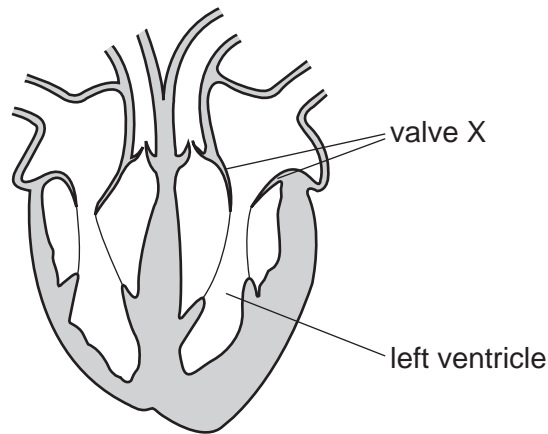
- 7 In what form is water as it enters and is lost from a plant?

	as it enters	as it is lost
A	liquid	liquid
B	liquid	vapour
C	vapour	liquid
D	vapour	vapour

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

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

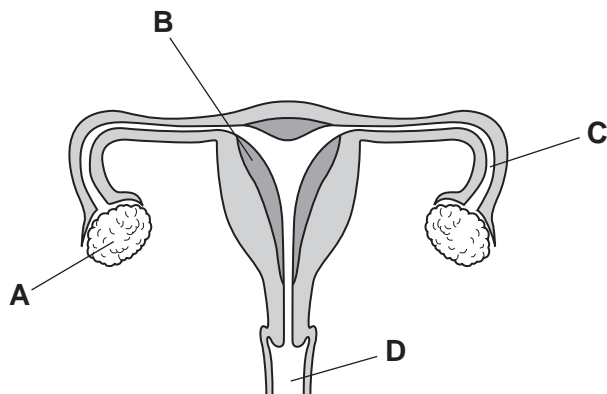
9 The diagram shows a section through the heart.



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
A	1	no	yes
B	1	yes	no
C	2	no	yes
D	2	yes	no

13 The diagram shows five organisms in a food chain.

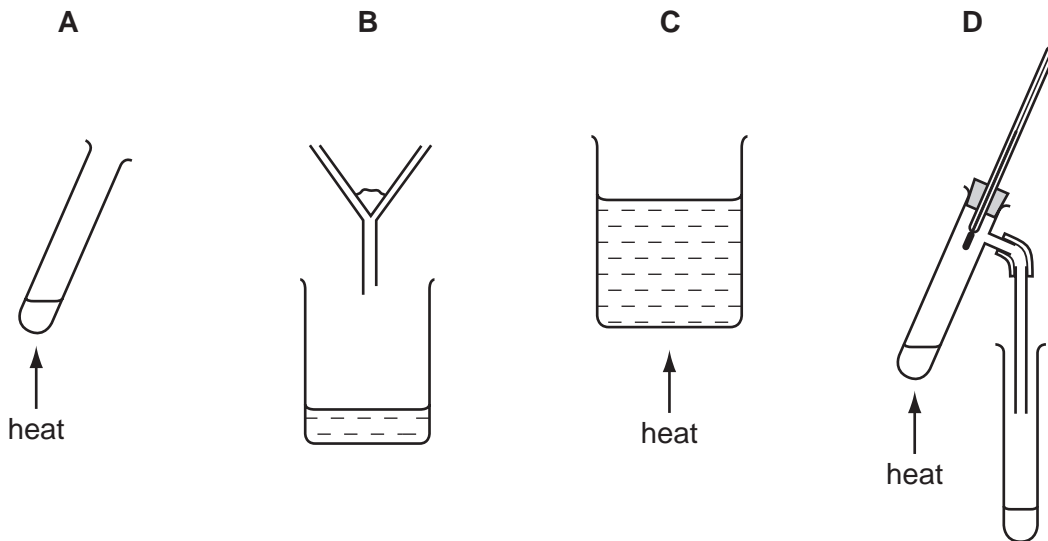
$T \rightarrow U \rightarrow V \rightarrow W \rightarrow X$

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
A	difficult to separate	heat given out
B	difficult to separate	heat taken in
C	easy to separate	heat given out
D	easy to separate	heat taken in

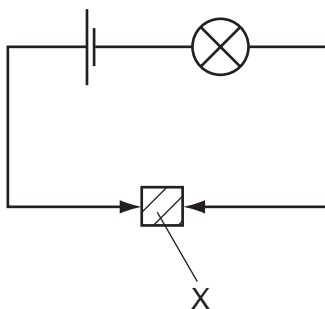
16 A student carries out experiments with zinc and dilute hydrochloric acid.

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.

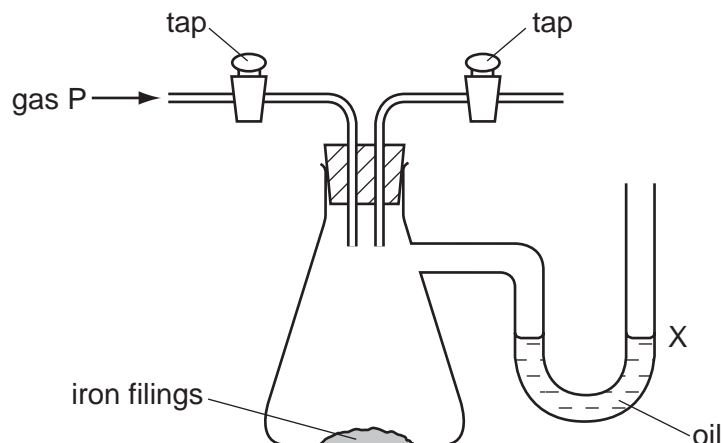
The lamp lights.



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
A	damp nitrogen	rises
B	damp oxygen	falls
C	dry nitrogen	falls
D	dry oxygen	rises

19 Which statements about air are correct?

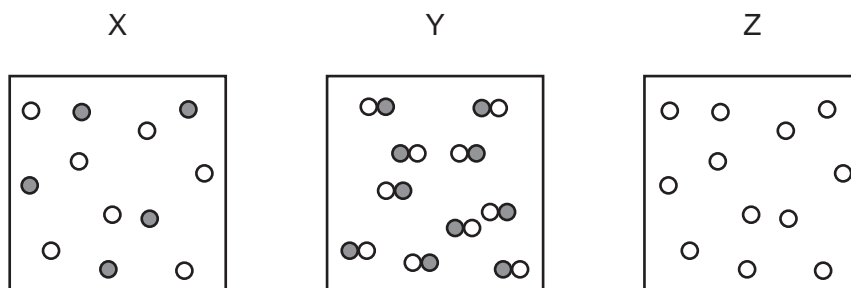
- 1 Air contains a small amount of argon which is a noble gas.
- 2 Air is made up of 78% oxygen and 21% nitrogen.
- 3 Air contains carbon dioxide which is a product of both respiration and the combustion of natural gas.

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
A	X	Y	Z
B	Y	Z	X
C	Z	X	Y
D	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** $\text{S}(\text{s})$

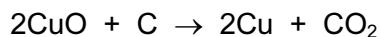
23 The diagram shows an outline of part of the Periodic Table.

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 the1..... agent and is2..... during the reaction.

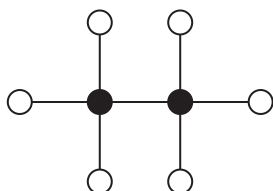
Which words complete gaps 1 and 2?

	1	2
A	oxidising	oxidised
B	oxidising	reduced
C	reducing	oxidised
D	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** CH₆
- B** CH₃
- C** C₂H₄
- D** C₂H₆

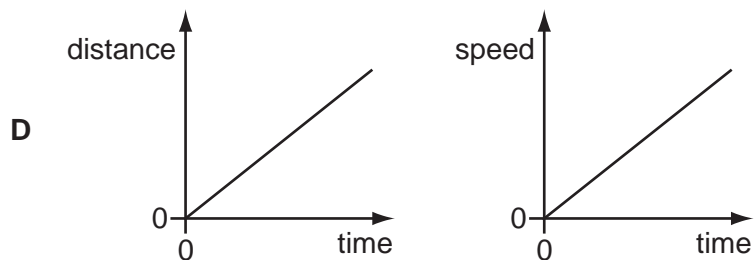
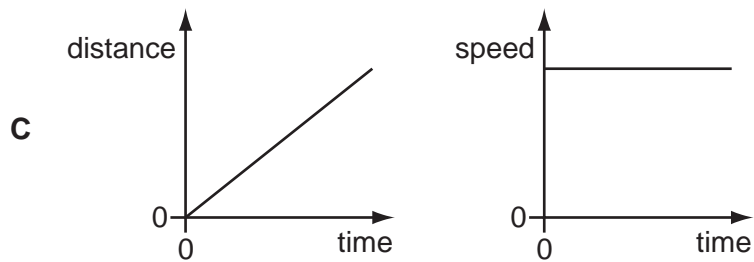
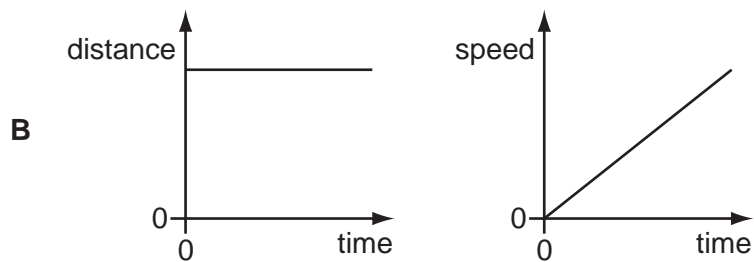
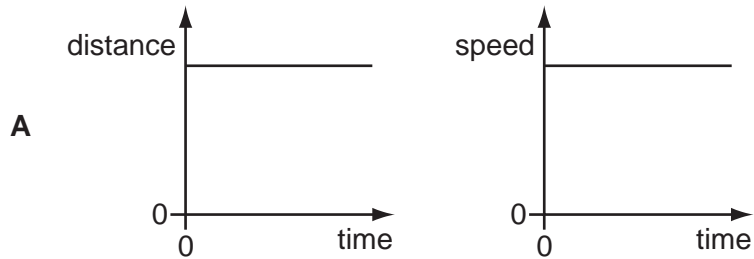
27 Three boiling tubes are each filled with a gas from Group VII in the Periodic Table.

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

Which gases are in the tubes?

	gas 1	gas 2	gas 3
A	Cl	I	Br
B	Br	Cl	I
C	Br	I	Cl
D	I	Br	Cl

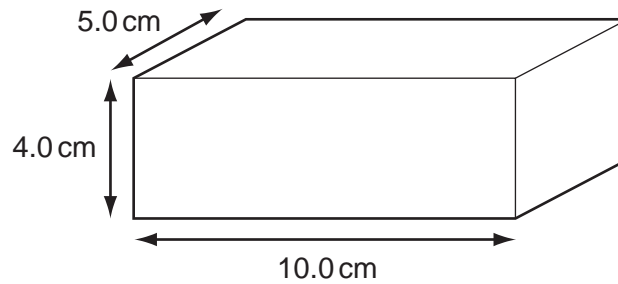
28 Which pair of distance/time and speed/time graphs represents an object which is moving with constant speed?



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 g/cm^3 .

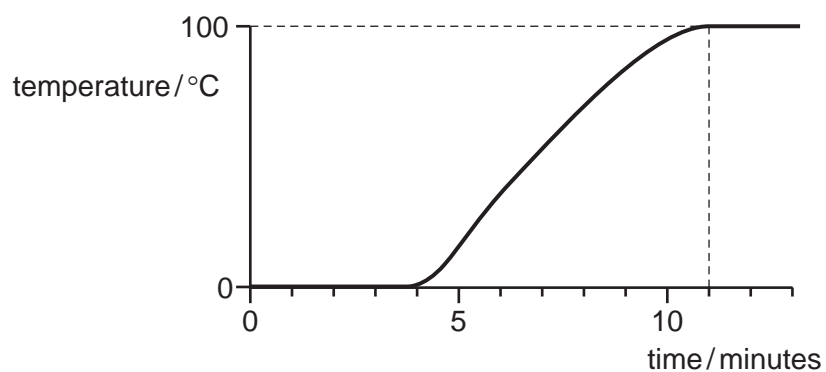


What is the mass of the metal block?

- 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?

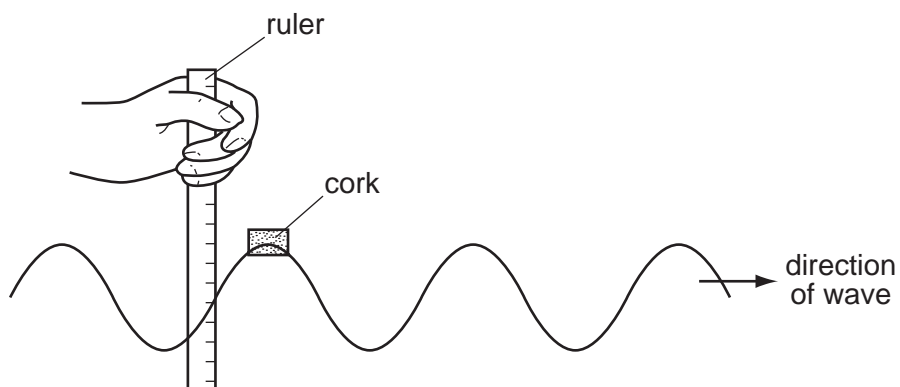
- A** 4 minutes **B** 7 minutes **C** 11 minutes **D** 13 minutes

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
A	microwaves	radio waves	infrared waves
B	microwaves	radio waves	microwaves
C	radio waves	infrared waves	infrared waves
D	radio waves	infrared waves	microwaves

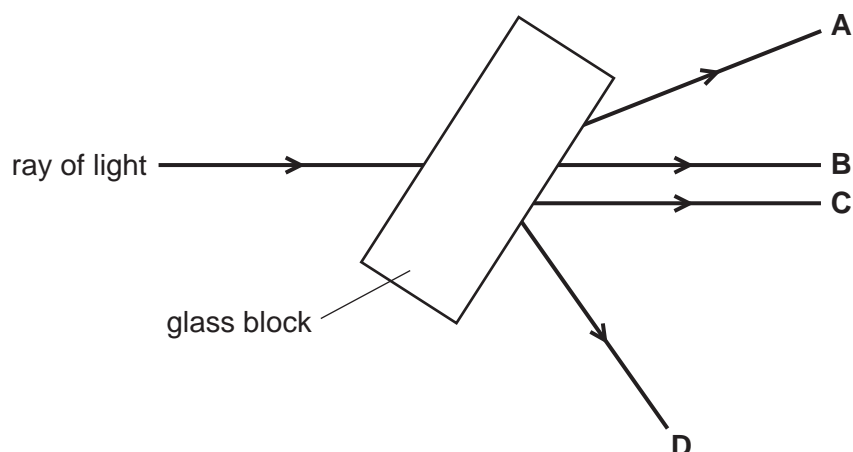
35 A student measures the distance a cork moves up and down on a wave in a tank of water.



Which quantity can she obtain from this measurement?

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

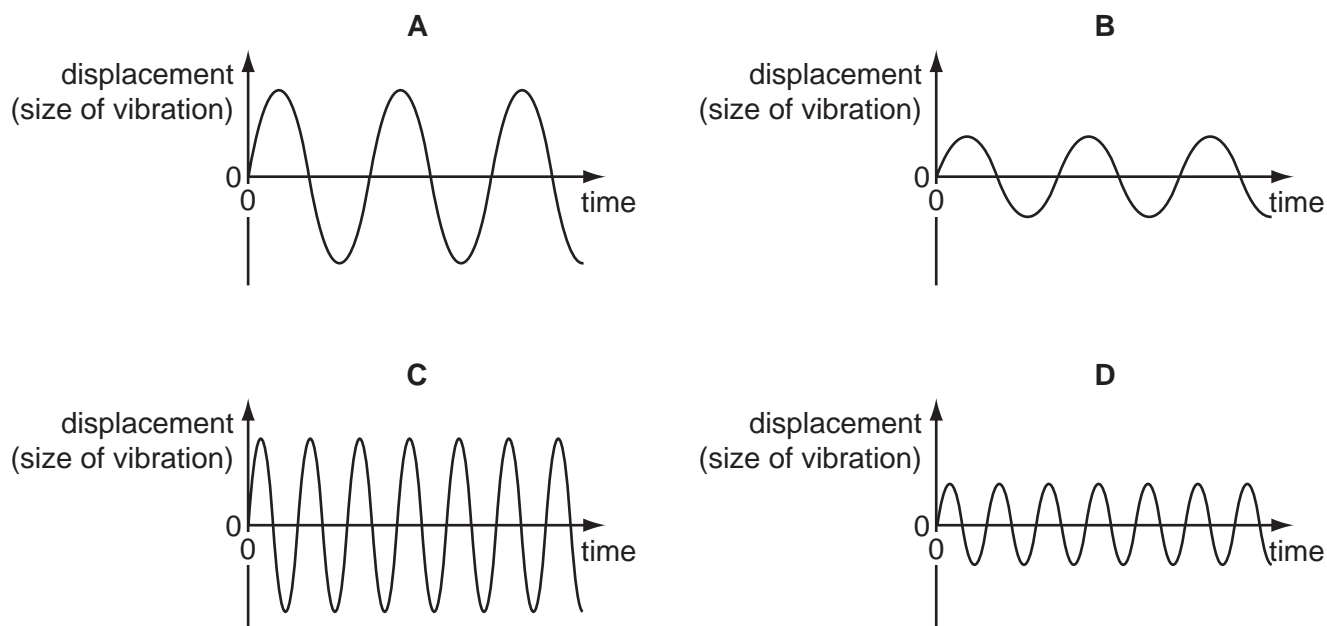
36 Which labelled ray shows the path of the ray of light after it has passed through the glass block?



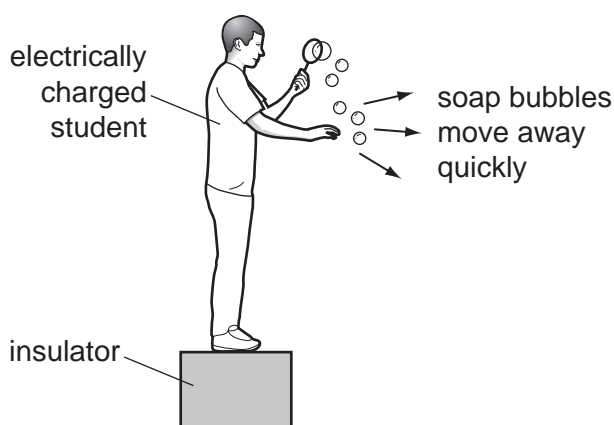
- 37 A microphone is connected to an oscilloscope. The oscilloscope produces graphs of four different sounds.

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.



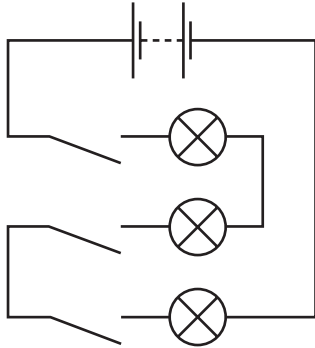
For this movement of the bubbles to happen, which statement is correct?

- 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.

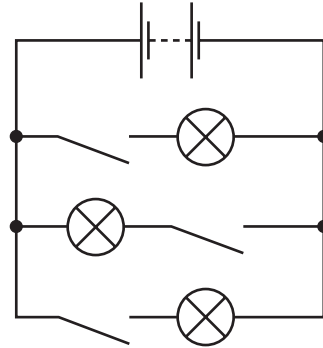
- 39 An electrician wishes to connect three lamps in a circuit so that each lamp can be switched on and off separately.

Which circuit should be used?

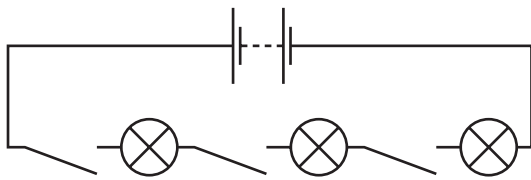
A



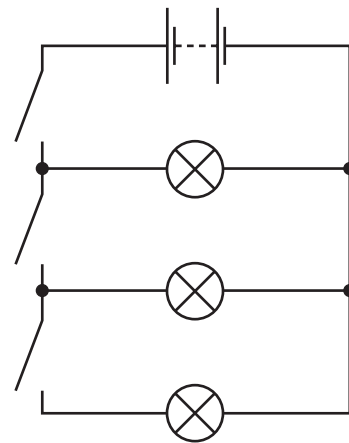
B



C



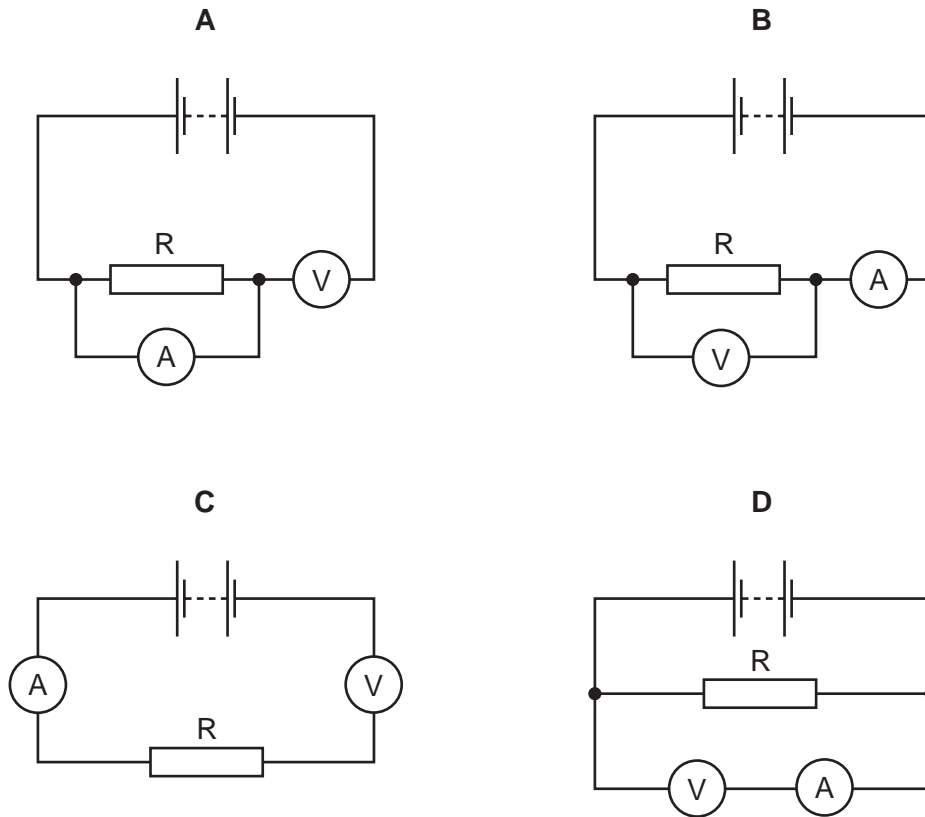
D



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	VIII	IX	X	
		1 H Hydrogen 1										
7	9											
Li Lithium 3	Be Beryllium 4											
23	24											
Na Sodium 11	Mg Magnesium 12											
39	40											
K Potassium 19	Ca Calcium 20	45	48	51	52	55	56	59	59	64	65	
		Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30	
85	88	89	91	93	96	101	101	103	106	108	112	
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48		
133	137	139	178	181	184	190	190	192	195	197	201	
Cs Caesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80		
226	227	227										
Fr Francium 87	Ra Radium 88	Ac Actinium 89										
*58-71 Lanthanoid series †90-103 Actinoid series												
		a	X	b								
Key		a = relative atomic mass	X = atomic symbol	b = proton (atomic) number								
140	141	144	150	152	157	159	162	165	167	169	173	
Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Sm Samarium 62	Pm Promethium 61	Gd Gadolinium 64	Tb Terbium 65	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	Tm Thulium 69	Yb Ytterbium 70	
232	238	238	238	238	238	238	238	238	238	238	238	
Th Thorium 90	Pa Protactinium 91	U Uranium 92	Pu Plutonium 94	Np Neptunium 93	Am Americium 95	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	
286	286	286	286	286	286	286	286	286	286	286	286	
Rn Radon 86	Fr Francium 87	Ra Radium 88	Ac Actinium 89	Th Thorium 90	Pa Protactinium 91	U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	
175	175	175	175	175	175	175	175	175	175	175	175	
Lu Lutetium 71	Yb Ytterbium 70	Tm Thulium 69	Er Erbium 68	Ho Holmium 67	Dy Dysprosium 66	Tb Terbium 65	Gd Gadolinium 64	Sm Samarium 62	Pm Promethium 61	Nd Neodymium 60	Pr Praseodymium 59	
103	103	103	103	103	103	103	103	103	103	103	103	
Lr Lawrencium 103	No Nobelium 102	Md Mendelevium 101	Fm Fermium 100	Es Einsteinium 99	Cf Californium 98	Bk Berkelium 97	Cm Curium 96	Am Americium 95	Pu Plutonium 94	Np Neptunium 93	U Uranium 92	

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

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