



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/11**

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)

\* 8 8 9 9 5 2 5 2 4 0 \*

**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 16.

Electronic calculators may be used.

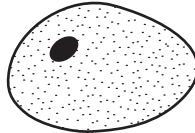
This document consists of **16** printed pages.



1 Which substance can enter a plant cell by diffusion?

- A carbon dioxide
- B cellulose
- C protein
- D starch

2 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  $\times 25$                       B  $\times 200$                       C  $\times 1250$                       D  $\times 2500$

3 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

4 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

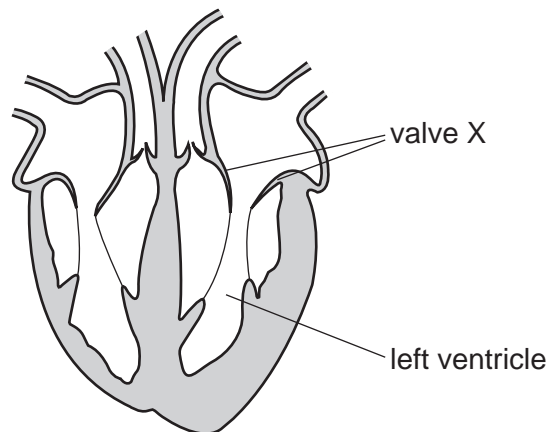
- 5 Mixtures were made from  $5\text{ cm}^3$  of a starch solution and  $2\text{ cm}^3$  of a solution of an enzyme that digests starch. The mixtures were all kept at the same temperature.

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

- 6 What is the word equation for aerobic respiration?
- A** carbon dioxide + glucose  $\rightarrow$  oxygen + water
- B** carbon dioxide + water  $\rightarrow$  glucose + oxygen
- C** glucose + oxygen  $\rightarrow$  carbon dioxide + water
- D** oxygen + water  $\rightarrow$  carbon dioxide + glucose
- 7 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

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

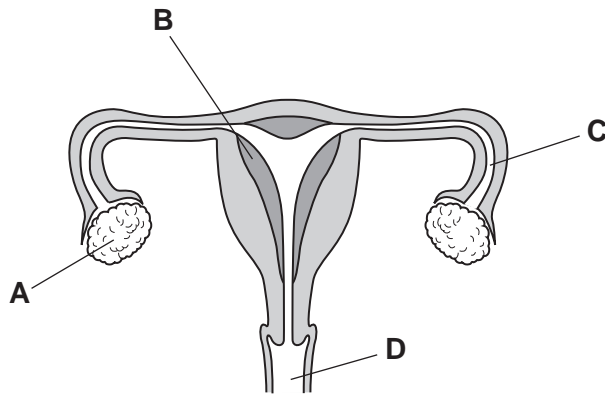
	as it enters	as it is lost
<b>A</b>	liquid	liquid
<b>B</b>	liquid	vapour
<b>C</b>	vapour	liquid
<b>D</b>	vapour	vapour

9 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

10 The diagram shows a section through the female reproductive system.

Where is the fertilised egg implanted?



11 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

12 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

13 The diagram shows five organisms in a food chain.

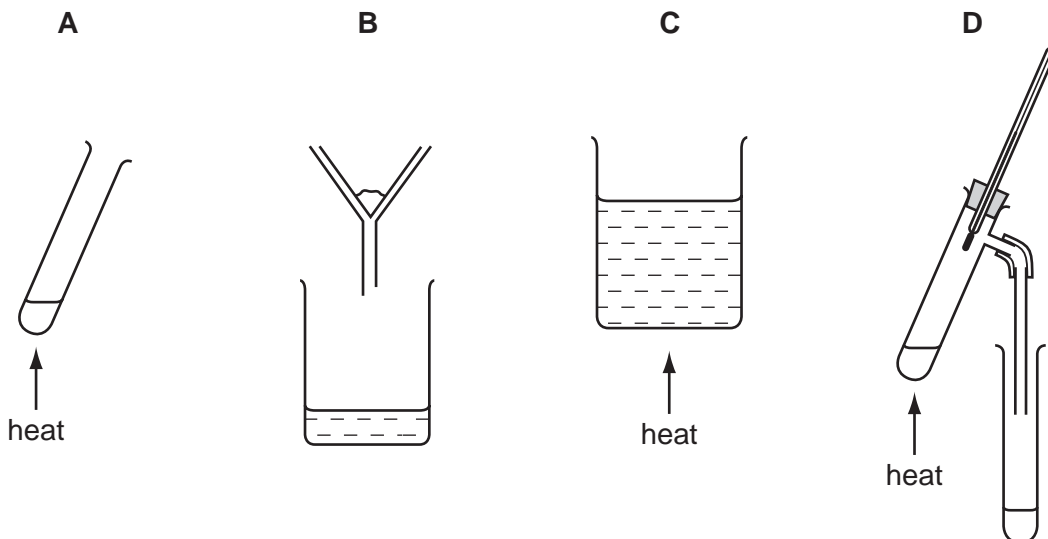
$T \rightarrow U \rightarrow V \rightarrow W \rightarrow X$

Which organisms are consumers?

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

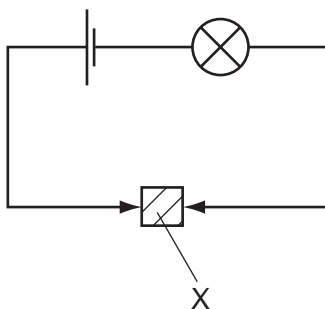
14 Aqueous copper(II) sulfate consists of copper(II) sulfate dissolved in water.

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



15 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

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

Which information in the table is correct?

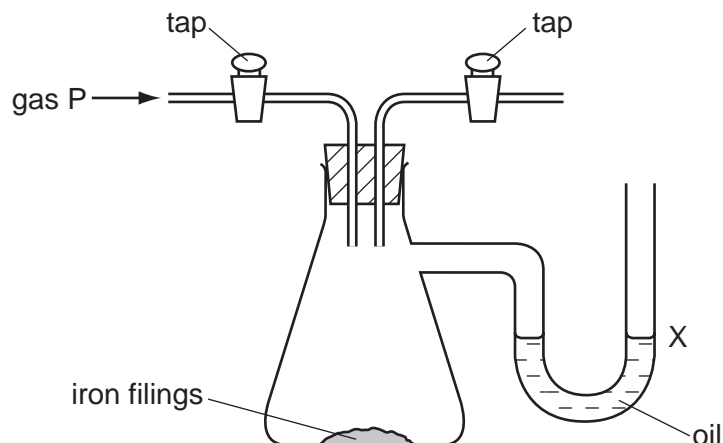
	elements in zinc sulfide	energy change during the formation of zinc sulfide
A	difficult to separate	heat given out
B	difficult to separate	heat taken in
C	easy to separate	heat given out
D	easy to separate	heat taken in

17 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

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 mixture **cannot** be separated by distillation?

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

20 Which statements about air are correct?

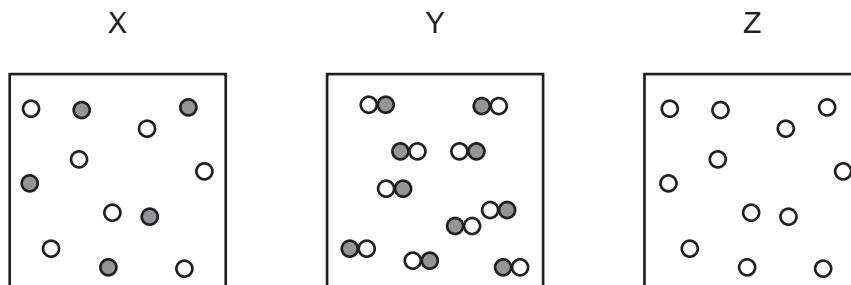
- 1 Air contains a small amount of argon which is a noble gas.
- 2 Air is made up of 78% oxygen and 21% nitrogen.
- 3 Air contains carbon dioxide which is a product of both respiration and the combustion of natural gas.

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

21 Which substance conducts electricity?

- A** CO<sub>2</sub>(g)      **B** NaCl(s)      **C** NaOH(aq)      **D** S(s)

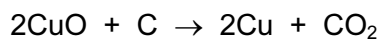
22 The diagrams represent the particles in substances X, Y and Z.



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

23 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?

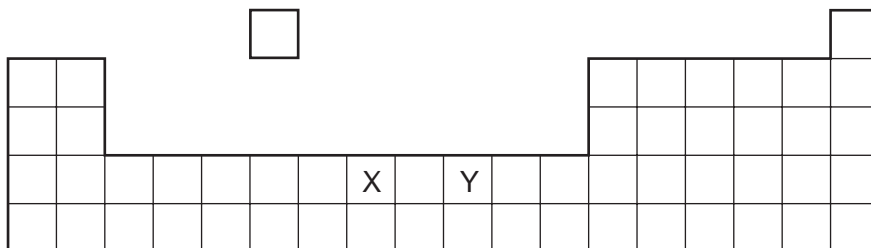
	1	2
<b>A</b>	oxidising	oxidised
<b>B</b>	oxidising	reduced
<b>C</b>	reducing	oxidised
<b>D</b>	reducing	reduced

24 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



25 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

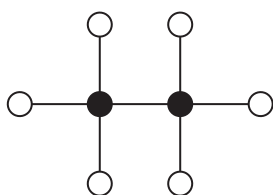
26 Three boiling tubes are each filled with a gas from Group VII in the Periodic Table.

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>	<i>Cl</i>	I	Br
<b>B</b>	Br	<i>Cl</i>	I
<b>C</b>	Br	I	<i>Cl</i>
<b>D</b>	I	Br	<i>Cl</i>

27 The diagram shows a molecule of ethane.



key

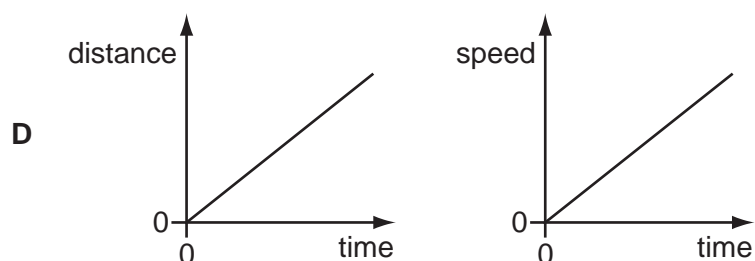
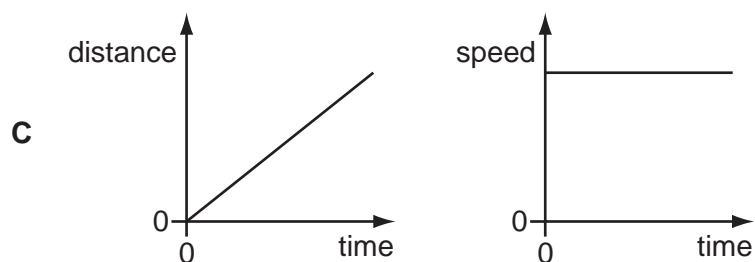
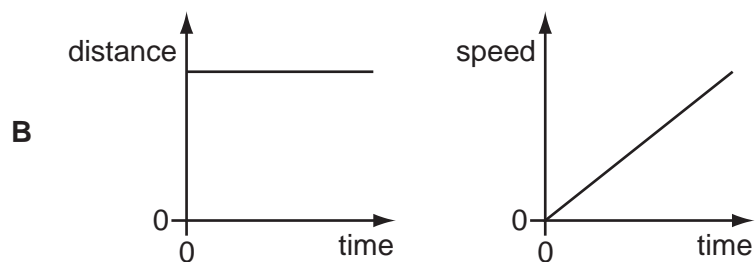
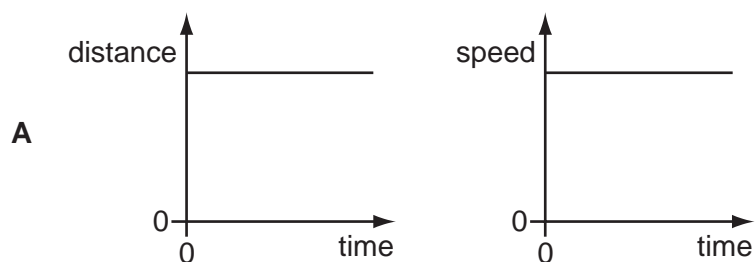
● carbon atom

○ hydrogen atom

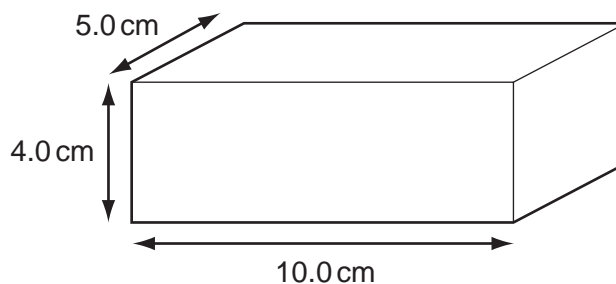
What is the molecular formula of ethane?

**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>

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



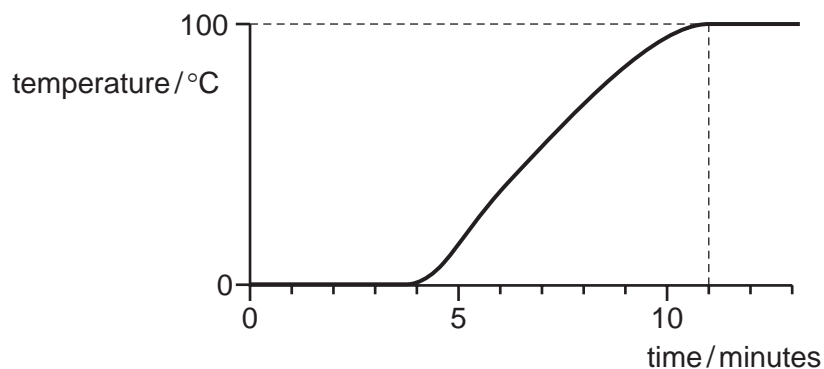
- 29 A rectangular metal block has the dimensions shown. The density of the metal is  $8.0 \text{ g/cm}^3$ .



What is the mass of the metal block?

- A** 160g      **B** 320g      **C** 400g      **D** 1600g
- 30 Which energy resource is non-renewable?
- A** geothermal energy  
**B** hydroelectric energy  
**C** nuclear energy  
**D** wave energy
- 31 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
- 32 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

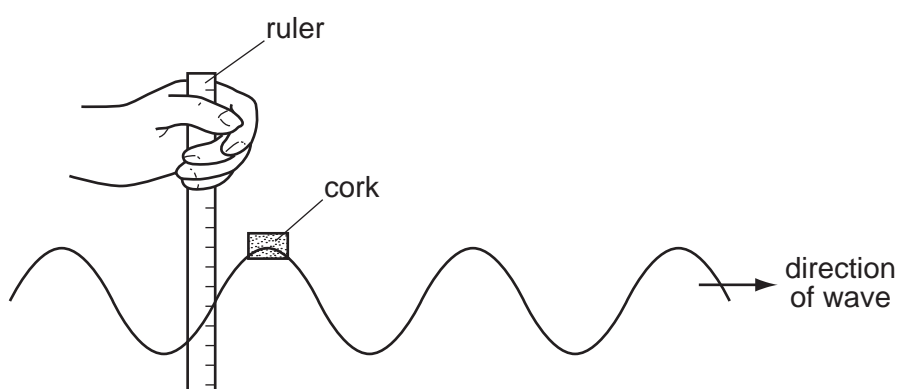
33 The International Space Station orbits the Earth in the vacuum above the atmosphere.

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

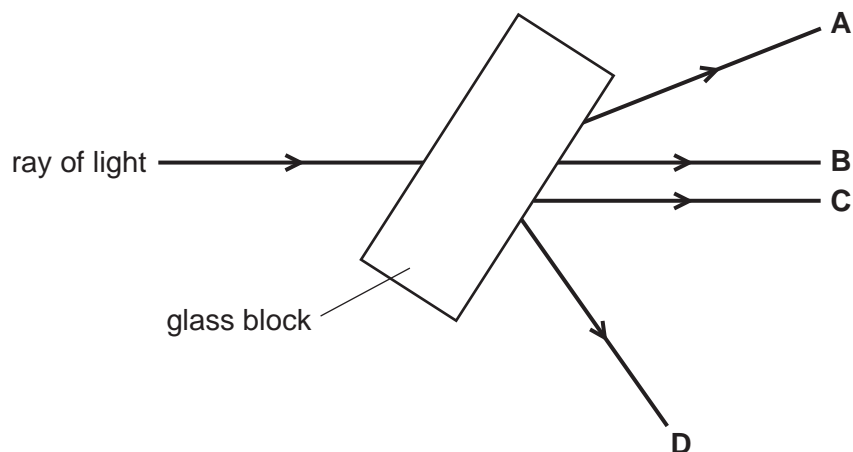
34 A student measures the distance a cork moves up and down on a wave in a tank of water.



Which quantity can she obtain from this measurement?

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

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



36 Electromagnetic waves have many different applications.

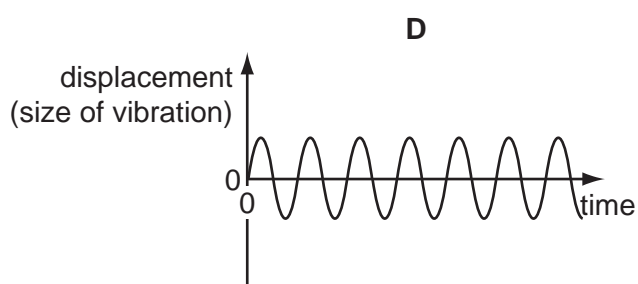
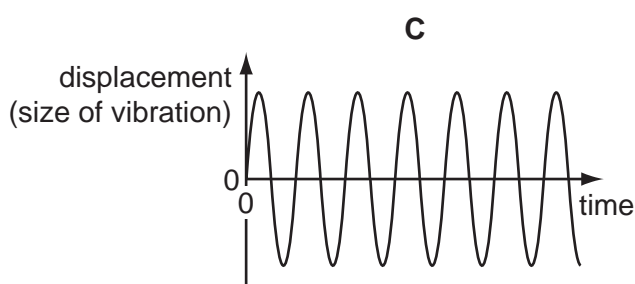
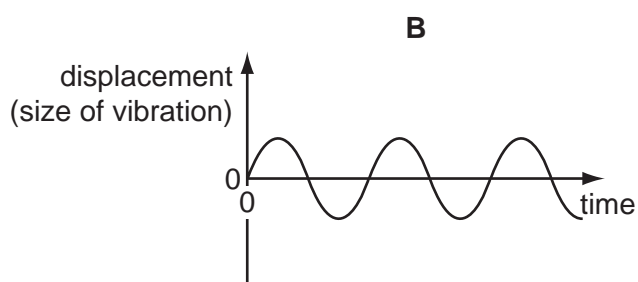
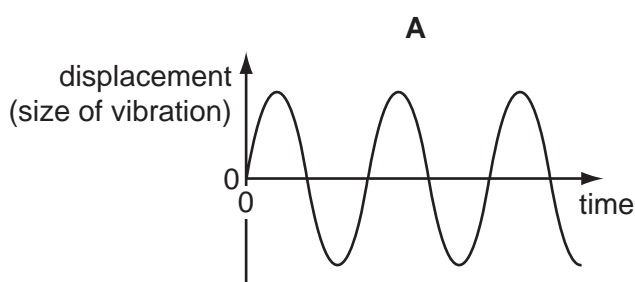
Which row identifies the type of electromagnetic wave used in each application?

	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

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

The scales for the graphs are the same.

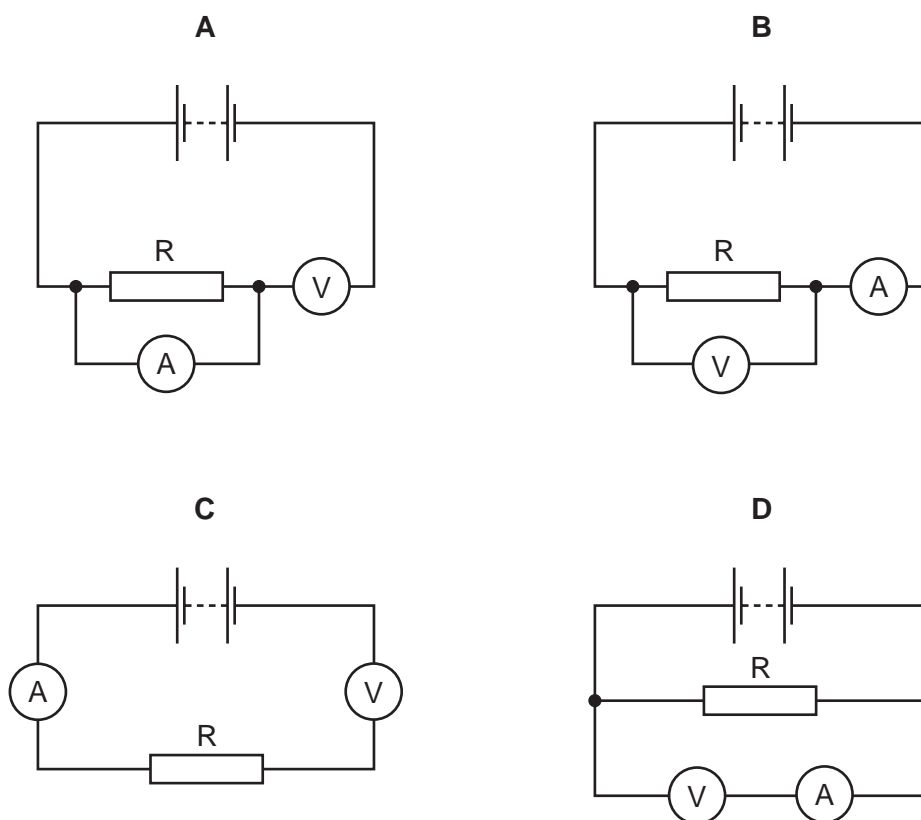
Which graph shows the quietest sound with the highest pitch?



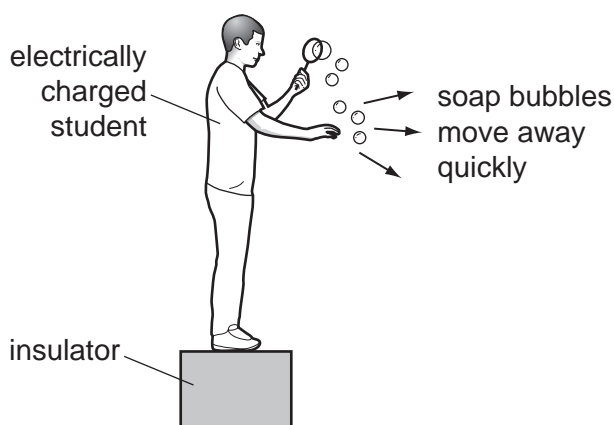
38 A student wishes to find the resistance of resistor R.

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

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



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



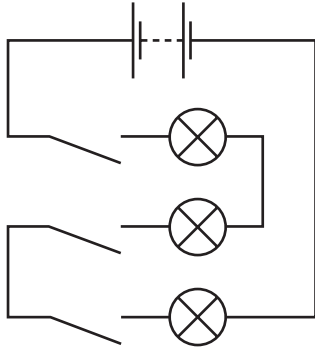
For this movement of the bubbles to happen, which statement is correct?

- 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.

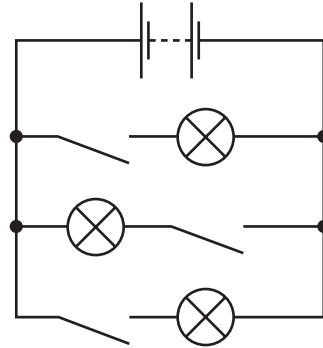
- 40 An electrician wishes to connect three lamps in a circuit so that each lamp can be switched on and off separately.

Which circuit should be used?

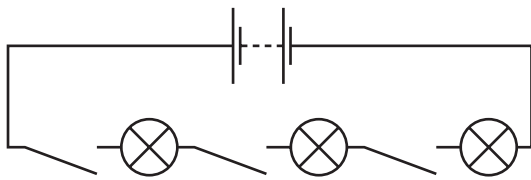
**A**



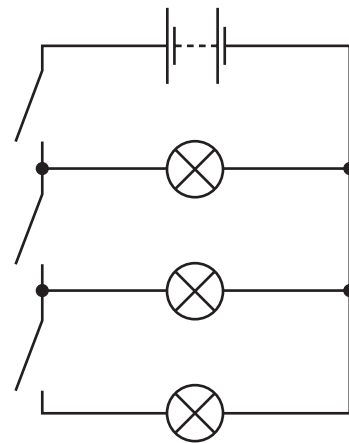
**B**



**C**



**D**



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

		Group																	
		I	II	III	IV	V	VI	VII	VIII	IX	X								
		1 <b>H</b> Hydrogen 1																	
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4																
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12																
39	40	<b>K</b> Potassium 19	<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	88	<b>Rb</b> Rubidium 37	<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	101 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54	
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	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>Fr</b> Francium 87	<b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89															
		*58-71 Lanthanoid series																	
		†90-103 Actinoid series																	
		169 <b>Tm</b> Thulium 69																	
		173 <b>Yb</b> Ytterbium 70																	
		175 <b>Lu</b> Lutetium 71																	
		167 <b>Er</b> Erbium 68																	
		168 <b>Fm</b> Fermium 100																	
		165 <b>Ho</b> Holmium 67																	
		162 <b>Dy</b> Dysprosium 66																	
		159 <b>Tb</b> Terbium 65																	
		157 <b>Gd</b> Gadolinium 64																	
		152 <b>Eu</b> Europium 63																	
		150 <b>Sm</b> Samarium 62																	
		144 <b>Nd</b> Neodymium 60																	
		141 <b>Pr</b> Praseodymium 59																	
		140 <b>Ce</b> Cerium 58																	
		238 <b>U</b> Uranium 92																	
		232 <b>Th</b> Thorium 90																	
		94 <b>Pu</b> Plutonium 94																	
		93 <b>Np</b> Neptunium 93																	
		91 <b>Pa</b> Protactinium 91																	
		96 <b>Cm</b> Curium 96																	
		97 <b>Bk</b> Berkelium 97																	
		98 <b>Cf</b> Californium 98																	
		99 <b>Es</b> Einsteinium 99																	
		101 <b>Md</b> Mendelevium 101																	
		102 <b>No</b> Nobelium 102																	
		103 <b>Lr</b> Lawrencium 103																	

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

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

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