Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice **May/June 2016**

45 minutes

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

9350306476

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 **17** printed pages and **3** blank pages.

1 All living organisms are capable of

A asexual reproduction.

B excretion.

C photosynthesis.

D phototropism.

2 Which is an example of diffusion?

A the net movement of carbon dioxide down the carbon dioxide concentration gradient

B the net movement of carbon dioxide up the sugar concentration gradient

C the net movement of oxygen down the carbon dioxide concentration gradient

D the net movement of sugar moving up the sugar concentration gradient

3 One method of preventing food spoilage is to store it at 4 °C in a refrigerator.

Why does storing food at low temperatures help to prevent food spoilage?

A It decreases enzyme activity.

B It denatures enzymes.

C It increases enzyme production.

D It kills cells.

4 What is needed in a cell to make a protein molecule?

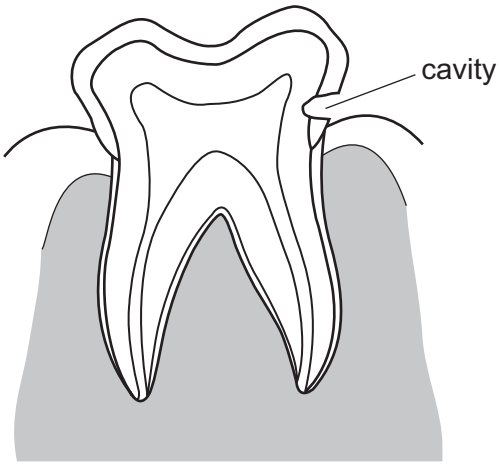
	amino acids	energy	glycerol
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

key

✓ = yes

✗ = no

5 The diagram shows a tooth with a cavity caused by decay.



Which parts of the tooth have been affected by the decay?

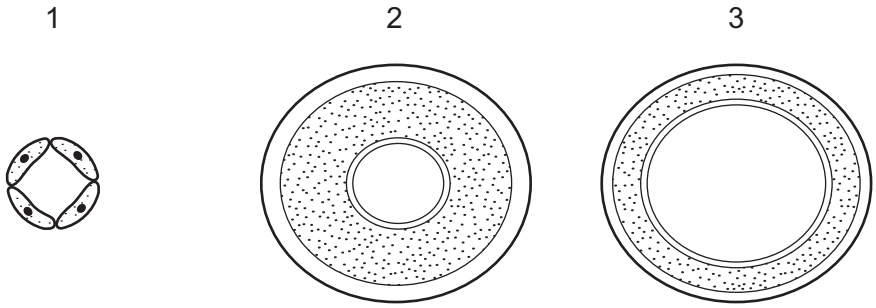
A crown and root

B dentine and enamel

C enamel and gum

D enamel and pulp

6 The diagrams show the cross-section of three blood vessels, not drawn to the same scale.



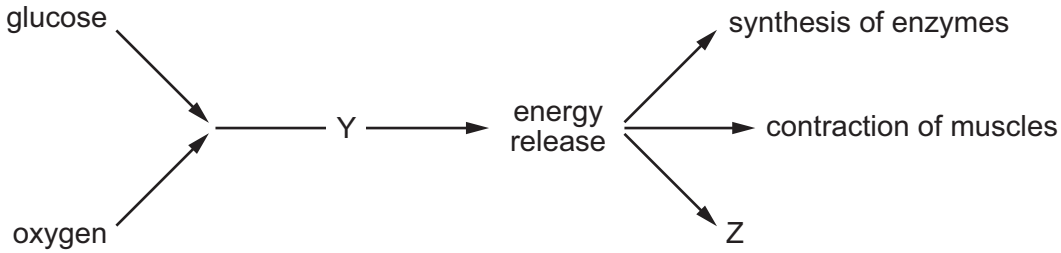
What are these vessels?

	1	2	3
A	artery	capillary	vein
B	artery	vein	capillary
C	capillary	artery	vein
D	capillary	vein	artery

7 Which conditions would cause the fastest rate of transpiration in a plant?

	temperature	humidity
A	high	high
B	high	low
C	low	high
D	low	low

8 The diagram shows what happens to glucose in the body.



What are processes Y and Z?

	Y	Z
A	photosynthesis	growth
B	photosynthesis	respiration
C	respiration	growth
D	respiration	photosynthesis

9 After feeding a pet animal, it is kept in a large box overnight.

Why must the box have holes in it?

A so that food can be pushed through the holes

B so that the pet can see out

C so that urine can drain out

D to allow the exchange of oxygen and carbon dioxide with the outside

10 What is an example of homeostasis?

A adding acid to food in the stomach

B breathing out water vapour from the lungs

C keeping the body temperature constant

D producing adrenaline in the adrenal glands

11 A student placed four sets of seeds in different conditions.

Which set of conditions must be kept constant to show the effect of temperature on germination?

A temperature and water only

B temperature only

C temperature, water and oxygen

D water and oxygen only

12 Which feature of human reproduction defines it as sexual reproduction?

A A woman's menstrual cycle controls when she can become pregnant.

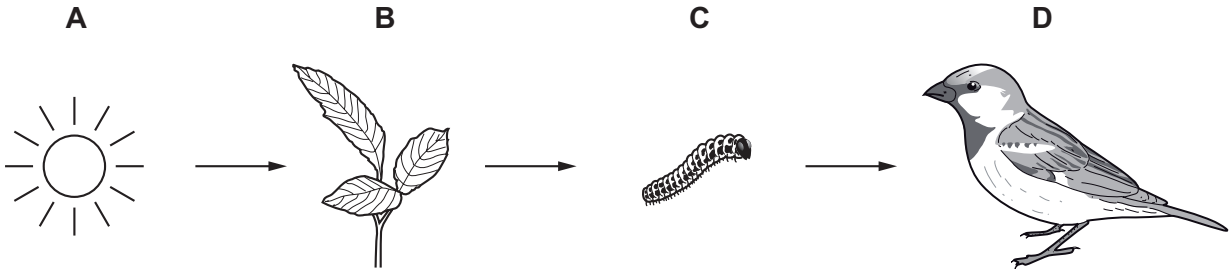
B Both parents are often involved in bringing up the baby.

C Human babies can be fed entirely on breastmilk.

D Joining of nuclei from sperm and egg must take place.

13 The diagram shows a food chain.

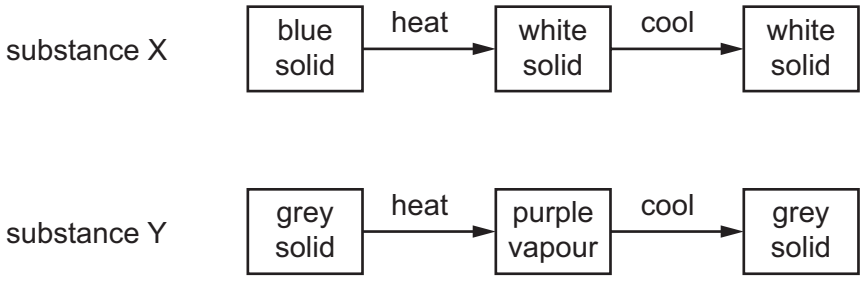
Which is the producer?



14 Which method of separation **cannot** be used to obtain a substance from each mixture?

	substance obtained from mixture	method
A	different colours from an ink mixture	chromatography
B	refinery gas from petroleum	fractional distillation
C	salt from salty water	filtration
D	water from ink	distillation

15 Two different substances, X and Y, are heated and then cooled. The observations are shown.



Which type of change occurs when X and Y are heated?

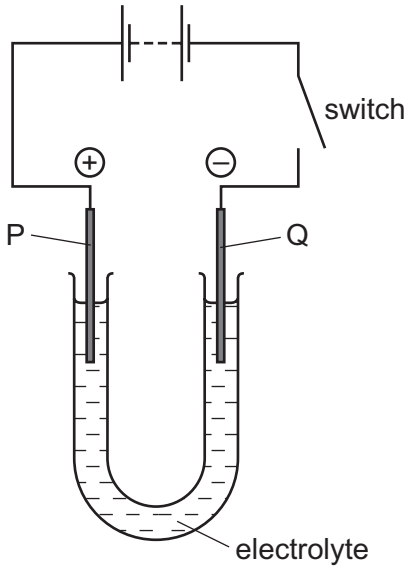
	X	Y
A	chemical	chemical
B	chemical	physical
C	physical	chemical
D	physical	physical

16 Phosphoric acid is a compound containing three hydrogen atoms, one phosphorous atom and four oxygen atoms.

What is the formula of phosphoric acid?

A $3HP_4O$ **B** $3HPO_4$ **C** H_3P_4O **D** H_3PO_4

17 The diagram shows the electrolysis of a compound.



When the switch is closed, the solution around electrode P turns orange because a halogen is formed.

The positive electrode P is called the ……1……, and the halogen is ……2…… .

Which words complete gaps 1 and 2?

	1	2
A	anode	bromine
B	anode	chlorine
C	cathode	bromine
D	cathode	chlorine

18 Which statement shows that methane, CH_4, is oxidised when it burns?

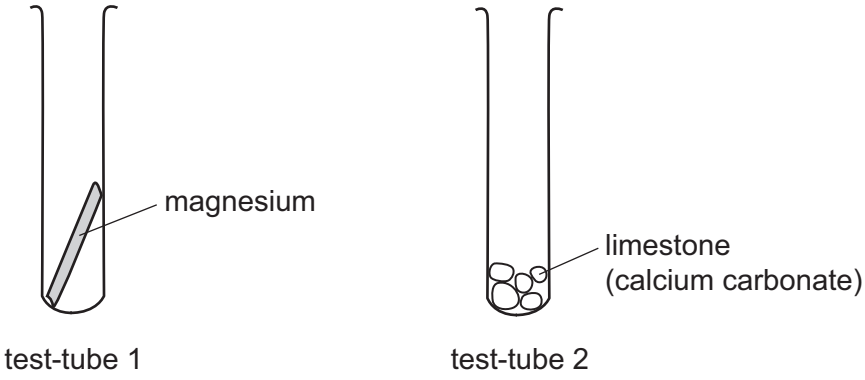
A The products of the reaction are gaseous.

B The products of the reaction are water and carbon dioxide.

C The reaction is exothermic.

D The total number of oxygen atoms has increased during the reaction.

19 Dilute hydrochloric acid is added to each of the test-tubes shown.



Which gases are produced?

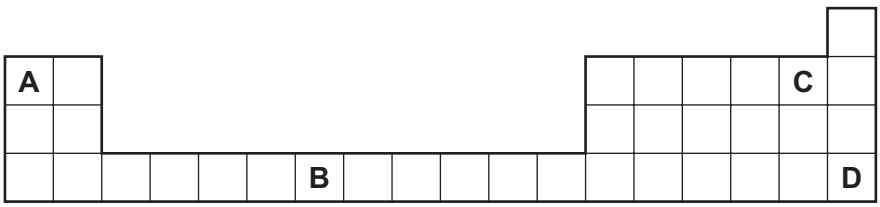
	test-tube 1	test-tube 2
A	chlorine	carbon dioxide
B	chlorine	oxygen
C	hydrogen	carbon dioxide
D	hydrogen	oxygen

20 Which test and result show that a fertiliser contains nitrate ions?

	test	result
A	warm with aqueous sodium hydroxide	gas turns litmus blue
B	warm with aqueous sodium hydroxide	gas turns litmus red
C	warm with aqueous sodium hydroxide, then add aluminium metal	gas turns litmus blue
D	warm with aqueous sodium hydroxide, then add aluminium metal	gas turns litmus red

21 The diagram shows part of the Periodic Table.

Which letter shows the position of a metal with a low melting point?



22 Filament lamps require an inert atmosphere.

Which gas is used to fill these lamps?

A argon

B helium

C hydrogen

D oxygen

23 What is a general property of metals?

A brittle

B low density

C low melting point

D oxides are basic

24 Which mixture forms an alloy?

A copper and zinc

B hydrogen and oxygen

C iron and sulfur

D sugar and water

25 Which gas emitted from a car exhaust contributes to acid rain?

A carbon monoxide, CO

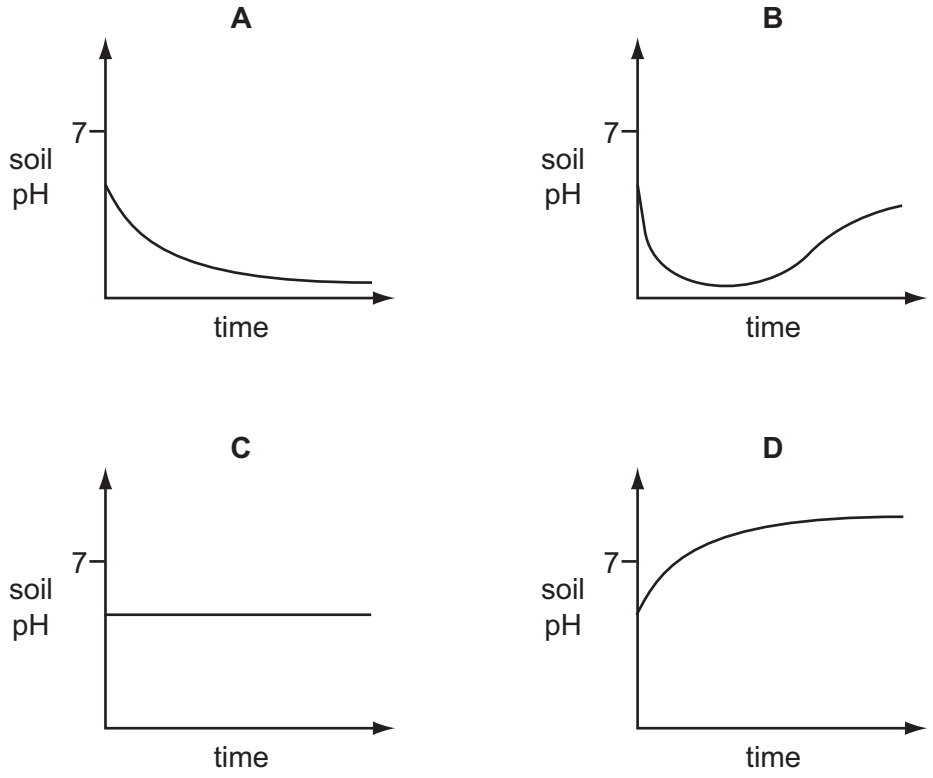
B nitrogen, N_2

C nitrogen monoxide, NO

D water vapour, H_2O

[Turn over

26 Which graph shows how the pH of soil changes when lime is added?



27 Poly(ethene) and ethene are both hydrocarbons.

Poly(ethene) is formed from ethene.

Ethene turns aqueous bromine colourless, but poly(ethene) does not.

Which statement is correct?

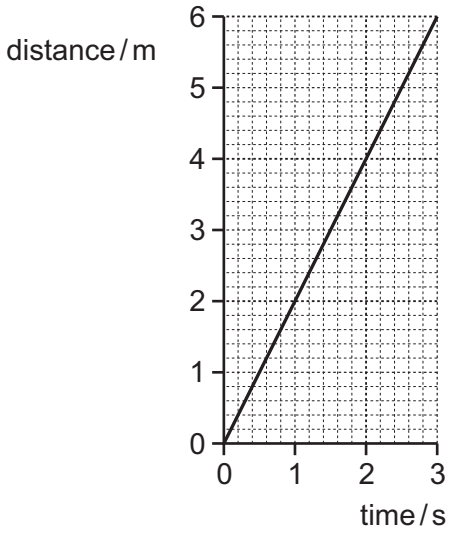
A Ethene is a saturated hydrocarbon.

B Ethene molecules are monomer units.

C Only a few molecules of ethene are used to make poly(ethene).

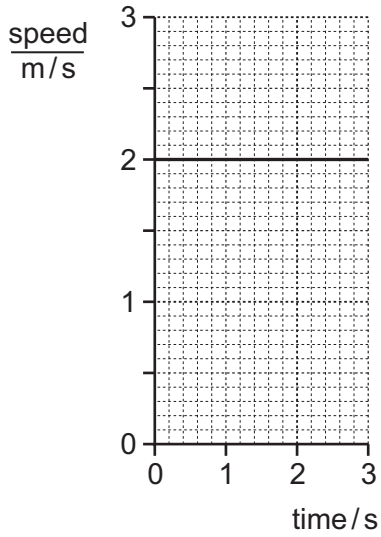
D Poly(ethene) is an unsaturated hydrocarbon.

28 The distance / time graph represents a short journey.

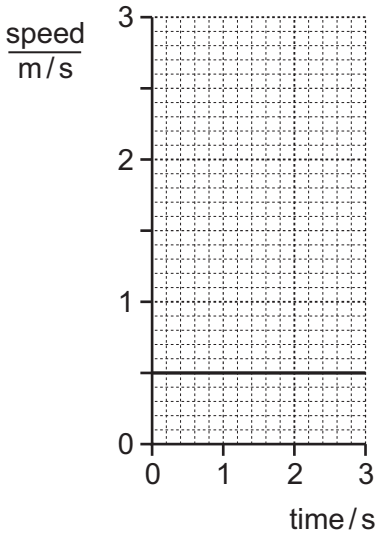


Which speed / time graph represents the same journey?

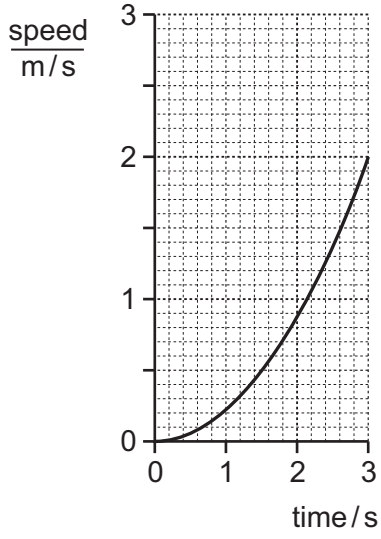
A



B



C



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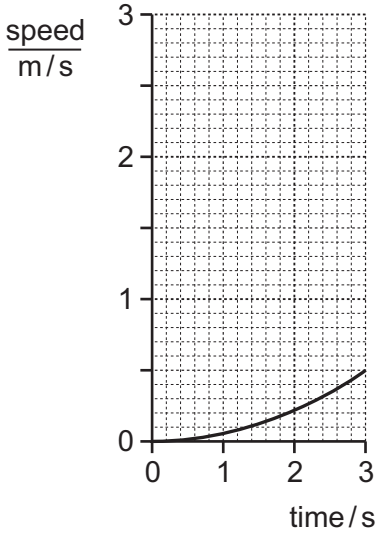
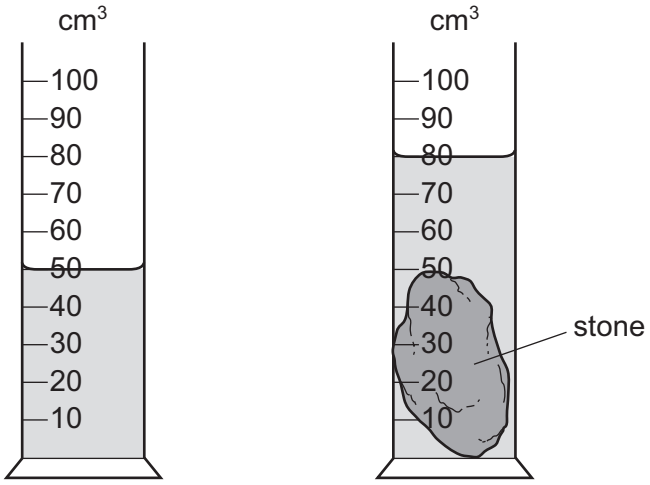


29 A stone of mass 60 g is placed in a measuring cylinder containing water. The water level in the measuring cylinder rises as shown.



What is the density of the stone?

A $0.50\,g/cm^3$ **B** $0.75\,g/cm^3$ **C** $1.3\,g/cm^3$ **D** $2.0\,g/cm^3$

30 A man climbs up a ladder, then stops. Some of the energy which the man had before he started climbing the ladder is converted into another type of energy.

Which row shows this energy change?

	energy before climbing	energy after climbing
A	chemical	gravitational
B	gravitational	chemical
C	gravitational	kinetic
D	kinetic	gravitational

31 The air in a room exerts a pressure on the walls of the room.

What causes this pressure?

A the air molecules being very close to each other

B the air molecules colliding with each other

C the air molecules colliding with the walls

D the air molecules expanding

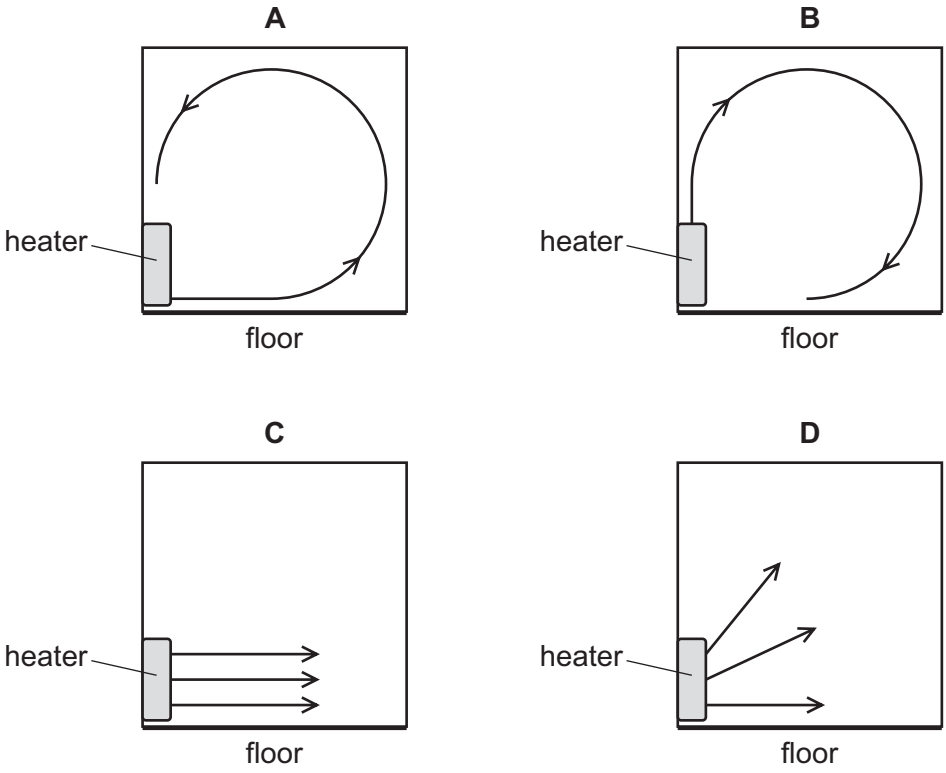
32 A substance is a gas when its temperature is 65 °C.

How do the boiling point and the melting point of this substance compare with 65 °C?

	boiling point	melting point
A	above 65 °C	above 65 °C
B	above 65 °C	below 65 °C
C	below 65 °C	above 65 °C
D	below 65 °C	below 65 °C

33 A heater in a room is switched on. The room is heated by convection.

Which diagram shows the convection current produced in the air?



34 Diagram 1 represents a wave.

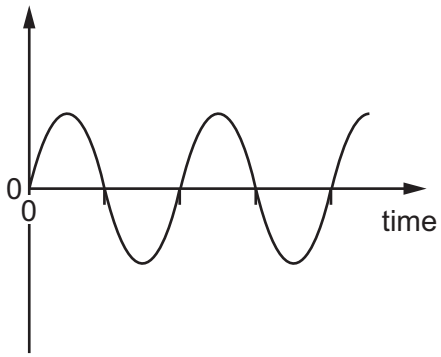
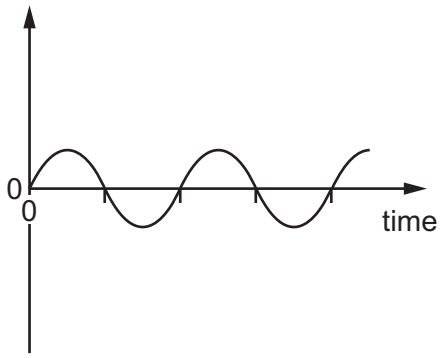


diagram 1

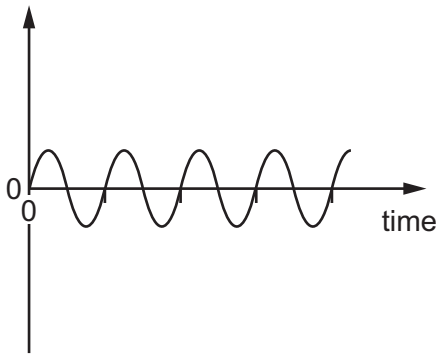
Which diagram below represents a wave with double the frequency and half the amplitude of the wave in diagram 1?

The scales are the same in all the diagrams.

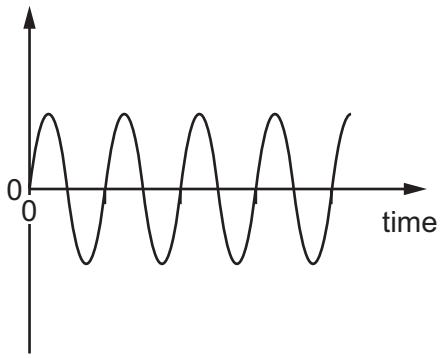
A



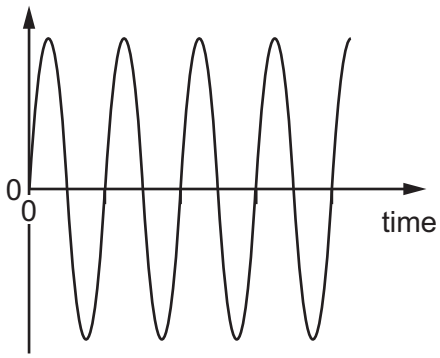
B



C



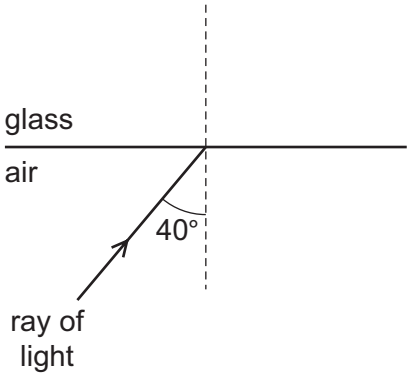
D



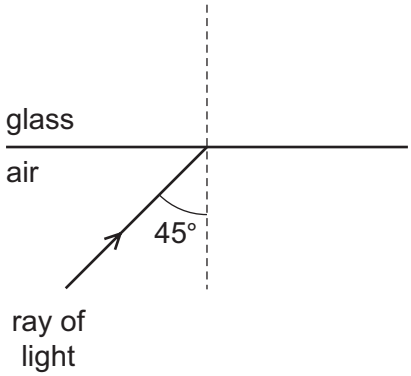
35 A ray of light strikes the boundary between glass and air. The critical angle for glass in air is 42°.

In which diagram does the ray undergo total internal reflection?

A



B



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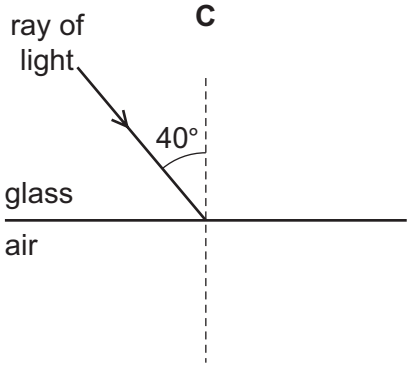
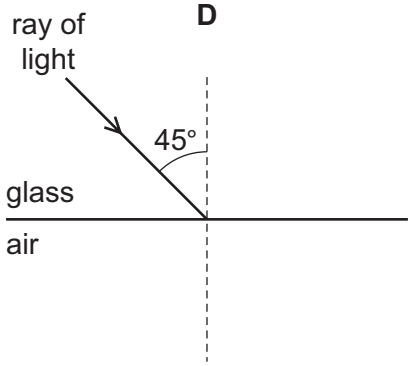


D



36 Some electrical devices require a magnet to be switched on and off many times in a second.

Which type of magnet may be used?

A an electromagnet only

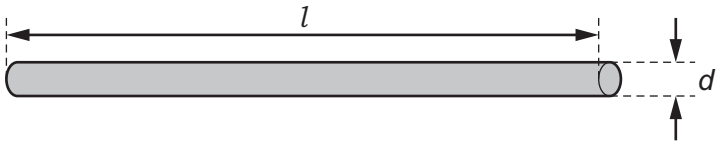
B a permanent magnet only

C either a permanent magnet or an electromagnet

D neither a permanent magnet nor an electromagnet

[Turn over

37 The diagram shows a wire of length l and diameter d.



Which pair of changes **must** increase the resistance of the wire?

A decrease l and decrease d

B decrease l and increase d

C increase l and decrease d

D increase l and increase d

38 The potential difference across a resistor is 5.0 V, and the current in it is 2.0 A.

What is the resistance of the resistor?

A 0.40 Ω **B** 2.5 Ω **C** 7.0 Ω **D** 10 Ω

39 Which row shows how lamps are connected in a lighting circuit and gives an advantage of connecting them in this way?

	how lamps are connected	advantage of connecting them in this way
A	in parallel	they can be switched separately
B	in parallel	they share the voltage
C	in series	they can be switched separately
D	in series	they share the voltage

40 Which row describes the properties of β-particles (beta-particles)?

	they are electromagnetic waves	they are ionising
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = yes
✗ = no

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The Periodic Table of Elements

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

Key

atomic number
atomic symbol
name
relative atomic mass

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

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