Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/13**

Paper 1 Multiple Choice **October/November 2016**

45 minutes

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

4066482233

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.

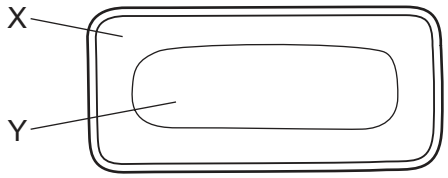
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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.

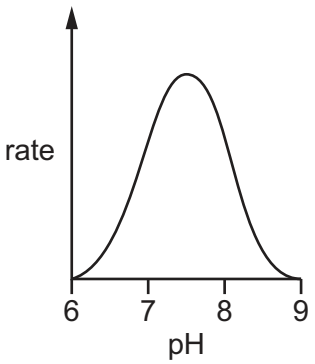
1 The diagram shows a plant cell.



In which regions of the cell are the chloroplasts and nucleus found?

	chloroplasts	nucleus
A	X	X
B	X	Y
C	Y	X
D	Y	Y

2 The diagram shows how the rate of an enzyme-controlled reaction is affected by pH.



What is the optimum pH for this enzyme-controlled reaction?

A 6 **B** 6.5 **C** 7.5 **D** 9

3 Which result with the biuret test would show protein is present?

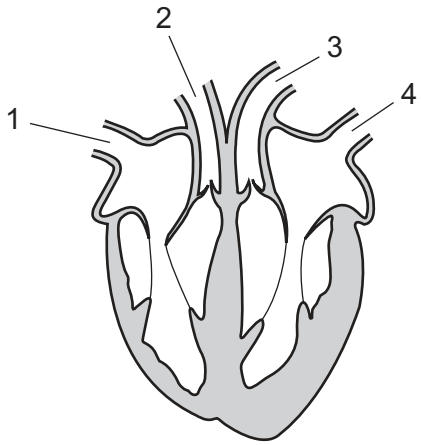
A blue

B green

C orange

D purple

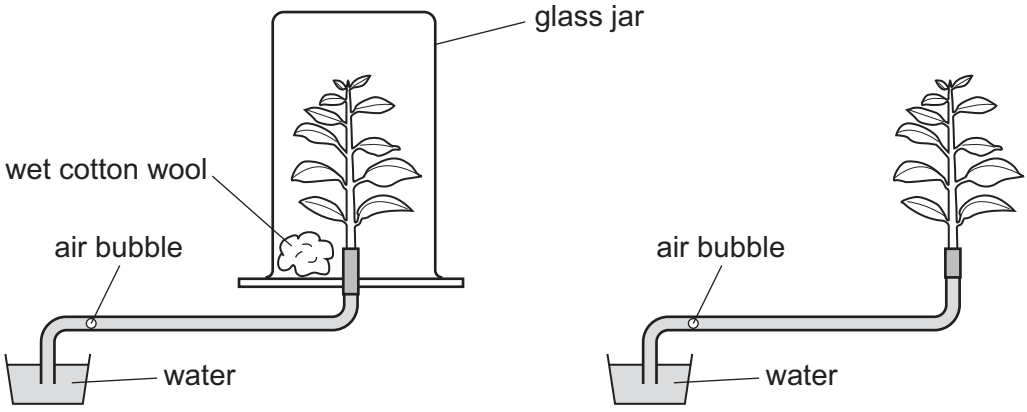
4 The diagram shows a section through the human heart.



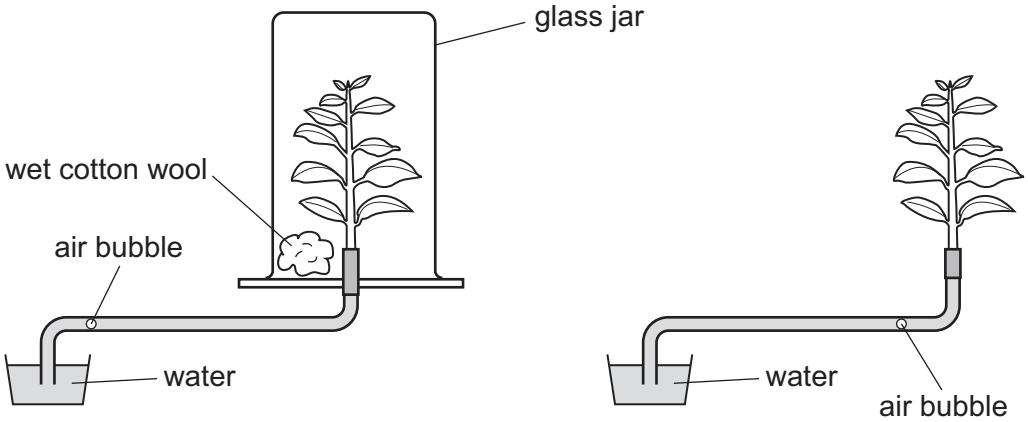
Which two blood vessels are arteries?

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

5 The diagram shows two stages in an experiment on water uptake in two shoots from the same plant. Both shoots are kept in the light for one hour.



at start



after one hour

What does the experiment show?

A Humidity affects the rate of water uptake.

B Light affects the rate of water uptake.

C Plants lose more water at higher temperatures.

D Plants take up water by their roots.

6 Limewater can be used to investigate a difference in the composition of inspired and expired air.

Which statement is correct?

A Expired air turns limewater milky because it contains less carbon dioxide.

B Expired air turns limewater milky because it contains more carbon dioxide.

C Inspired air turns limewater milky because it contains less oxygen.

D Inspired air turns limewater milky because it contains more oxygen.

7 What could be measured to determine the rate of aerobic respiration of a plant?

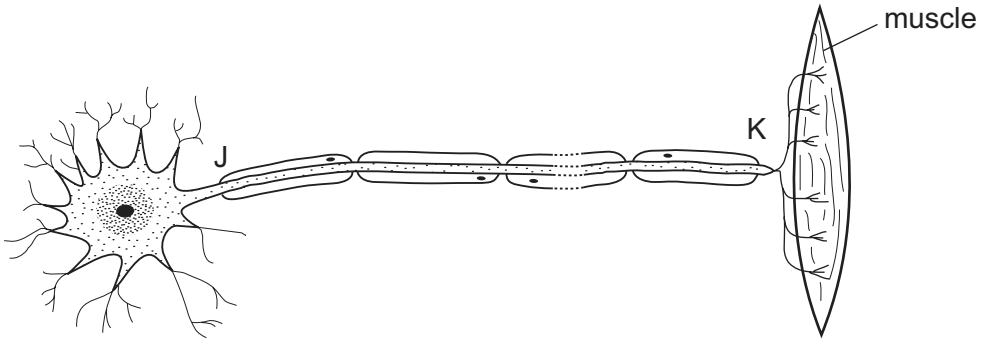
A the rate of production of alcohol in the dark

B the rate of production of carbon dioxide in the dark

C the rate of production of glucose in the light

D the rate of production of oxygen in the light

8 The diagram shows a neurone and associated structures.



What type of neurone is shown and in which direction do impulses travel?

	type of neurone	direction of impulse
A	motor	J to K
B	motor	K to J
C	sensory	J to K
D	sensory	K to J

9 What are the effects of adrenaline?

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

[Turn over

10 In a human female, where is the egg usually fertilised?

A ovary

B oviduct

C uterus

D vagina

11 Which aspect of human reproduction defines it as sexual reproduction?

A A man and woman must have sexual intercourse to produce a baby naturally.

B Genetic material from each parent combines to produce a zygote.

C Human babies are naturally fed on breast milk.

D Young women have menstrual periods when they are not pregnant.

12 The diagram shows a food chain.

Which organisms pass the greatest amount of energy along the food chain?

13 Which natural resource is renewable?

A coal

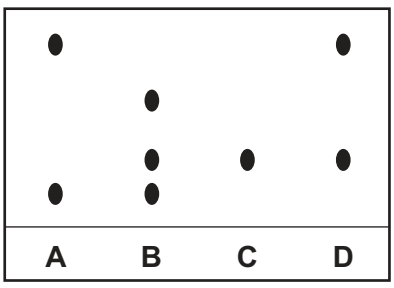
B natural gas

C oil

D wood

14 The diagram shows the chromatogram obtained from four different substances.

Which substance is pure?



15 Which statements about atomic structure are correct?

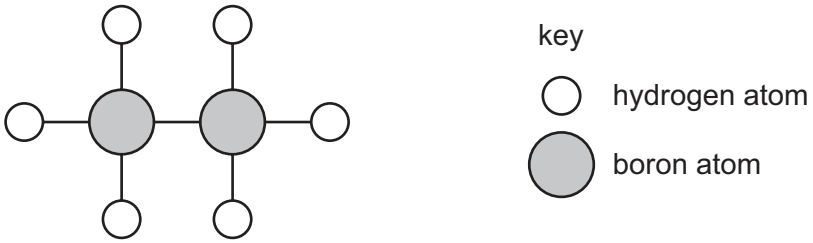
1 A neutron is a particle with negligible mass.

2 The nucleus is at the centre of the atom and contains only protons and neutrons.

3 The nucleon number is the total number of protons and neutrons in an atom.

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

16 A model of a molecule is shown.



Which row shows the formula of this molecule and describes the type of bonding between the atoms?

	formula	bonding
A	$2BH_3$	covalent
B	$2BH_3$	ionic
C	B_2H_6	covalent
D	B_2H_6	ionic

17 Which word equation represents a redox reaction?

A carbon + copper oxide → copper + carbon dioxide

B hydrochloric acid + potassium hydroxide → potassium chloride + water

C magnesium carbonate → magnesium oxide + carbon dioxide

D sodium sulfate + barium nitrate → barium sulfate + sodium nitrate

18 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

	type of reaction	temperature change
A	endothermic	decrease
B	endothermic	increase
C	exothermic	decrease
D	exothermic	increase

19 Which products are formed when dilute sulfuric acid is electrolysed using inert electrodes?

A hydrogen and oxygen

B hydrogen and sulfur

C hydrogen and sulfur dioxide

D oxygen and sulfur dioxide

20 A piece of magnesium ribbon is placed in dilute hydrochloric acid.

The magnesium reacts and bubbles of a colourless gas are formed.

What is the word equation for this reaction?

A magnesium + hydrochloric acid → magnesium chloride + carbon dioxide

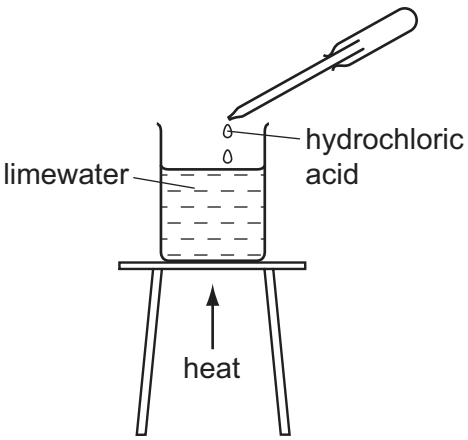
B magnesium + hydrochloric acid → magnesium chloride + carbon dioxide + water

C magnesium + hydrochloric acid → magnesium chloride + hydrogen

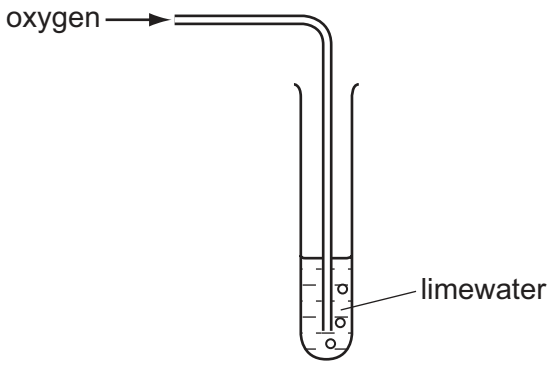
D magnesium + hydrochloric acid → magnesium chloride + hydrogen + water

21 In which experiment does limewater become milky?

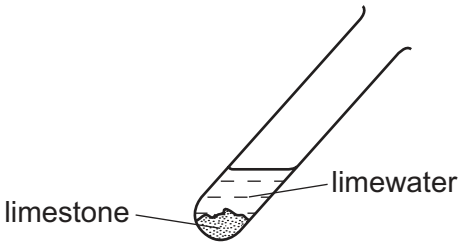
A



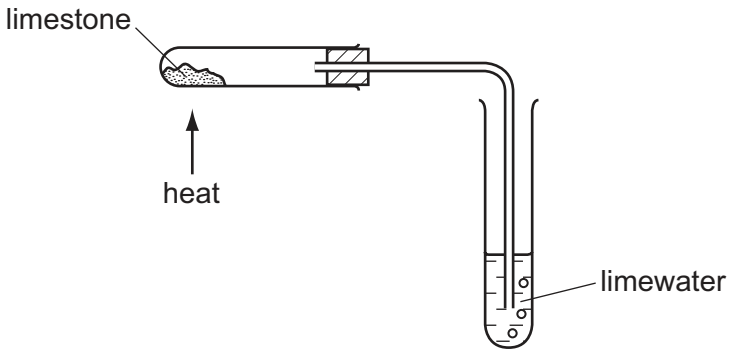
B



C



D



22 Which statement about lithium, sodium and potassium is **not** correct?

A They are in the same group of the Periodic Table.

B They are in the same period of the Periodic Table.

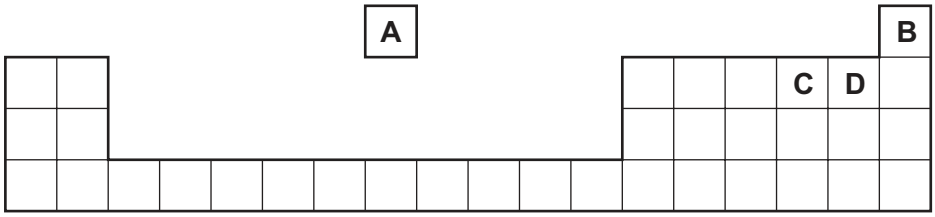
C They float on water.

D They react with water to give a flammable gas.

23 Part of the Periodic Table is shown.

The letters are not the symbols of the elements.

Which element is used to fill balloons?



24 A student reacts five metals with cold water and with dilute hydrochloric acid. The student measures the volumes of gas produced in one minute.

The results are shown.

metal	volume of gas in cold water / cm^3	volume of gas in dilute hydrochloric acid / cm^3
magnesium	2	15
zinc	0	8
calcium	18	25
iron	0	4
copper	0	0

What is the order of reactivity from most reactive to least reactive?

A calcium → magnesium → zinc → copper → iron

B calcium → magnesium → zinc → iron → copper

C magnesium → calcium → zinc → iron → copper

D zinc → calcium → magnesium → iron → copper

25 Which conditions are required for rusting?

A air only

B air and water

C salt and water

D water only

26 Lime is manufactured from limestone.

$$\text{limestone} \rightarrow \text{lime} + \text{carbon dioxide}$$

The limestone undergoes .....1..... during the reaction.

The chemical name for lime is .....2..... .

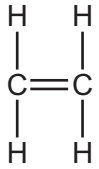
Lime is used to treat .....3..... industrial waste.

Which words complete gaps 1, 2 and 3?

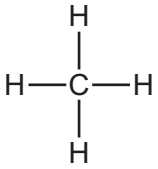
	1	2	3
A	reduction	calcium oxide	acidic
B	thermal decomposition	calcium carbonate	acidic
C	thermal decomposition	calcium oxide	acidic
D	thermal decomposition	calcium oxide	basic

27 Which structure represents an unsaturated hydrocarbon?

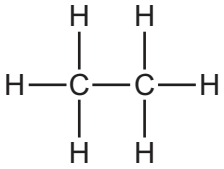
A



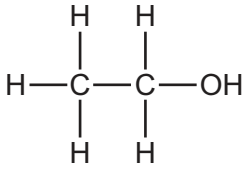
B



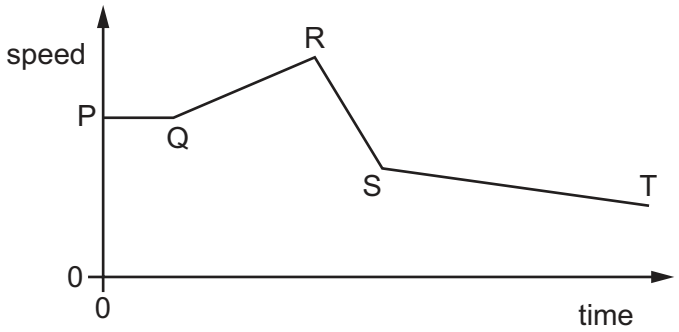
C



D



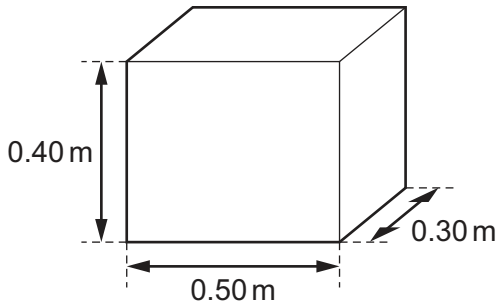
28 The diagram shows the speed / time graph for a train as it travels along a track.



For which part of the graph is the train's speed changing at the greatest rate?

A PQ **B** QR **C** RS **D** ST

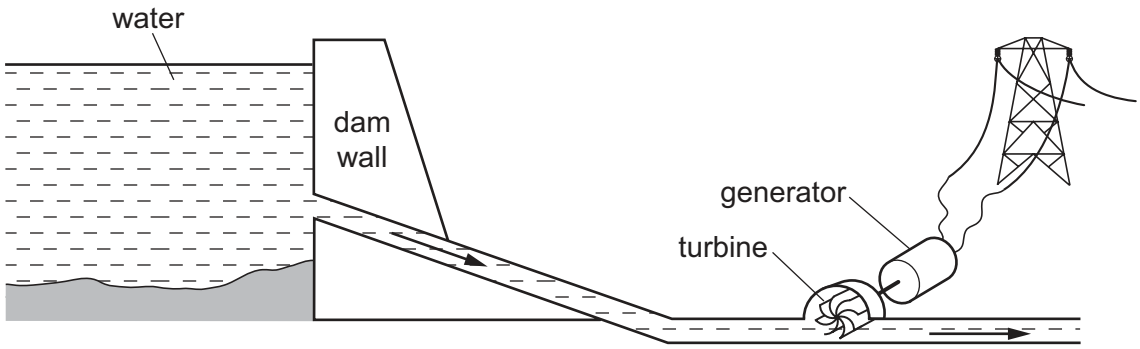
29 The diagram shows the dimensions of a block of wood of density 500 kg / m^3.



What is the mass of the block?

A 30 kg **B** 60 kg **C** 75 kg **D** 100 kg

30 The diagram shows the main parts of a hydroelectric power station. Electricity is generated from energy stored by the water.



Which form of energy decreases as the electricity is generated?

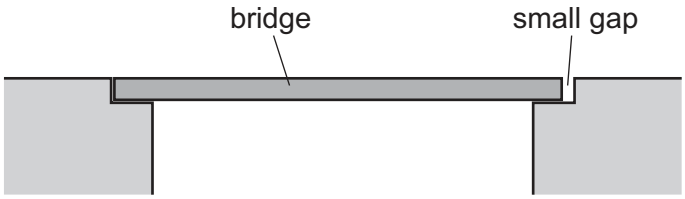
A chemical

B gravitational

C nuclear

D thermal

31 The diagram shows a bridge on a cold day. The bridge has been built with a small gap at one end.



On a warmer day, the bridge changes size and the gap changes size.

What happens to the size of the bridge, and what happens to the size of the gap?

	bridge	gap
A	becomes bigger	becomes bigger
B	becomes bigger	becomes smaller
C	becomes smaller	becomes bigger
D	becomes smaller	becomes smaller

32 How is thermal energy transferred in a vacuum?

A by conduction and convection

B by convection and radiation

C by convection only

D by radiation only

33 A water wave passes point Y.

A student counts how many wave crests pass point Y in 30 seconds.

Using **only** this information, what can the student calculate?

A the amplitude of the wave

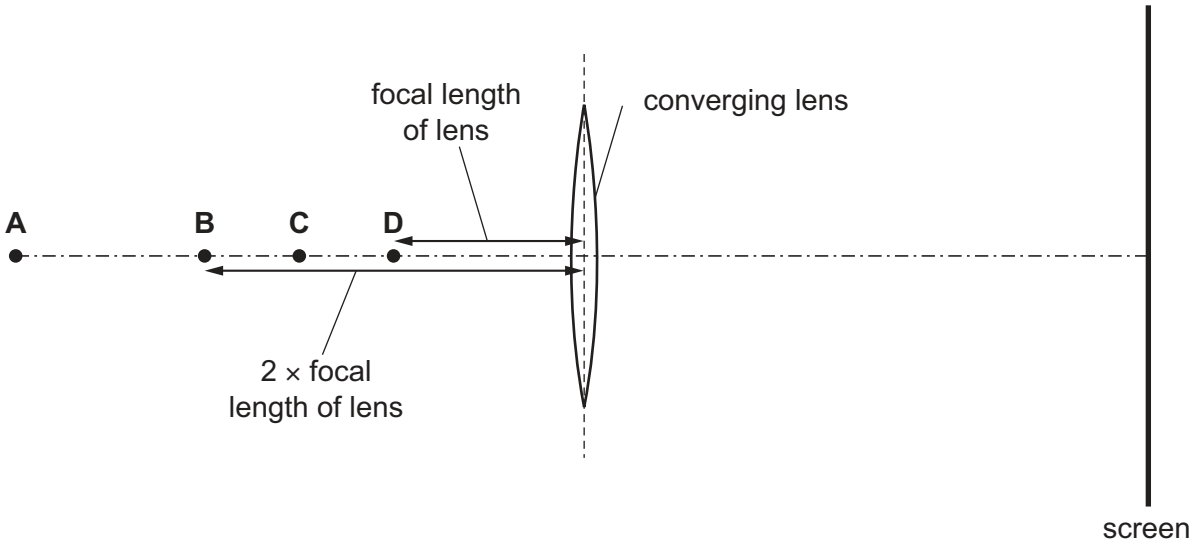
B the frequency of the wave

C the speed of the wave

D the wavelength of the wave

34 A converging lens in a projector is used to make an **enlarged** (magnified) image of an object on a screen.

At which labelled point could the object be placed so that the lens produces this image?



35 Electromagnetic waves are used to cook food under a grill. Electromagnetic waves are also used to send telephone messages over large distances.

Which type of electromagnetic wave is used for each of these two purposes?

	cooking food under a grill	sending telephone messages
A	infra-red waves	infra-red waves
B	infra-red waves	microwaves
C	microwaves	infra-red waves
D	microwaves	microwaves

36 What is the range of frequencies a typical person can hear?

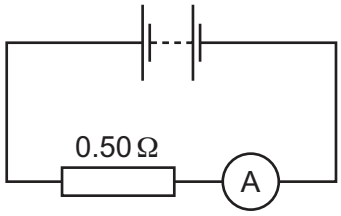
A 20 Hz – 2000 Hz

B 20 Hz – 20 000 Hz

C 200 Hz – 2000 Hz

D 200 Hz – 20 000 Hz

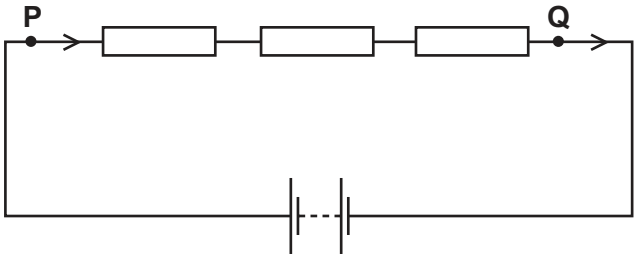
37 The diagram shows a battery connected to a 0.50 Ω resistor and an ammeter. The reading on the ammeter is 0.20 A.



What is the p.d. across the resistor?

A 0.10 V **B** 0.40 V **C** 0.70 V **D** 2.5 V

38 Three resistors are connected in series with a battery, as shown in the diagram.

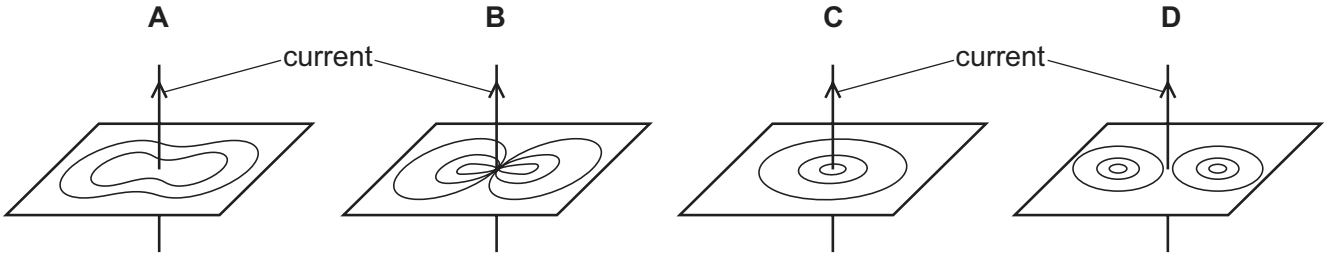


The current at point **P** is 6.0 A.

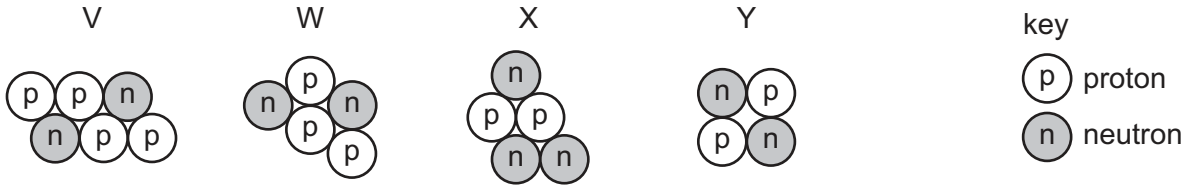
What is the current at point **Q**?

A 0 A **B** 2.0 A **C** 3.0 A **D** 6.0 A

39 Which diagram shows the magnetic field pattern around a straight wire carrying a current?



40 The diagrams represent the nuclei of four different atoms V, W, X and Y.



Which two diagrams represent isotopes of the same element?

A V and W **B** W and X **C** X and Y **D** Y and V

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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.)