UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/01**

Paper 1 Multiple Choice **October/November 2007**

45 minutes

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

* 2 5 2 8 8 4 3 2 2 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.

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.

This document consists of **18** printed pages and **2** blank pages.

1 Which feature is characteristic only of birds?

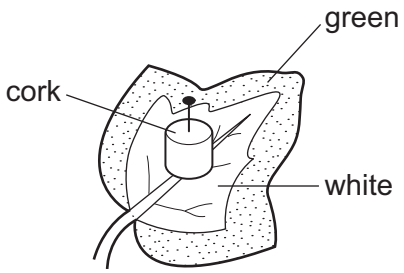
A feathers and scales

B fins and hard-shelled eggs

C hair and scales

D skin and soft-shelled eggs

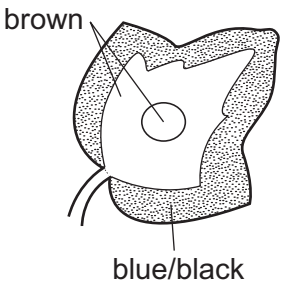
2 The diagram shows a cork pinned to a leaf of a plant which is then exposed to light for 8 hours.



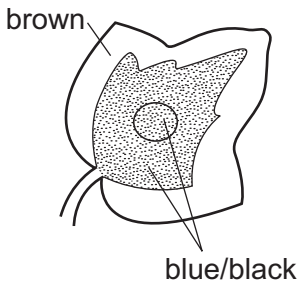
The leaf is then removed from the plant and a starch test carried out on it.

Which diagram shows the result of this starch test?

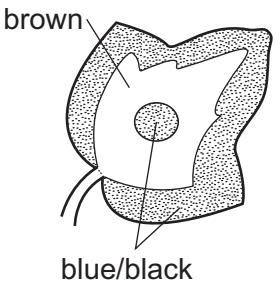
A



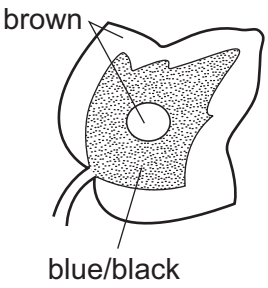
B



C

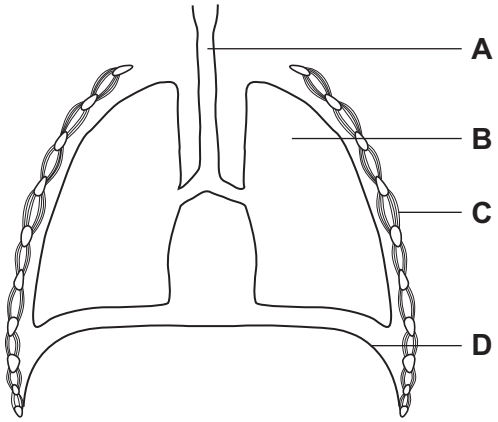


D



3 The diagram shows a section through the human thorax.

Which structure contains goblet cells and cilia?



4 Which structures make up the nervous system?

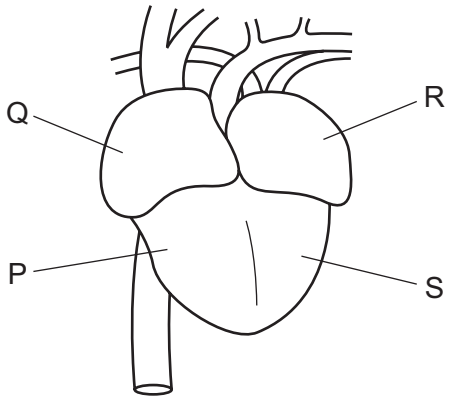
A brain, nerves, spinal cord

B effectors, impulses, spinal cord

C impulses, muscles, nerves

D effectors, receptors, stimuli

5 The diagram shows a human heart, seen from the front.



Which shows the sequence in which a blood cell passes through the four chambers of the heart?

A P → S → R → Q

B Q → P → R → S

C R → Q → P → S

D S → R → Q → P

6 Which process in living organisms does **not** use energy from respiration?

A growth

B movement

C photosynthesis

D temperature maintenance

7 Food tests are performed on four substances.

Which substance contains fat and protein?

	test reagent			
	Benedict's	biuret	ethanol	iodine
A	✓	✗	✗	✓
B	✓	✓	✗	✗
C	✗	✓	✓	✗
D	✗	✗	✓	✓

key

✓ = positive test result

✗ = negative test result

8 What is a cause and a symptom of scurvy?

	cause	symptom
A	lack of vitamin C	bleeding gums
B	lack of vitamin C	soft bones and teeth
C	lack of vitamin D	bleeding gums
D	lack of vitamin D	soft bones and teeth

9 What is most likely to happen if a diet contains excess proteins?

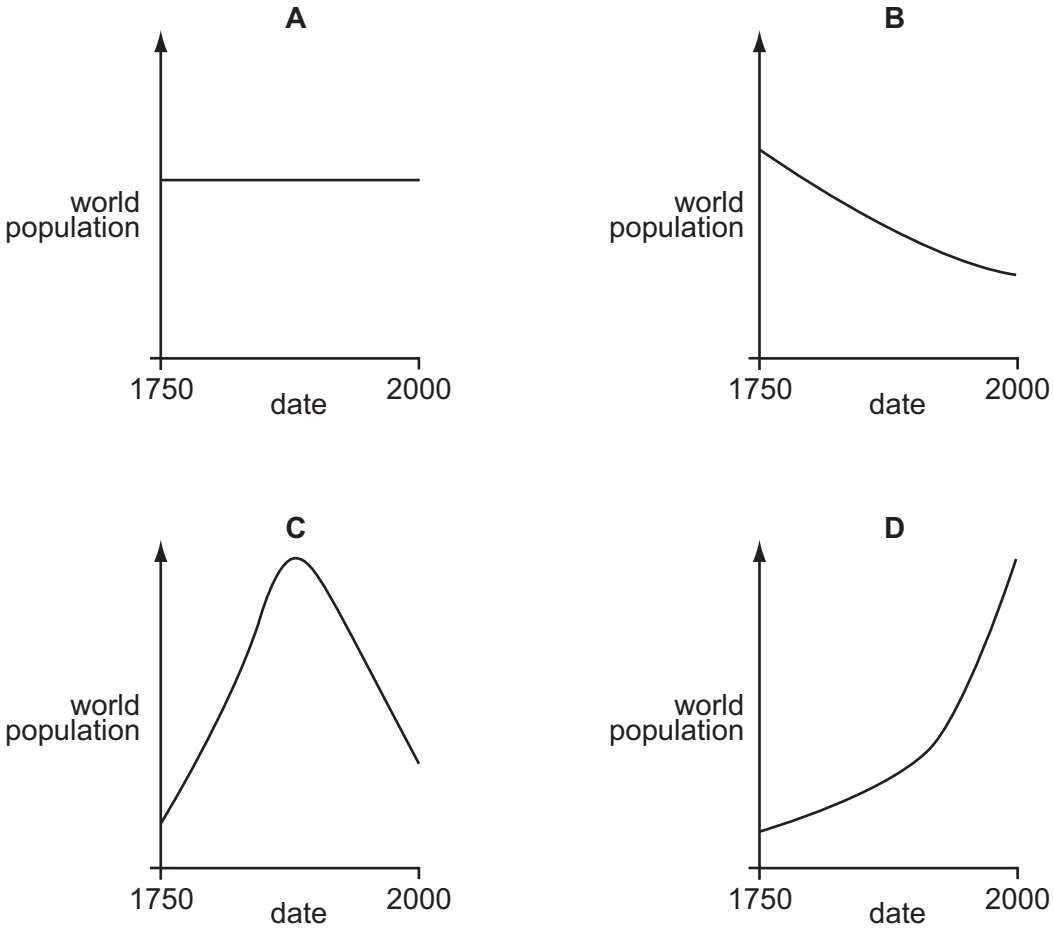
A Bacteria will form acids in the mouth.

B More amylase will be secreted by the pancreas.

C More fibre will be removed through the anus.

D More urea will be excreted by the kidneys.

10 Which graph shows the change in world population between 1750 and 2000?



11 In human reproduction, where does fertilisation usually take place?

A ovary

B oviduct

C uterus

D vagina

12 Which shows the number of chromosomes in an organism and in its male and female gametes?

	organism	male gamete	female gamete
A	14	7	7
B	16	32	16
C	19	17	36
D	46	22	22

13 What can lead to global warming?

	nitrogen fixation	deforestation	denitrification	burning of fossil fuels
A	✓	✓	✓	✗
B	✗	✗	✓	✓
C	✓	✗	✓	✗
D	✗	✓	✗	✓

14 The proton number of element X is 44. Its nucleon number is 145.

How many neutrons are there in an atom of X?

A 44 **B** 101 **C** 145 **D** 189

15 An atom has 2 electrons in its outer shell.

Which element could this atom be?

	Ca	He
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

16 Which material is made from silicon(IV) oxide combined with metal oxides?

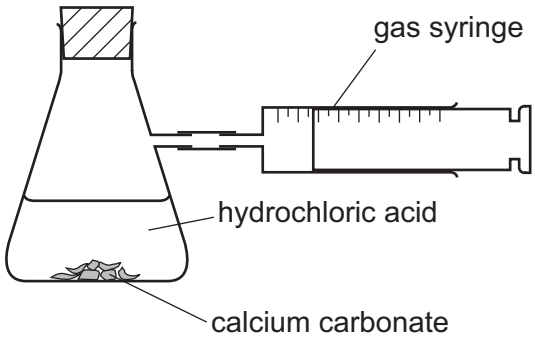
A brass

B glass

C polythene

D steel

17 The apparatus shown is used to investigate the speed of reaction between hydrochloric acid and calcium carbonate.



The time to collect 50 cm^3 of gas is measured. Using concentrated acid and lumps of calcium carbonate, the time is 150 s.

In a second experiment, the time is 90 s.

Which change was made in the second experiment?

A larger lumps of calcium carbonate

B less concentrated acid

C lower temperature

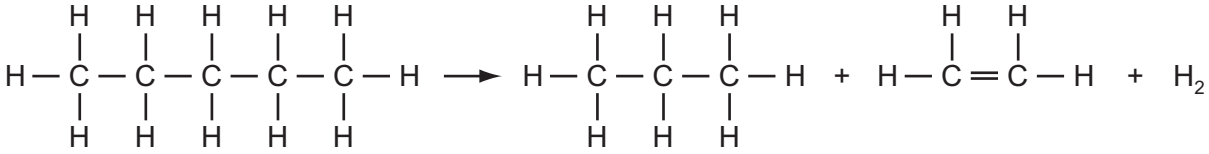
D powdered calcium carbonate

18 The table shows physical properties of some substances.

Which substance is metal?

	malleability	density	electrical conductivity
A	brittle	high density	high
B	brittle	low density	low
C	malleable	high density	high
D	malleable	low density	low

19 A petrochemical molecule undergoes the chemical change shown.



What is the chemical change?

A cracking

B fractional distillation

C polymerisation

D reduction

20 Glucose gives a red precipitate when tested with reagent X.

Cellulose, a protein and starch are broken down into their monomers.

Which of these monomers also give a red precipitate when tested with reagent X?

	cellulose	protein	starch
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

21 A reagent in solution is added to a solid sample of a fertiliser. The mixture is warmed and the gas given off changes the colour of damp litmus paper.

The test shows that the fertiliser contains ammonium ions.

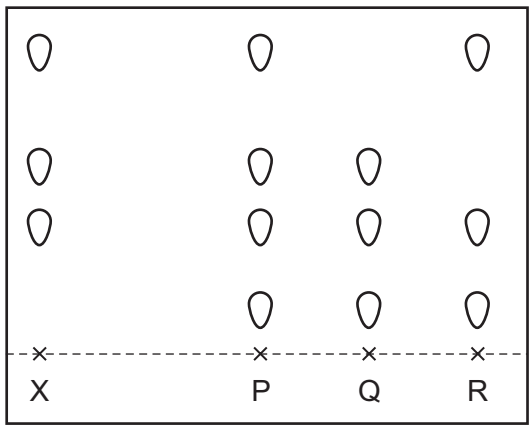
What is the reagent and what is the **original** colour of the litmus paper used in the test?

	reagent	colour of litmus paper
A	acid	blue
B	acid	red
C	alkali	blue
D	alkali	red

22 A plant colour X is a mixture.

Chromatography is used to compare X with three other coloured mixtures, P, Q and R.

The results are shown in the diagram.



Which other mixtures contain the plant colour X?

A P only

B P and Q only

C R only

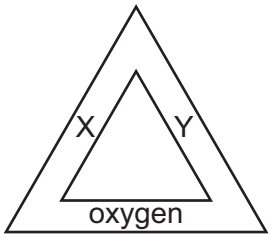
D P, Q and R

23 The element sulphur forms a colloid with water.

How are the sulphur particles held in the water and how do the particles affect a light beam shone on to the colloid?

	the particles are	the light beam is
A	dissolved	reflected
B	dissolved	scattered
C	suspended	reflected
D	suspended	scattered

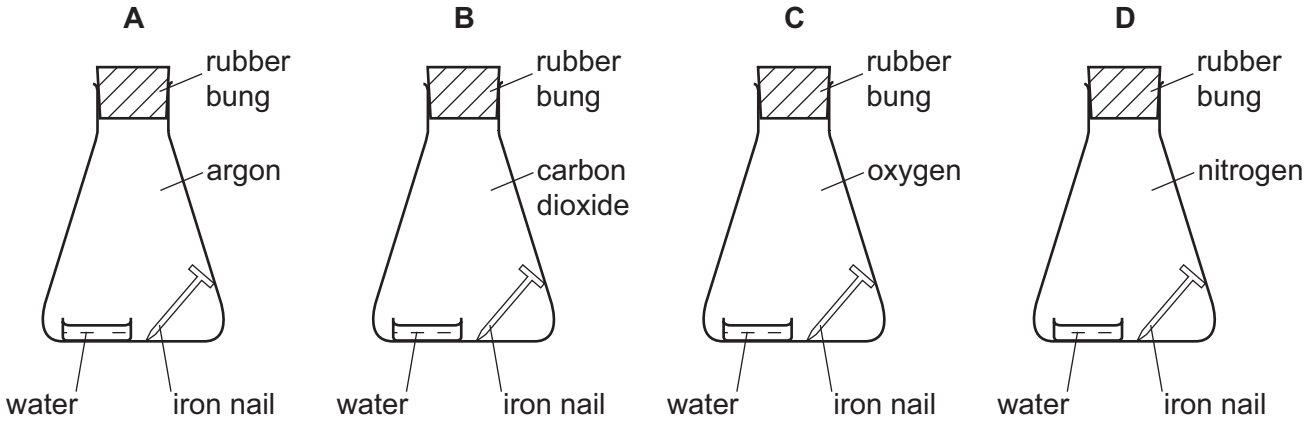
24 The diagram shows a fire triangle.



What are X and Y?

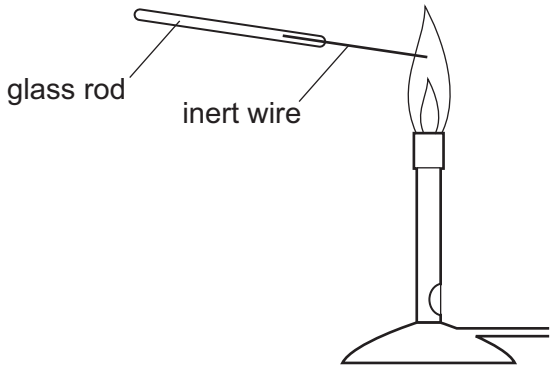
	X	Y
A	air	catalyst
B	air	heat
C	fuel	catalyst
D	fuel	heat

25 In which flask does iron rust?



26 In separate experiments, an inert wire is dipped into two solutions, P and Q.

The wire is then placed in the flame of a Bunsen burner.



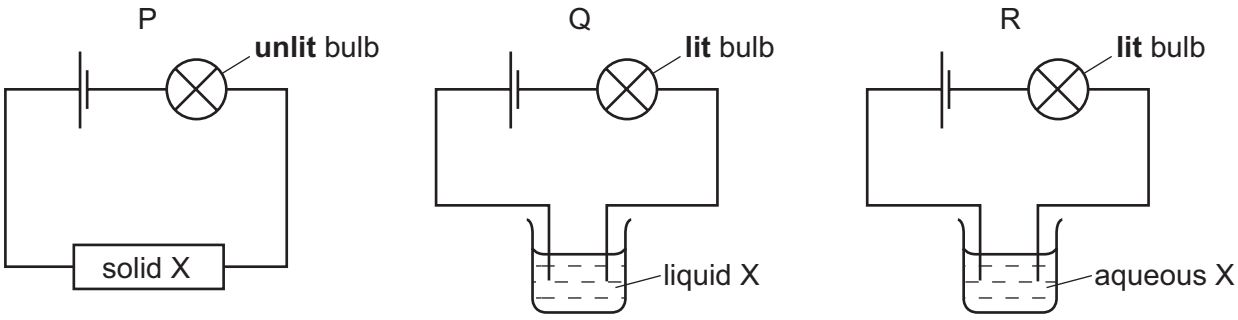
The table shows the results.

	solution P	solution Q
colour of Bunsen flame	green	yellow

Which metal ions are present in the solutions?

	P	Q
A	copper	potassium
B	copper	sodium
C	sodium	copper
D	sodium	potassium

27 Substance X is an ionic compound.



Which diagrams are correct for X?

A P and Q only

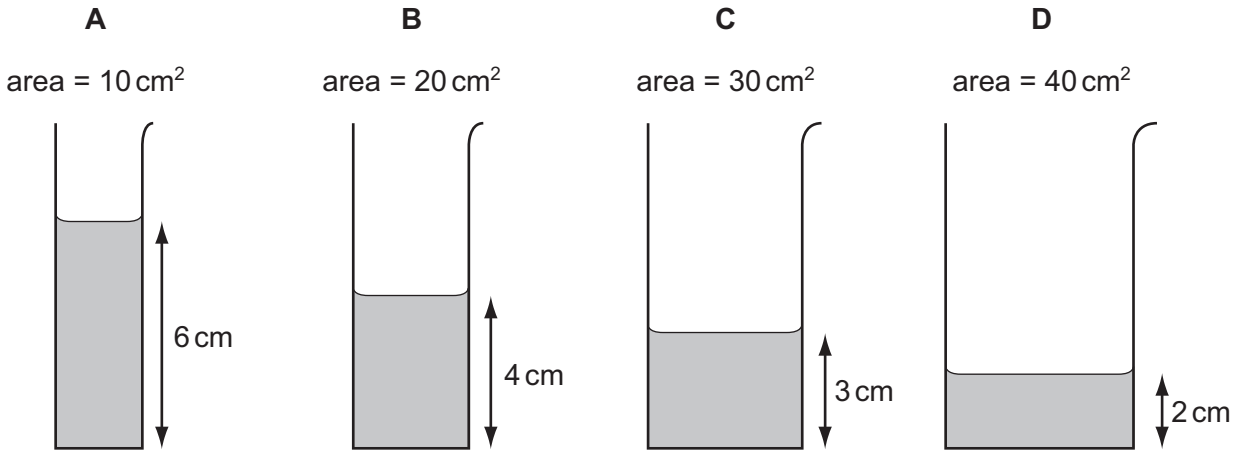
B P and R only

C R and Q only

D P, Q and R

28 Some water is poured into four tubes of different cross-sectional areas.

Which tube contains the largest volume of water?



29 What are the correct units for force and for weight?

	force	weight
A	kg	kg
B	kg	N
C	N	kg
D	N	N

30 A metal drum has a mass of 200 kg when empty and 1000 kg when filled with 1.0 m^3 of methylated spirit.

What is the density of methylated spirit?

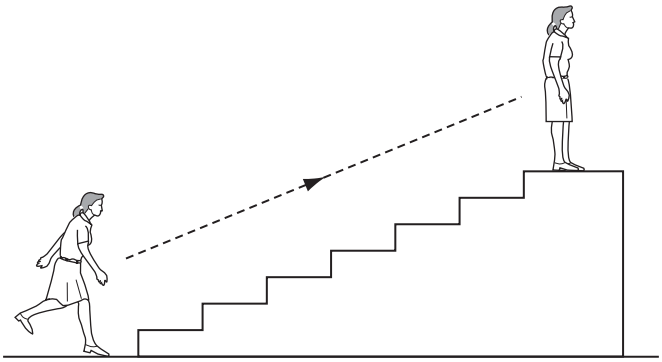
A 0.0050 kg/m^3

B 0.11 kg/m^3

C 800 kg/m^3

D 1000 kg/m^3

31 A person uses chemical energy to run up some stairs.



She stops at the top of the stairs.

What has the chemical energy been converted to when she is at the top of the stairs?

A kinetic energy and gravitational potential energy

B kinetic energy and nuclear energy

C gravitational potential energy and heat energy

D nuclear energy and heat energy

32 Some gas in a sealed plastic bag is cooled.

How do the gas molecules behave when this happens?

A They move more quickly and become closer together.

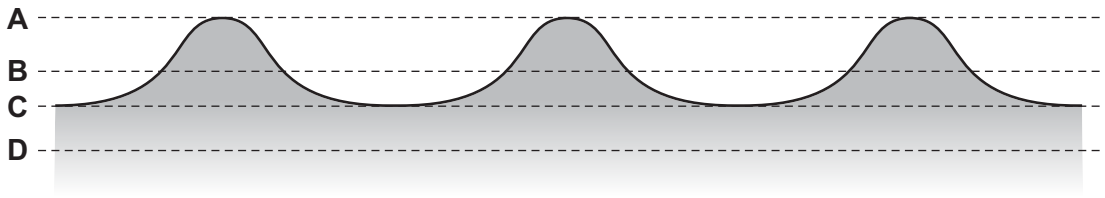
B They move more quickly and become further apart.

C They move more slowly and become closer together.

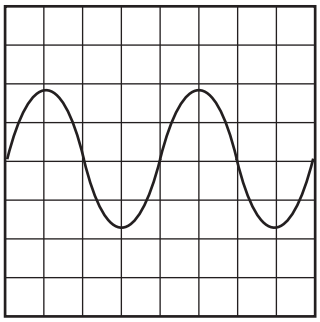
D They move more slowly and become further apart.

33 The diagram shows a section through a series of waves on water.

Which dotted line shows the position of the still water surface after the waves have passed?



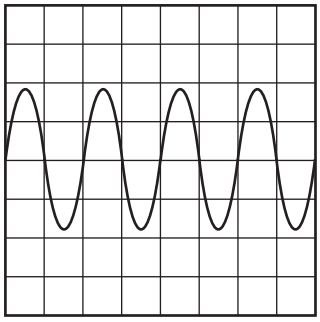
34 The diagram represents a sound wave.



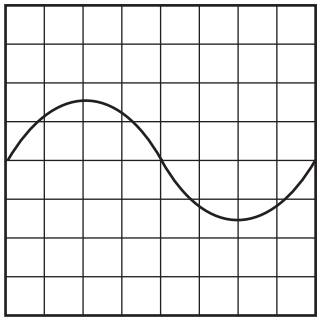
The frequency of the sound is increased.

The diagrams below are shown to the same scale. Which diagram represents the new sound wave?

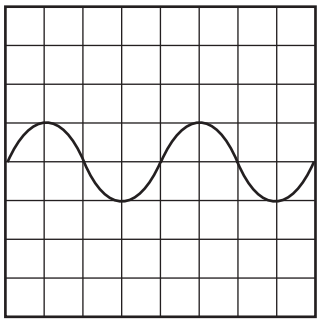
A



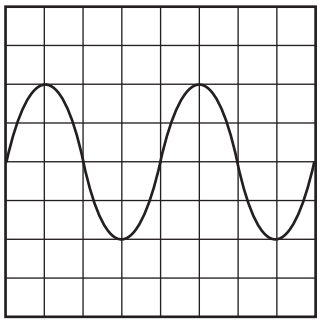
B



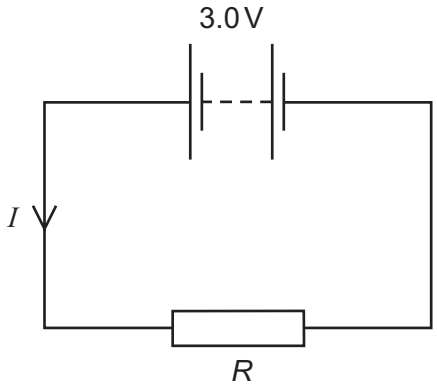
C



D



35 The circuit shows a current I in a resistor of resistance R.



Which line gives possible values of I and R?

	I / A	R / Ω
A	1.5	1.5
B	1.5	2.0
C	6.0	2.0
D	4.0	12

36 A mains electrical circuit uses insulated copper cable and the cable overheats.

To prevent the cable overheating, how should the cable be changed, and why?

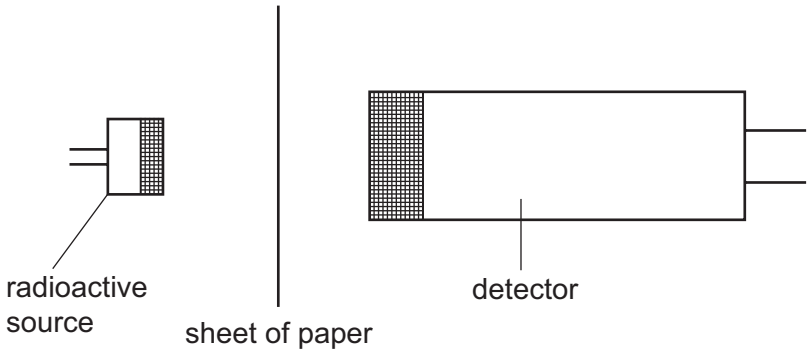
A Use thicker copper cable which has less resistance.

B Use thicker insulation which stops the heat escaping.

C Use thinner copper cable which has more resistance.

D Use thinner insulation which allows less heat to escape.

37 A sheet of paper is placed between a radioactive source and a detector.



Which types of radiation can pass through the paper?

A alpha radiation and beta radiation only

B alpha radiation and gamma radiation only

C beta radiation and gamma radiation only

D alpha radiation, beta radiation and gamma radiation

38 Which energy source is **not** renewable?

A hydroelectric

B nuclear

C solar

D wind

39 The output from a power station is connected to the transmission cables through a transformer.

What is the purpose of the transformer?

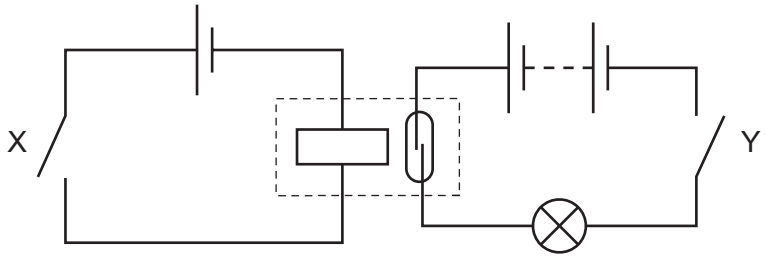
A to change the frequency of the output

B to increase the current

C to increase the voltage

D to turn the current into alternating current

40 The diagram shows the use of a reed relay.



Which switch positions cause the lamp to light?

	X	Y
A	closed	closed
B	closed	open
C	open	closed
D	open	open

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
							1 H Hydrogen 1									4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

*58-71 Lanthanoid series
†90-103 Actinoid series

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92

Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63
Np Neptunium 93	Pu Plutonium 94	Am Americium 95

157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66
Cm Curium 96	Bk Berkelium 97	Cf Californium 98

165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69
Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101

173 Yb Ytterbium 70	175 Lu Lutetium 71
No Nobelium 102	Lr Lawrencium 103

Key: a X b — a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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