UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/01**

Paper 1 Multiple Choice

May/June 2006

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.

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

1 The diagram shows a bone from the human arm.

Use the key to identify the bone.

i Has a distinct socket at one end…… go to ii
Has no distinct socket at one end..…….. go to iii

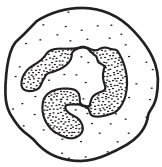
ii Broad and flat in shape…… **A**
Rod-like in shape…… **B**

iii Has a rounded structure that fits into a socket….. **C**
Has no rounded structure…… **D**

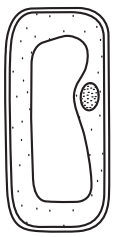
2 The diagram shows four cells.

Which cell is a plant cell?

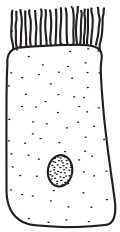
A



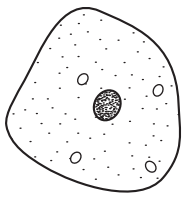
B



C



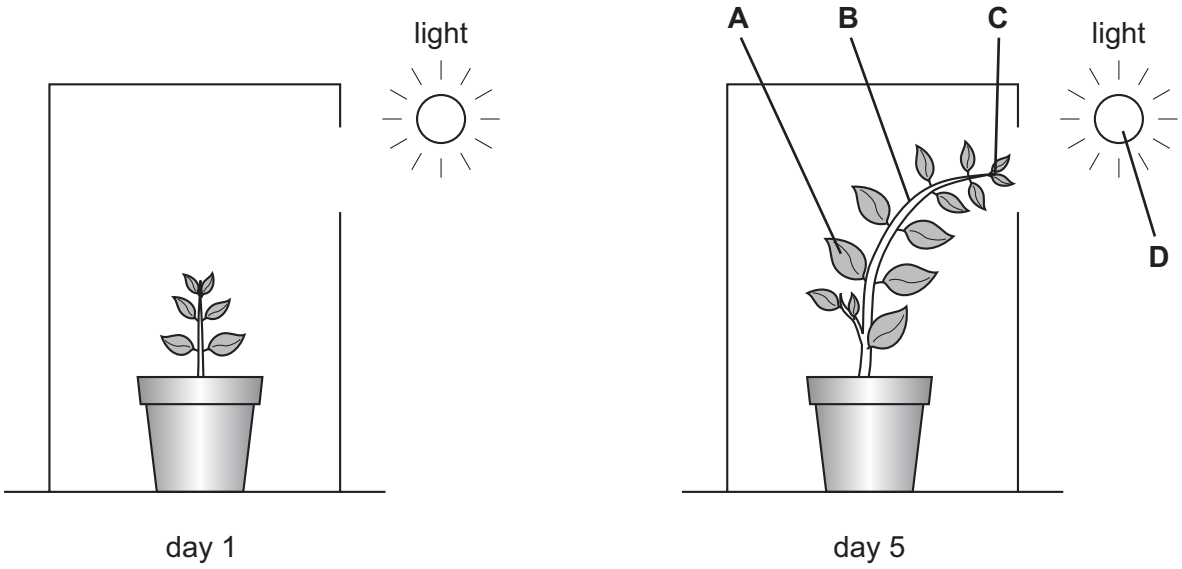
D



3 The diagram shows two stages in the growth of a plant inside a black box.

Light enters the box through a hole in one side.

Which part is the effector?



4 Air is moved in and out of the lungs by changes in the volume of the chest cavity.

In which structure are there muscles that help to bring this about?

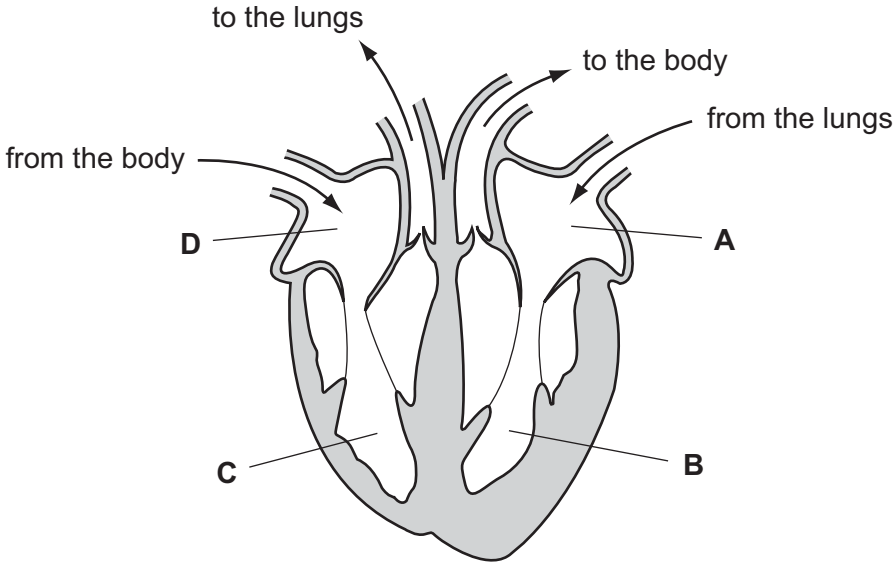
A alveolus

B bronchus

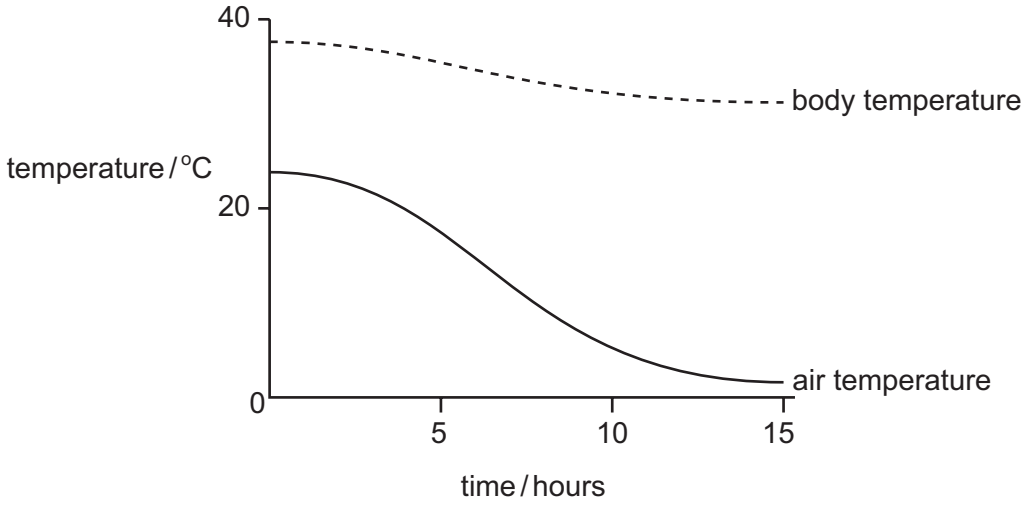
C diaphragm

D trachea

5 From which chamber of the human heart is blood pumped most strongly?



6 The graph shows how a person's body temperature changes with changing air temperature.



Which process provides the energy for maintaining the body temperature as shown in the graph?

A breathing

B digestion

C excretion

D respiration

7 A food contains reducing sugar, but no starch.

What colours will be obtained if samples of the food are tested with Benedict's reagent and with iodine solution?

	Benedict's test	iodine test
A	blue	blue-black
B	blue	brown
C	red-orange	blue-black
D	red-orange	brown

8 Which bones form a joint at the shoulder?

A humerus and radius

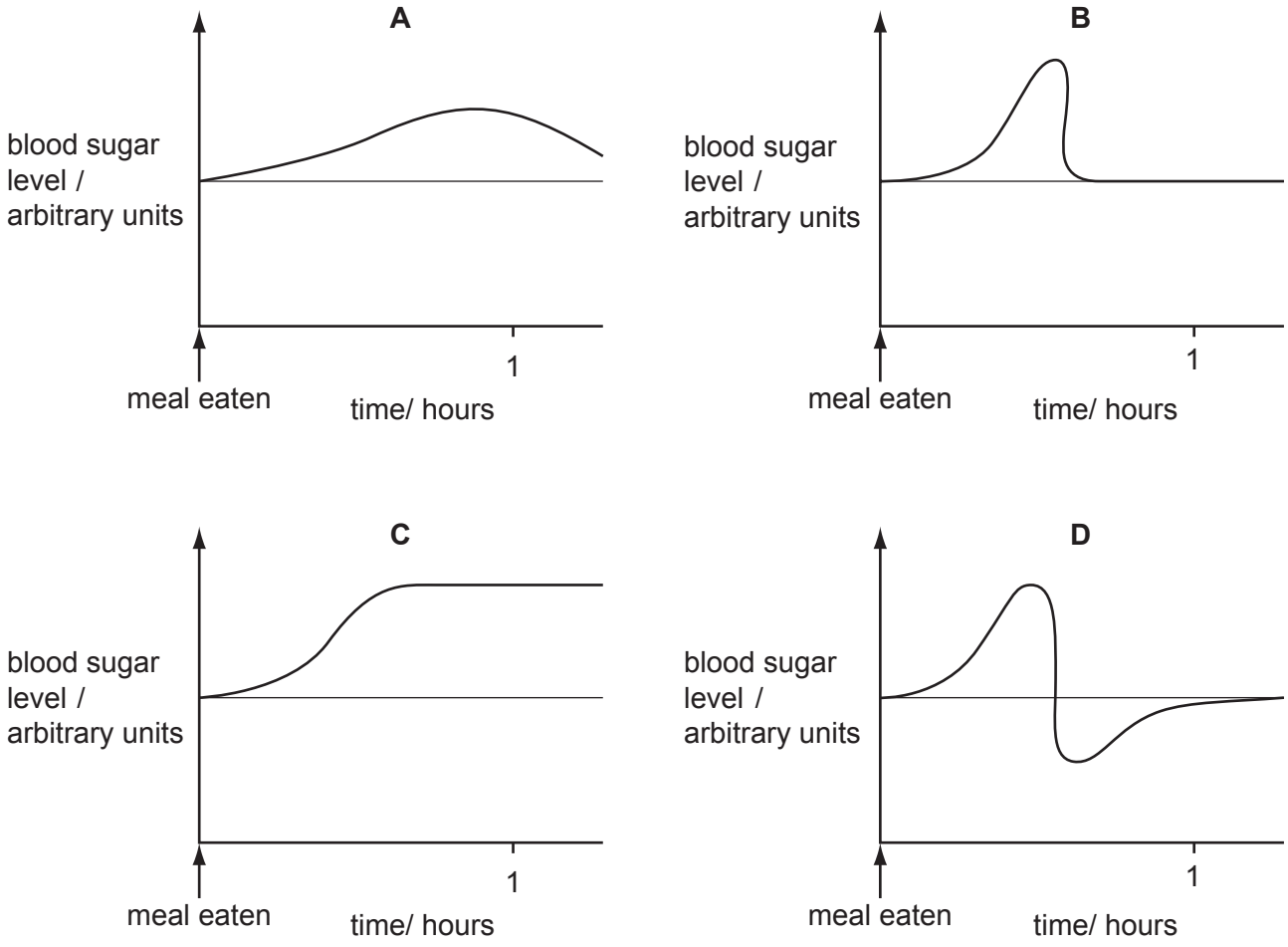
B humerus and scapula

C ulna and radius

D ulna and scapula

9 The graphs show changes in the amount of sugar in the blood after a person has eaten a sugary meal.

Which graph shows changes in the amount of blood sugar of a person with untreated diabetes?



10 Where does fertilisation take place in a flowering plant?

A anther

B bud

C ovule

D stigma

11 An organism has 28 chromosomes in each body cell.

How many chromosomes would there be in a gamete of the same organism?

A 7 **B** 14 **C** 28 **D** 56

12 Dung beetles lay their eggs in the dung of plant-eating mammals like buffalo. Both the adult beetles and their young stages eat the undigested food in the dung.

Which shows this food relationship?

A buffalo → dung beetles; buffalo → grass

B dung beetles → grass → buffalo

C grass → dung beetles → buffalo

D grass → buffalo; grass → dung beetles

13 Which organisms increase the amount of nitrogen gas in the air?

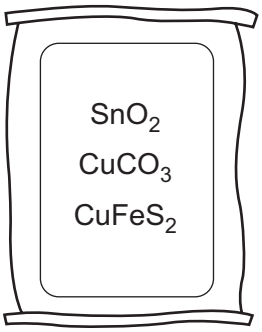
A decomposing bacteria

B denitrifying bacteria

C nitrifying bacteria

D nitrogen fixing bacteria

14 The diagram shows a sack containing a mixture of three minerals.



Which element is **not** present in the mixture?

A cobalt

B copper

C iron

D tin

15 Heating a metal compound in a Bunsen flame turns the flame green.

Which metal ion is present in the compound?

A calcium

B copper

C potassium

D sodium

16 Which process produces molecules with longer chains?

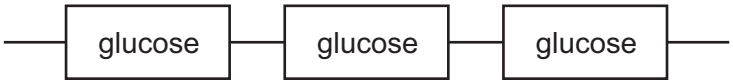
A combustion of hydrocarbon

B cracking

C fractional distillation of crude oil

D polymerisation

17 The diagram shows part of a polymer molecule.



Which polymers can be represented by this diagram?

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

18 The table shows the name and formula of four metal ores.

	name	formula
1	chalcopyrite	$CuFeS_2$
2	ilmenite	$FeTiO_3$
3	malachite	$Cu_2CO_3(OH)_2$
4	wolframite	$FeWO_4$

Which metal ores contain two different metals?

A 1 and 3 only

B 2 and 4 only

C 1, 2 and 4 only

D 2, 3 and 4 only

19 Compound **X** is an important industrial raw material.

Products obtained from the electrolysis of its concentrated aqueous solution include:

- a gas that bleaches damp litmus paper,
- a gas that ignites with a pop,
- an alkali.

What is compound **X**?

A copper(II) sulphate

B hydrochloric acid

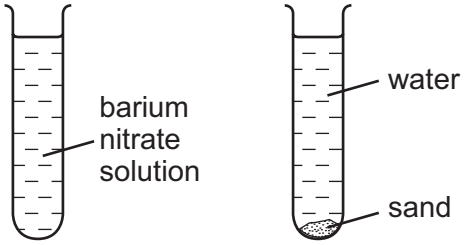
C sodium carbonate

D sodium chloride

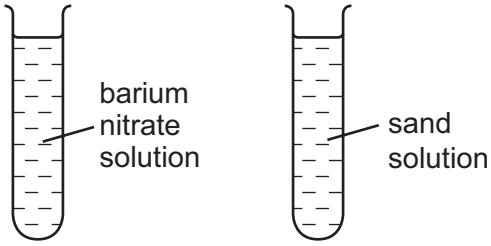
20 Small amounts of barium nitrate and sand are shaken with separate samples of water in two test-tubes. The test-tubes are left to stand.

Which two diagrams show the behaviour of the barium nitrate and sand?

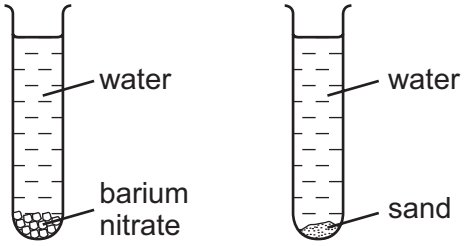
A



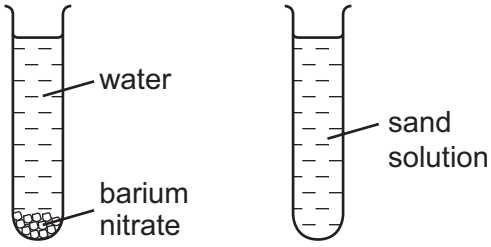
B



C



D



21 A sample of tap water forms a scum, rather than a lather, with soap solution.

This shows that the tap water is …X… and that it contains …Y… ions.

What are X and Y?

	X	Y
A	hard	calcium
B	hard	sodium
C	soft	calcium
D	soft	sodium

22 Modern synthetic dyes have largely replaced natural plant dyes.

This is because, compared with natural plant dyes, synthetic dyes …X… readily fade in sunlight and can be made in a …Y… choice of colours.

Which words correctly complete gaps X and Y?

	X	Y
A	less	bigger
B	less	smaller
C	more	bigger
D	more	smaller

23 How may the compounds in chlorophyll be separated?

A chemotherapy

B chromatography

C distillation

D emulsification

24 A fuel used for cooking food is the hydrocarbon …X… that burns in an …Y… reaction.

Which words correctly complete gaps X and Y?

	X	Y
A	coke	endothermic
B	coke	exothermic
C	methane	endothermic
D	methane	exothermic

25 The table shows the results of adding three metals, X, Y and Z, to water and to dilute hydrochloric acid.

metal	reaction with	
	water	dilute hydrochloric acid
X	no reaction	no reaction
Y	violent reaction	explodes
Z	bubbles slowly	bubbles vigorously

What is the order of reactivity of the three metals?

	most reactive ⟶		least reactive
A	X	Y	Z
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

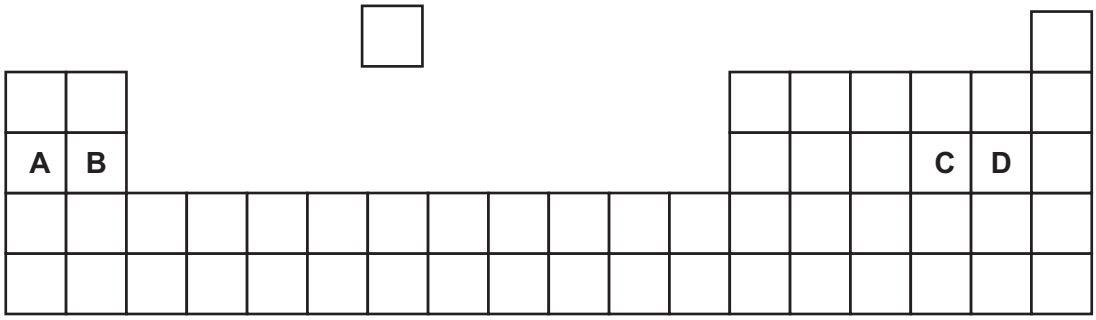
26 An element X has a high melting point and its oxide, X_2O_3, is coloured.

How are X and X_2O_3 described?

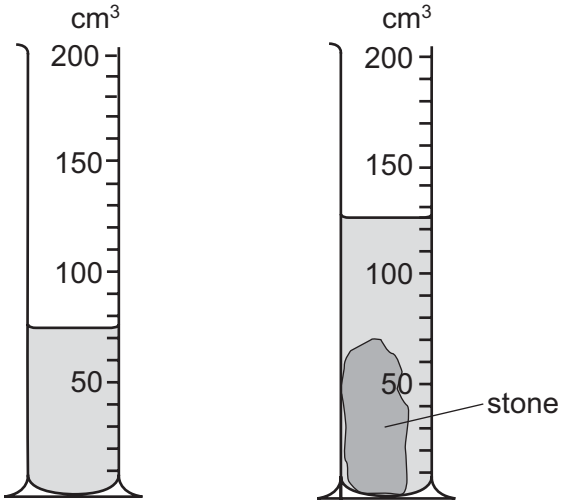
	X	X_2O_3
A	transition metal	acidic
B	transition metal	basic
C	non-metal	acidic
D	non-metal	basic

27 The positions of four elements are shown on the outline of part of the Periodic Table.

Which element would form an ion with two positive charges?



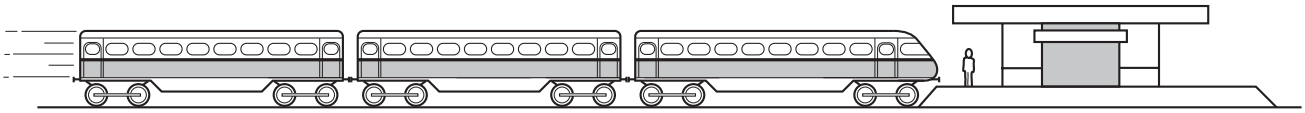
28 A measuring cylinder contains some water. When a stone is put in the water, the level rises.



What is the volume of the stone?

A 50 cm^3 **B** 70 cm^3 **C** 75 cm^3 **D** 125 cm^3

29 A child is standing on the platform of a station, watching the trains.



A train travelling at 30 m / s takes 3 s to pass the child.

What is the length of the train?

A 10m **B** 30m **C** 90m **D** 135m

30 Which form of energy do we receive directly from the Sun?

A chemical

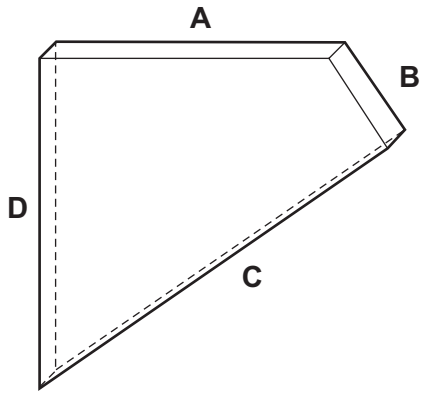
B light

C nuclear

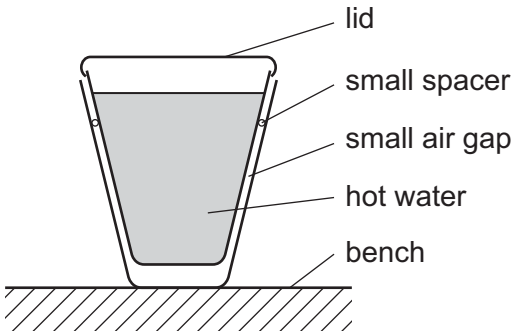
D sound

31 The diagram shows a thick sheet of glass.

Which edge must it stand on to cause the greatest pressure?



32 Two plastic cups are placed one inside the other. Hot water is poured into the inner cup and a lid is put on top as shown.



Which statement is correct?

A Heat loss by radiation is prevented by the small air gap.

B No heat passes through the sides of either cup.

C The bench is heated by convection from the bottom of the outer cup.

D The lid is used to reduce heat loss by convection.

33 Which is the best description of the speed of a water wave?

A the distance between one wave crest and the next

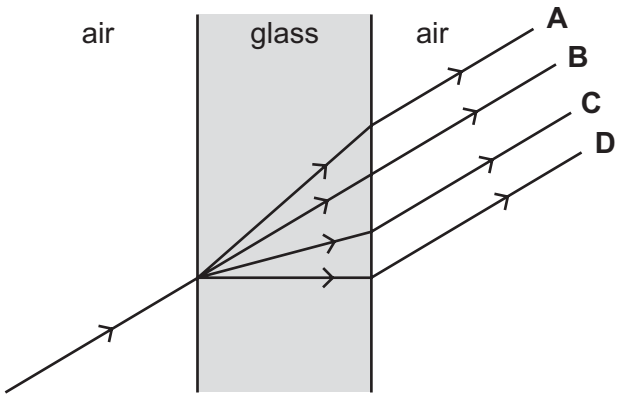
B the distance between the crest of a wave and a trough

C the distance that a particle of water moves up and down in one second

D the distance that a wavefront moves along the surface in one second

34 A ray of light passes through a window.

Which path does it take?



35 Sounds are made by vibrating objects. A certain object vibrates but a person nearby cannot hear any sound.

Which statement might explain why nothing is heard?

A The amplitude of the sound waves is too large.

B The frequency of the vibration is too high.

C The sound waves are transverse.

D The speed of the sound waves is too high.

36 A student investigates which end of a magnetic compass needle is attracted to a bar magnet.

What does the investigation show?

A Both ends of the compass needle are attracted by the north pole of the magnet.

B Both ends of the compass needle are attracted by the south pole of the magnet.

C One end of the compass needle is attracted by the north pole and the other end by the south pole.

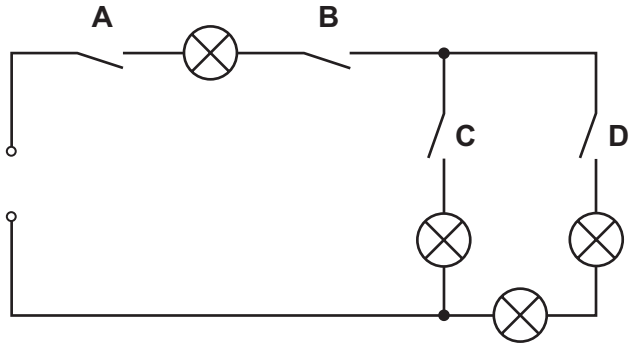
D The compass needle is not attracted by either end of the magnet.

37 Four lamps and four switches are connected to a power supply as shown in the circuit diagram.

When all the switches are closed, all the lamps are lit.

When one of the switches is then opened, only **one** lamp goes out.

Which switch is opened?



38 An electric power tool is being used outdoors in a shower of rain.

What is the greatest hazard to the user?

A The cable gets hot and causes burns.

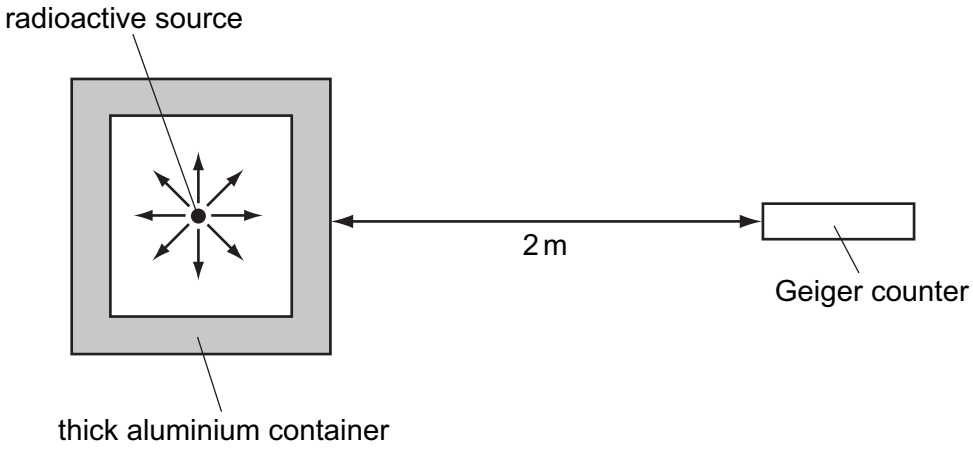
B The circuit-breaker cuts off the current.

C The current passes through water and causes a shock.

D The tool rusts.

39 A Geiger counter detects radiation from radioactive sources.

A radioactive source is inside a thick aluminium container as shown.



Which type of radiation from this source is being detected?

A alpha-particles

B beta-particles

C gamma-rays

D radio waves

40 A thermistor is a device whose resistance decreases as its temperature increases.

The table shows the voltage needed at different times during the day to cause a current of 0.02 A in a particular thermistor.

time of day	09:00	12:00	15:00
voltage / V	12.0	6.0	4.0

Which statement describes how the temperature changed during the period 09:00 to 15:00?

A The temperature decreased throughout this period.

B The temperature increased throughout this period.

C The temperature was greatest at 12:00.

D The temperature was least at 12:00.

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DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	0
																4 He Helium 2
						1 H Hydrogen 1					11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
	7 Li Lithium 3	9 Be Beryllium 4									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
	23 Na Sodium 11	24 Mg Magnesium 12									70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
	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	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
	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	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
†90-103 Actinoid series	232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

Key

a	a = relative atomic mass
X	X = atomic symbol
b	b = proton (atomic) number

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