Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

PHYSICAL SCIENCE   **0652/11**

Paper 1 Multiple Choice   **October/November 2017**

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, 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.

CAMBRIDGE
International Examinations

[Turn over

1 What is the name of the process by which gas particles move to occupy all the available space?

  A   boiling

  B   condensation

  C   diffusion

  D   evaporation

2 An atom of sodium contains 11 protons, 11 electrons and 12 neutrons.

  What is the nucleon number of the atom?

  A   11   B   12   C   22   D   23

3 When atoms of sodium combine with atoms of chlorine, sodium chloride is formed.

  How are the bonds between sodium and chlorine formed?

  A   Chlorine gives electrons to sodium.

  B   Sodium and chlorine lose electrons.

  C   Sodium gives electrons to chlorine.

  D   Sodium shares electrons with chlorine.

4 Sodium carbonate reacts with hydrochloric acid to form sodium chloride, carbon dioxide and water.

  What is the balanced equation for the reaction?

  A $Na_2CO_3 + HCl \rightarrow NaCl + CO_2 + H_2O$

  B $Na_2CO_3 + 2HCl \rightarrow NaCl + CO_2 + H_2O$

  C $Na_2CO_3 + HCl \rightarrow 2NaCl + CO_2 + H_2O$

  D $Na_2CO_3 + 2HCl \rightarrow 2NaCl + CO_2 + H_2O$

5 Which compound has the largest relative molecular mass, M_r?

  A CO_2 B NO_2 C SiO_2 D SO_2

6 The diagram shows wood burning in air.

Which two words describe what happens to the wood and the type of reaction taking place?

	wood is	type of reaction
A	oxidised	endothermic
B	oxidised	exothermic
C	reduced	endothermic
D	reduced	exothermic

7 The rate of reaction between marble chips and hydrochloric acid is investigated.

The equation is shown.

$$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$$

Which conditions give the fastest rate of production of carbon dioxide gas?

	concentration of hydrochloric acid	size of marble chips	hydrochloric acid temperature / °C
A	high	small	30
B	high	medium	25
C	low	large	30
D	low	small	20

8 Which oxide is basic?

A calcium oxide

B carbon dioxide

C sulfur dioxide

D water

       [Turn over

9 Which test is used to show that a gas is ammonia?

A	B	C	D

flame — splint
glowing — splint
limewater
damp litmus paper
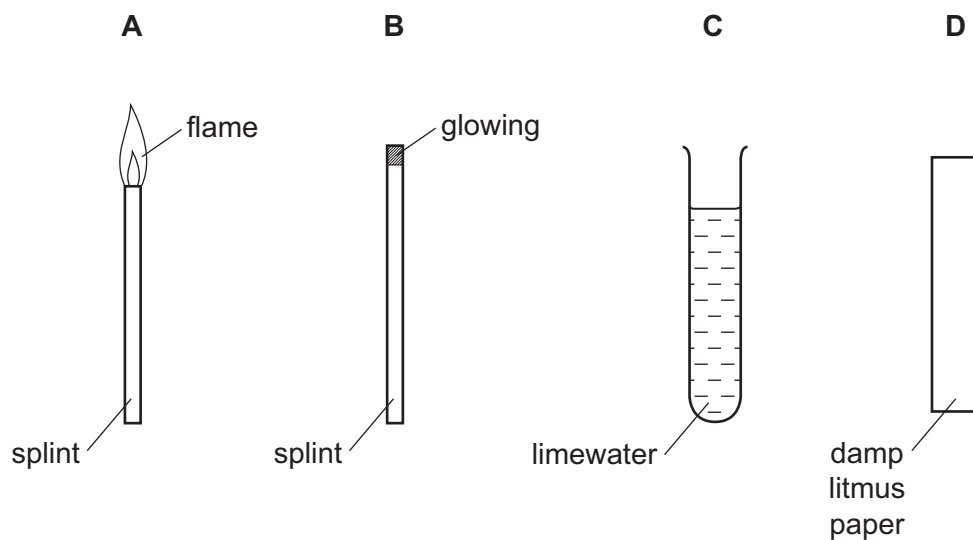
10 Which row describes the trend in melting point and density of the Group I elements as the group is descended?

	melting point	density
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

11 Metal element X has a high melting point.

It does not react with cold water.

The chloride salt of X is soluble in water forming a blue solution.

What is another property of X?

A it can be cut with a knife

B it does not conduct electricity

C it floats on water

D it is a catalyst

5

12 Metal Q is added to different metal sulfate solutions.

The results are shown.

metal sulfate solution	reaction takes place
calcium sulfate	no
copper sulfate	yes
magnesium sulfate	no
sodium sulfate	no

What is the order of reactivity?

	most reactive				least reactive
A	sodium	calcium	magnesium	copper	Q
B	sodium	calcium	magnesium	Q	copper
C	sodium	calcium	Q	magnesium	copper
D	sodium	Q	calcium	magnesium	copper

13 Bauxite and haematite are important ores.

Which metals do the ores contain?

	bauxite	haematite
A	Al	Cu
B	Al	Fe
C	Cu	Al
D	Fe	Cu

14 Air is a mixture of different gases.

Which row gives the percentage of nitrogen, oxygen and other gases in the air?

	percentage of gas present in air		
	nitrogen	oxygen	other gases
A	1	21	78
B	21	78	1
C	78	1	21
D	78	21	1

15 Which process does **not** produce carbon dioxide?

A an acid reacting with a carbonate

B burning coal

C burning hydrogen

D respiration

16 A power station burns coal to generate electricity.

Sulfur dioxide, an acidic gas, is present in the waste gases.

Which compound is used to neutralise the sulfur dioxide?

A calcium chloride

B hydrated cobalt chloride

C hydrated copper sulfate

D slaked lime

17 The fractional distillation of petroleum is shown.

From which position is methane obtained?

petroleum →

heater at 400 °C
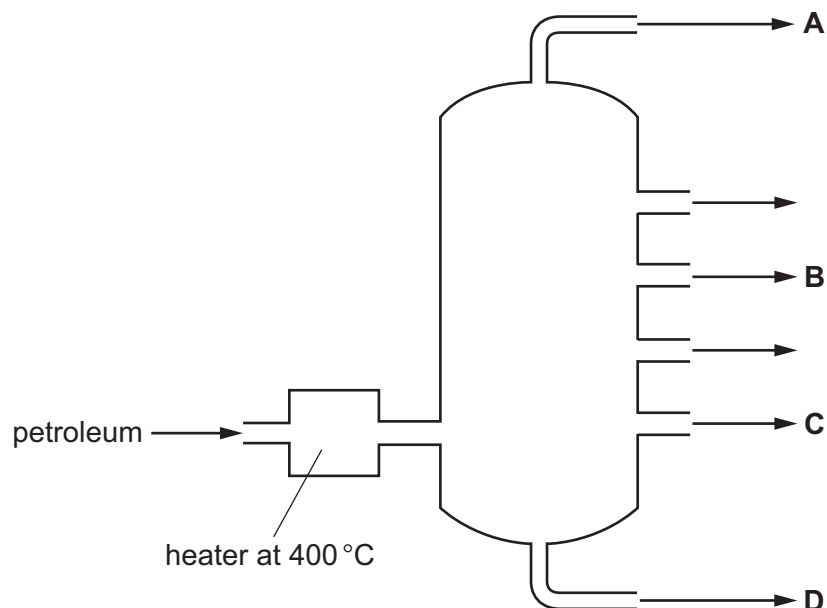
18 Which row describes compounds in the same homologous series?

	chemical properties	functional group
A	different	different
B	different	the same
C	similar	different
D	similar	the same

19 Limonene is a colourless, unsaturated hydrocarbon found in lemons.

Which row describes the colour change when a few drops of limonene are shaken with bromine?

	colour of bromine at the start of experiment	colour of bromine after mixing with limonene
A	colourless	colourless
B	colourless	orange
C	orange	colourless
D	orange	orange

20 Ethanol is an alcohol used in antibacterial wipes.

What is the formula for ethanol?

A C_2H_5O

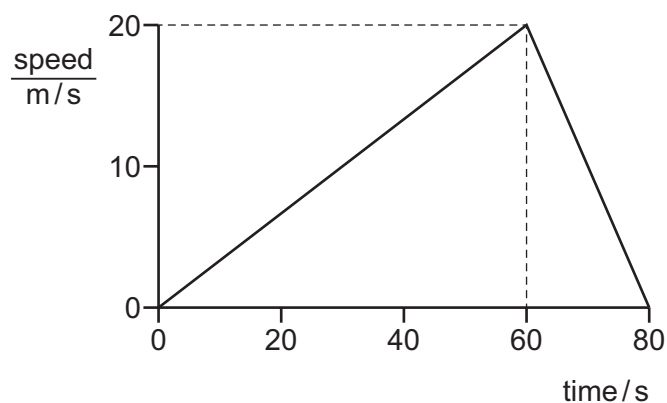**B** CH_3CO_2H

C C_2H_5OH

D C_2H_4OH

21 The diagram shows some water in a measuring cylinder, and the same measuring cylinder with a stone completely immersed in the water.
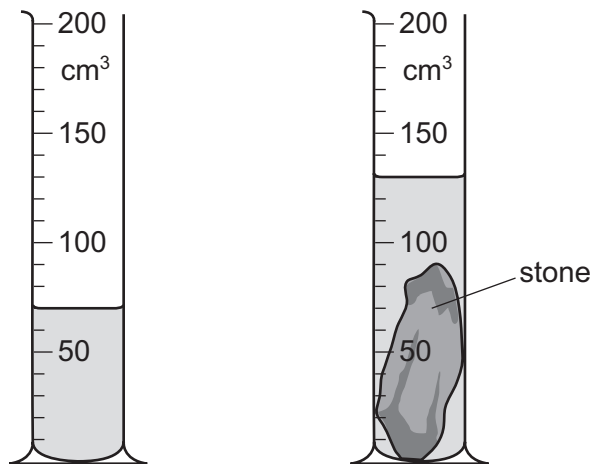
What is the volume of the stone?

A $60\,cm^3$ **B** $70\,cm^3$ **C** $72.5\,cm^3$ **D** $125\,cm^3$

22 The speed-time graph represents the motion of a car.

What is the total distance travelled by the car in 80 seconds?

A $100\,m$ **B** $800\,m$ **C** $1200\,m$ **D** $1600\,m$

23 Which statement about the weight of an object is correct?

    A   Its weight is its mass divided by the acceleration of free fall.

    B   Its weight is its mass multiplied by the acceleration of free fall.

    C   Its weight is the acceleration of free fall divided by its mass.
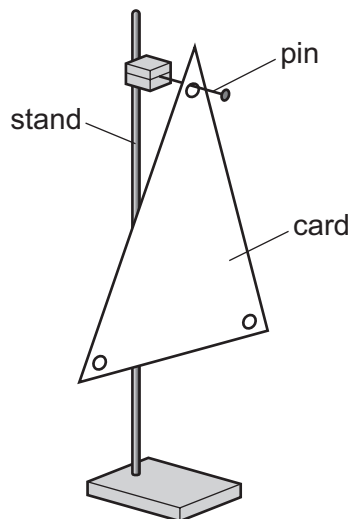
    D   Its weight is the same as its mass.

24 A metal container has a mass of 200 kg.

The container is filled with $1.00 \, \text{m}^3$ of a liquid. The total mass is now 1000 kg.

What is the density of the liquid?

    A $0.00125 \, \text{kg}/\text{m}^3$

    B $0.00500 \, \text{kg}/\text{m}^3$

    C $800 \, \text{kg}/\text{m}^3$

    D $1000 \, \text{kg}/\text{m}^3$

25 The diagram shows some of the equipment used to find the centre of mass of a sheet of card.

Which row shows other items needed?

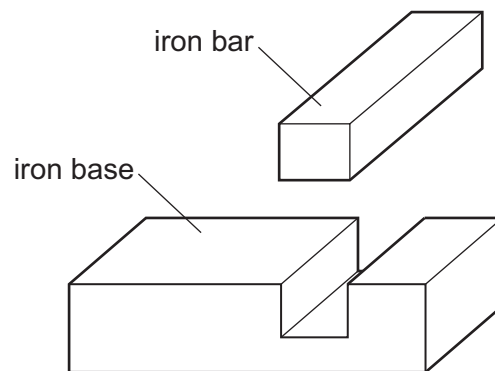|	pencil	small weight	stopwatch	string
A	✓	✓	✓	✗
B	✓	✓	✗	✓
C	✓	✗	✓	✓
D	✗	✓	✓	✓

key

✓ needed

✗ not needed

26 A power station uses nuclear fission to obtain energy.

In this process, nuclear energy is **first** transferred to

A chemical energy.

B electrical energy.

C gravitational energy.

D thermal (heat) energy.

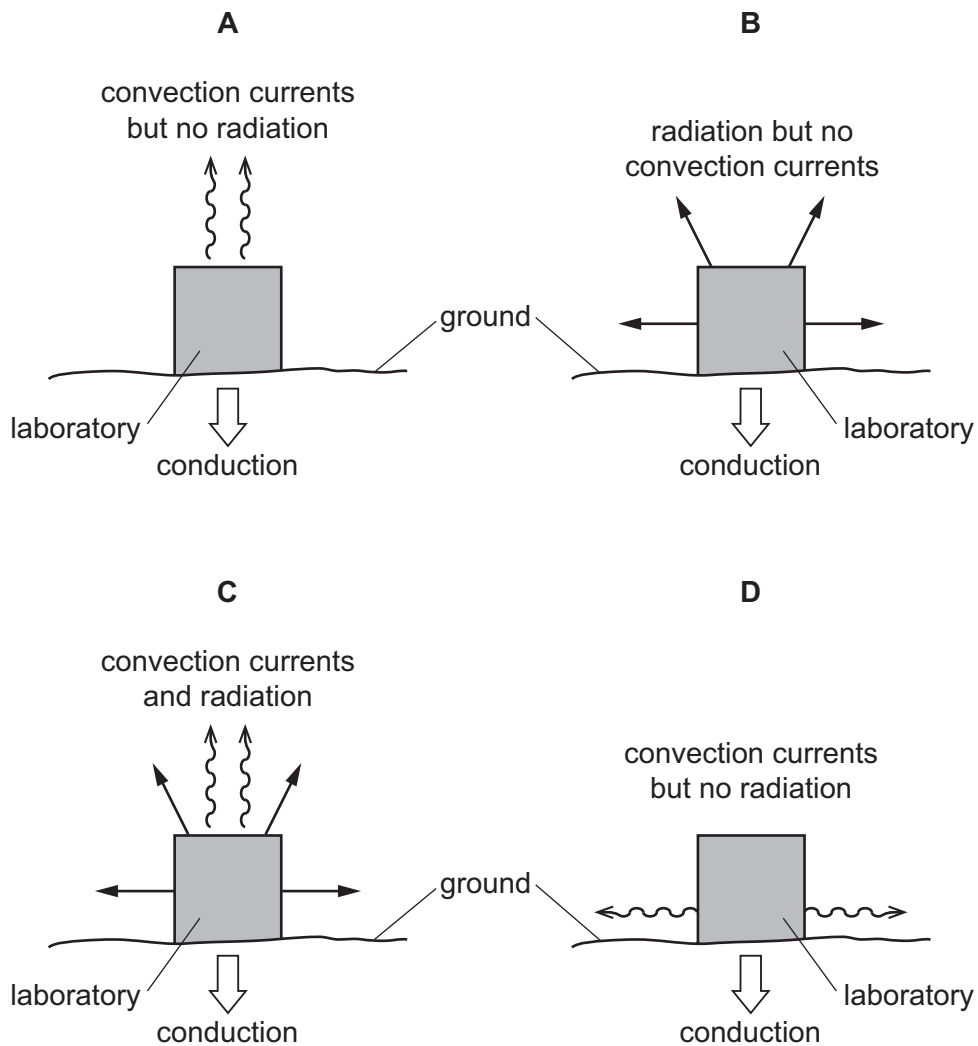27 An engineer needs to fit an iron bar into a gap in an iron base.

At room temperature, the bar is slightly too big to fit in the gap.

How can the engineer make the bar fit into the gap?

A Cool the bar and heat the base.

B Cool the base and cool the bar to the same temperature.

C Cool the base and heat the bar.

D Heat the base and heat the bar to the same temperature.

28 An engineer is designing a laboratory to be built on the Moon. There is no air on the Moon.

Which diagram shows how energy is lost as heat from a laboratory on the Moon?

A

convection currents
but no radiation

ground

laboratory

conduction

B

radiation but no
convection currents

laboratory

conduction

C

convection currents
and radiation

ground

laboratory

conduction

D

convection currents
but no radiation

laboratory

conduction

29 A boy throws a small stone into a pond. A wave spreads out from where the stone hits the water and travels to the side of the pond.

The boy notices that 8 wave crests reach the side of the pond every 5.0 s.

What is the frequency of the wave?

A 0.20 Hz   **B** 0.63 Hz   **C** 1.6 Hz   **D** 40 Hz

30 A ray of light in a glass block strikes the edge of the block. The angle of incidence is much smaller than the critical angle.

air

glass block

ray of light
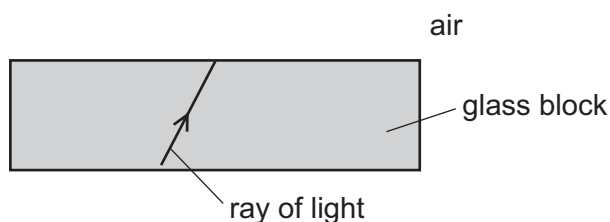
What happens to this ray?

A It is completely reflected.

B It is completely refracted.

C It is partially reflected and partially refracted.

D It is refracted at an angle of refraction of 90°.

31 The diagram represents the electromagnetic spectrum. Some sections have been labelled.

Which section is infra-red radiation?

gamma-rays	**A**	**B**	visible light	**C**	**D**	radio waves

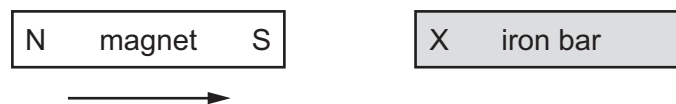**32** Three objects, P, Q and R, vibrate with the frequencies shown and produce longitudinal waves in the air.

object	frequency / Hz
P	25
Q	1000
R	15 000

Which of these waves can be heard by a human with normal hearing?

A P, Q and R

B P and Q only

C P and R only

D Q and R only

33 A magnet is brought near to an unmagnetised iron bar. This causes the iron bar to become magnetised.

| N | magnet | S |

| X | iron bar |

Which magnetic pole is induced at X and what is the effect on the iron bar?

	pole induced	effect on iron bar
A	N	attracted
B	N	repelled
C	S	attracted
D	S	repelled

34 A positively charged insulating rod is placed on a balance. The reading on the balance is shown in diagram 1.

Two charged rods X and Y are now brought close to the positively charged rod in turn.

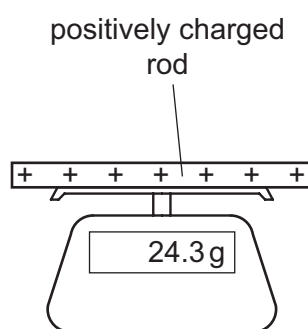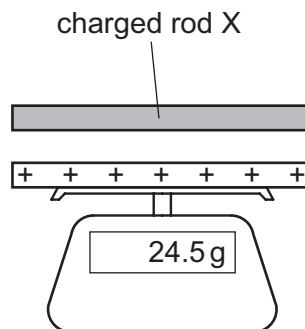Diagram 2 and diagram 3 show the new reading on the balance in each case.

positively charged rod
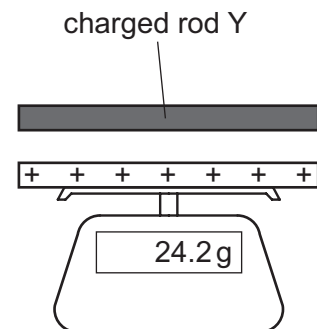+ + + + + + +
24.3 g
diagram 1

charged rod X
+ + + + + + +
24.5 g
diagram 2

charged rod Y
+ + + + + + +
24.2 g
diagram 3

Which row gives the charges on rod X and rod Y?

	rod X	rod Y
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

35 The circuit shown is used to determine the resistance of resistor R.
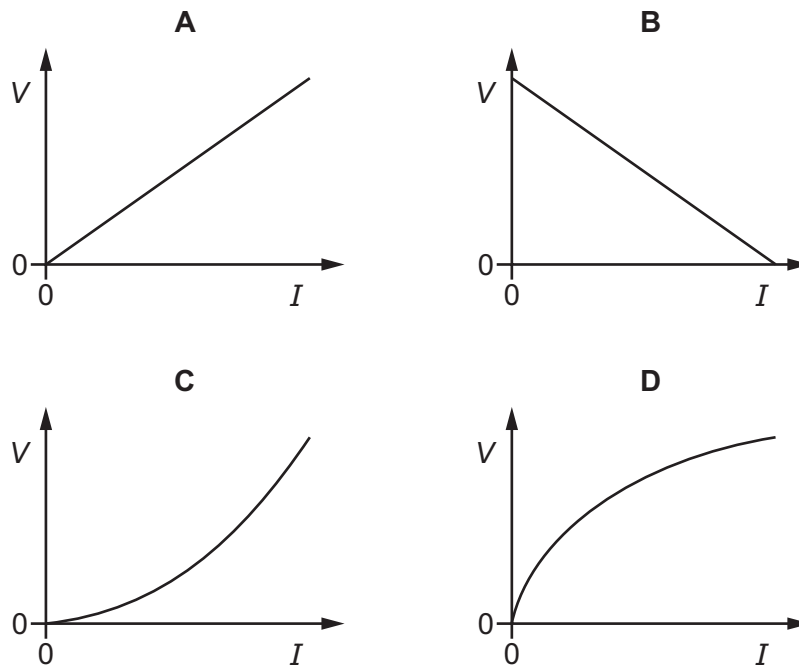
P and Q are two meters, connected correctly.
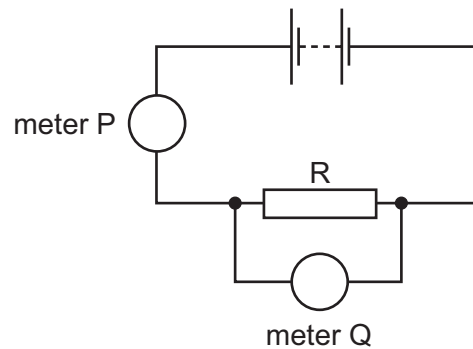

Which calculation gives the value of R?

A   (reading of meter P) ÷ (reading of meter Q)

B   (reading of meter P) × (reading of meter Q)

C   (reading of meter Q) + (reading of meter P)

D   (reading of meter Q) ÷ (reading of meter P)

36 Which is the V/I characteristic graph for a metallic (ohmic) conductor at a constant temperature?

37 A student investigates the current in a circuit that contains two resistors connected in parallel. The circuit includes four ammeters **A**, **B**, **C** and **D**.

Which ammeter shows the largest reading?
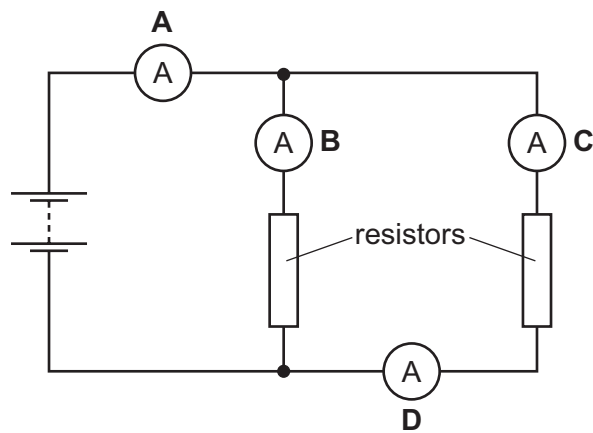
38 The diagram shows cathode rays entering an electric field between two charged parallel plates.
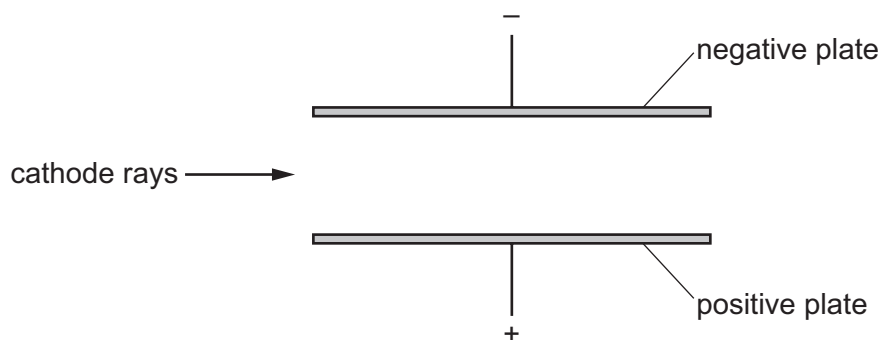
The cathode rays are deflected as they pass between the plates.

In which direction are they deflected?

A   into the page

B   out of the page

C   towards the top of the page

D   towards the bottom of the page

       [Turn over

39 The emissions from a radioactive source pass through a sheet of lead, 10 mm thick.

Which row describes other properties of these emissions?

	ionising effect	deflection in an electric field
A	strong	from positive to negative
B	strong	no deflection
C	weak	from positive to negative
D	weak	no deflection

40 A certain element has two isotopes.

Which row compares the nucleon numbers and the proton numbers of the isotopes?

	nucleon numbers	proton numbers
A	must be different	must be different
B	must be different	must be the same
C	must be the same	must be different
D	must be the same	must be the same

17

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18

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19

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The Periodic Table of Elements

Group

Key

atomic number
atomic symbol
name
relative atomic mass

I	II	III	IV	V	VI	VII	VIII
							2 He helium 4

| 1
H
hydrogen
1 | | | | | | | |

I	II												III	IV	V	VI	VII	VIII
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 –		

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.).