



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

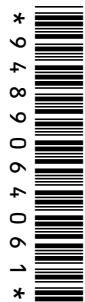
**0654/11**

Paper 1 Multiple Choice (Core)

**May/June 2018**

**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 16.

Electronic calculators may be used.

This document consists of **16** printed pages.

1 Which rows correctly match characteristics of living things with their descriptions?

	characteristic	description
1	excretion	removing the waste products of metabolism
2	growth	making more living things of the same type
3	nutrition	taking in or producing food
4	respiration	releasing energy from food

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

2 Which statement about cells is correct?

- A** Cell membranes are found only in animal cells.
- B** Cell membranes are found only in plant cells.
- C** Cell walls are found only in animal cells.
- D** Cell walls are found only in plant cells.

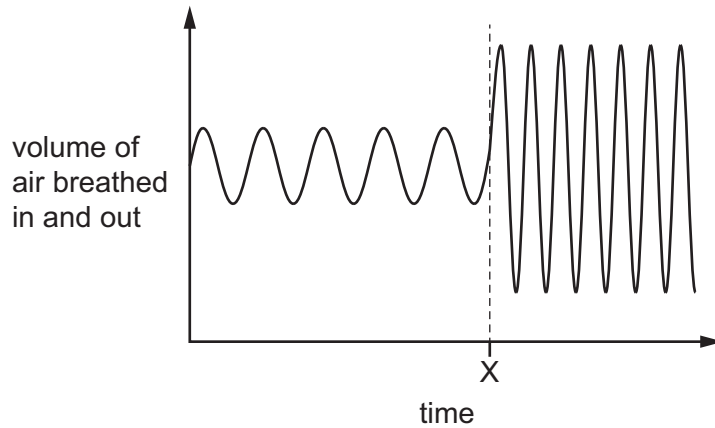
3 Tests were carried out on a colourless liquid, with the following results.

test	colour obtained
Benedict's	blue
biuret	purple
iodine	blue/black

What did the colourless liquid contain?

- A** protein only
- B** protein and reducing sugar only
- C** protein and starch only
- D** protein, reducing sugar and starch

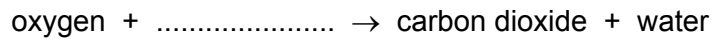
- 4 The graph shows the volume of air breathed in and out over a period of time.



What happens after time X?

	breathing rate	breathing volume
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

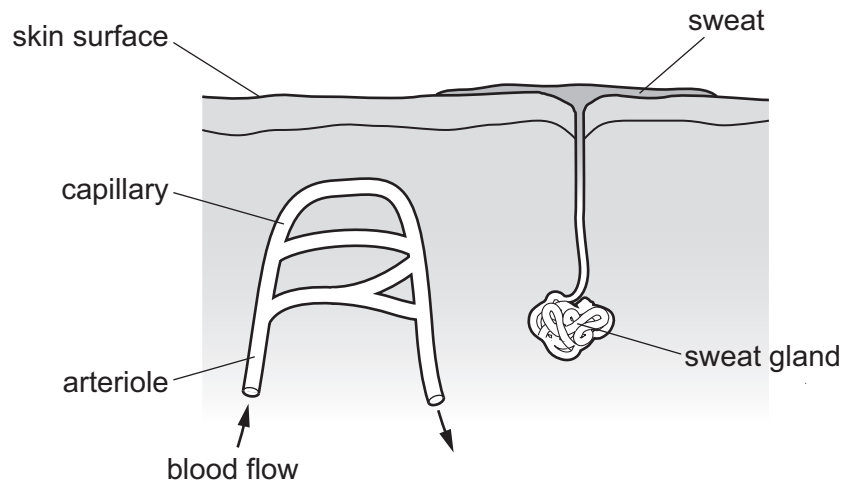
- 5 The word equation for aerobic respiration is shown.



Which molecule is missing from the equation?

- A** glucose
  - B** glycogen
  - C** starch
  - D** sucrose
- 6 By which process does oxygen pass from the alveoli to the blood capillaries in the lungs?
- A** diffusion
  - B** evaporation
  - C** secretion
  - D** transpiration

7 The diagram shows a section through the skin of a person who is sweating.



What happens to the arteriole and what will be the effect on heat loss when a person is sweating?

	arteriole	heat loss
<b>A</b>	vasoconstricts	decreases
<b>B</b>	vasoconstricts	increases
<b>C</b>	vasodilates	decreases
<b>D</b>	vasodilates	increases

8 Which statement about reproduction is correct?

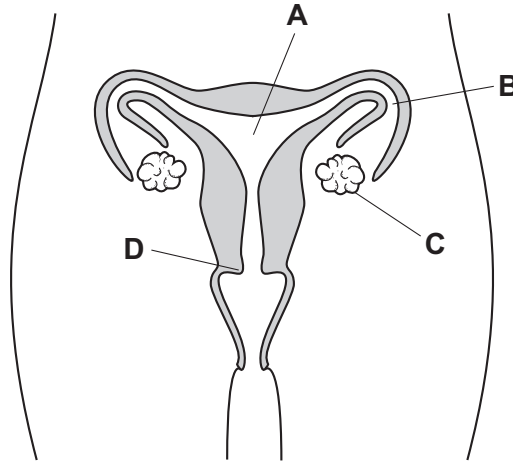
- A** Diploid gametes are produced in sexual reproduction.
- B** Diploid zygotes are produced in sexual reproduction.
- C** Genetically identical offspring are produced in sexual reproduction.
- D** Haploid zygotes are produced in sexual reproduction.

9 Which statement about flowers is correct?

- A** The anther and stigma are parts of the carpel.
- B** The anther and stigma are parts of the stamen.
- C** The ovary and stigma are parts of the carpel.
- D** The ovary and stigma are parts of the stamen.

10 The diagram shows the female reproductive system.

In which labelled part is the egg usually fertilised?

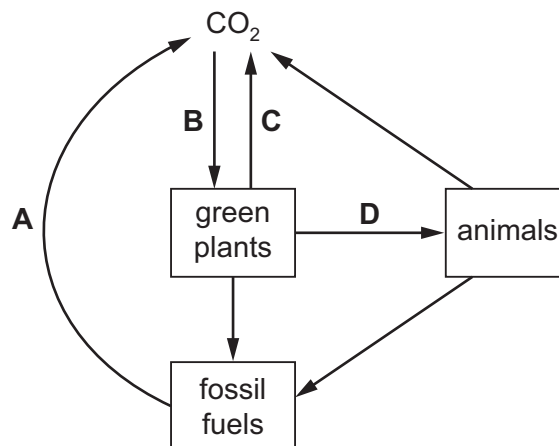


11 Which statement describes why humans use artificial selection in the breeding of animals?

- A The animals are better suited to their environment.
- B The animals are genetically identical to each other.
- C The animals contain genes from another species.
- D The animals have increased economic importance.

12 The diagram shows a simplified carbon cycle.

Which labelled arrow represents respiration?



13 What are the likely consequences of the large scale clearing of forests?

	flooding	number of species
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

14 Which statement about liquids is correct?

- A** They have a fixed shape and a fixed volume.
- B** They have a fixed shape but not a fixed volume.
- C** They have no fixed shape but they do have a fixed volume.
- D** They have no fixed shape and no fixed volume.

15 Pure copper chloride can be obtained from a mixture of powdered copper and solid copper chloride.

Three stages in the method are listed.

- P add water and stir
- Q crystallise
- R filter

In which order are these stages carried out in order to obtain pure copper chloride from the mixture?

- A** P → Q → R
- B** P → R → Q
- C** R → P → Q
- D** R → Q → P

16 An ion of sodium has the symbol  ${}^{23}_{11}\text{Na}^+$ .

Which row shows the number of protons and the number of electrons in this ion?

	number of protons	number of electrons
<b>A</b>	11	10
<b>B</b>	11	12
<b>C</b>	12	11
<b>D</b>	12	13

17 A rock contains three ores, galena ( $\text{PbS}$ ), copper pyrites ( $\text{CuFeS}_2$ ) and cinnabar ( $\text{HgS}$ ).

How many metals are present in this rock?

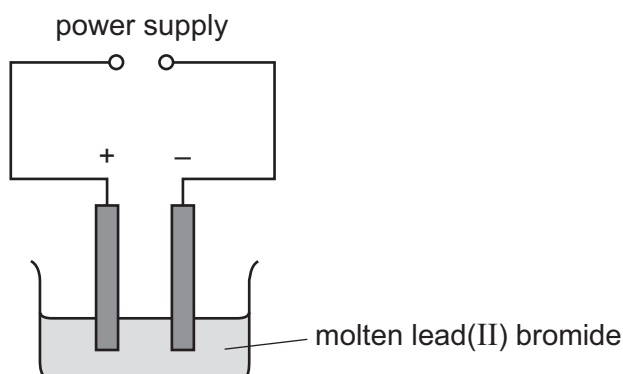
**A** 3

**B** 4

**C** 5

**D** 8

18 Molten lead(II) bromide is electrolysed as shown.



An element is produced at the negative electrode.

What is the name of the element and of the negative electrode?

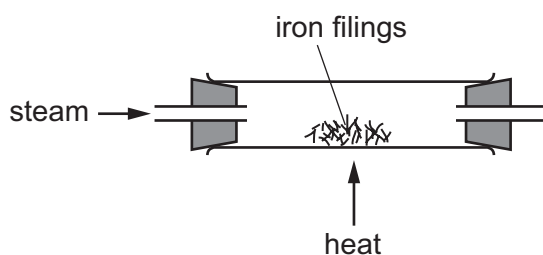
	element	negative electrode
<b>A</b>	bromine	anode
<b>B</b>	bromine	cathode
<b>C</b>	lead	anode
<b>D</b>	lead	cathode

19 Dilute hydrochloric acid is added to lumps of calcium carbonate.

Which change decreases the rate of the reaction?

- A Decrease the temperature of the acid.
- B Increase the concentration of the acid.
- C Use a larger volume of the acid.
- D Use powdered calcium carbonate.

20 When iron is heated with steam, a black solid is formed.



The equation for the reaction is shown.



Which statement about this reaction is correct?

- A Iron has been oxidised because it has gained oxygen.
- B Iron has been reduced because it removed oxygen from water.
- C Iron oxide has been reduced because it contains oxygen.
- D Water has been oxidised because it contains oxygen.

21 When aqueous sodium hydroxide is added to a solution of salt P, a white precipitate is produced.

The white precipitate dissolves in excess aqueous sodium hydroxide.

When a solution containing aqueous barium ions is added to a solution of salt P under acidic conditions, a white precipitate is produced.

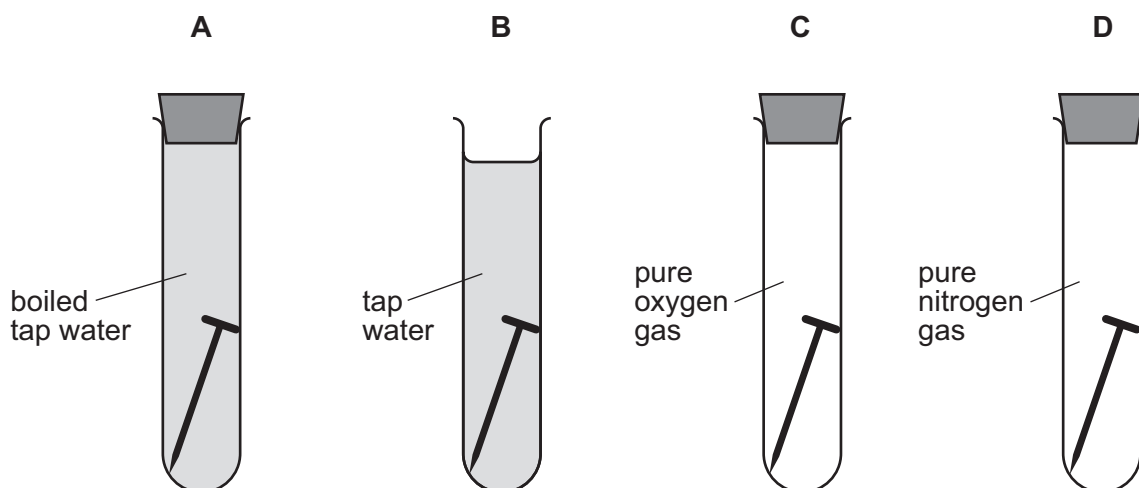
What is P?

- A iron(II) chloride
- B iron(II) sulfate
- C zinc chloride
- D zinc sulfate



- 22 Which statement about the elements in the Periodic Table is correct?
- A Group I elements become less reactive down the group.
  - B Group VII elements become less reactive down the group.
  - C The elements are arranged in mass number order.
  - D The elements become more metallic from left to right.
- 23 Which property explains why aluminium is used to make food containers?
- A It has a low density.
  - B It has a high strength.
  - C It is resistant to corrosion.
  - D It is very shiny.
- 24 Four iron nails are placed in four test-tubes as shown.

In which test-tube does the iron nail rust most quickly?



- 25 Other than hydrogen and oxygen, which substance provides only **one** of the essential elements for plant growth?
- A  $K_3PO_4$
  - B  $KNO_3$
  - C  $(NH_4)_3PO_4$
  - D  $NH_4NO_3$

26 Calcium carbonate is decomposed by heating in an industrial process.

The equation for this reaction is shown.

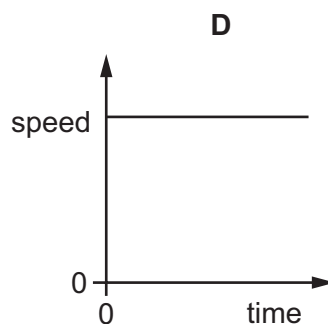
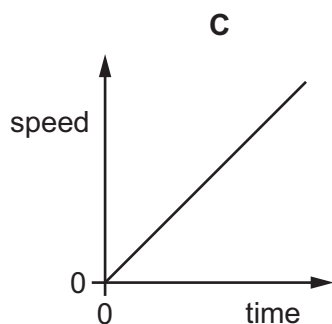
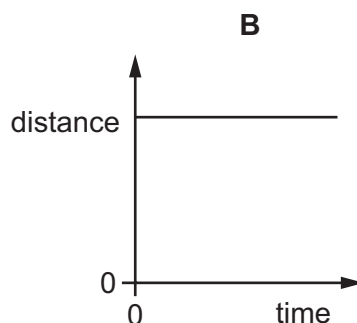
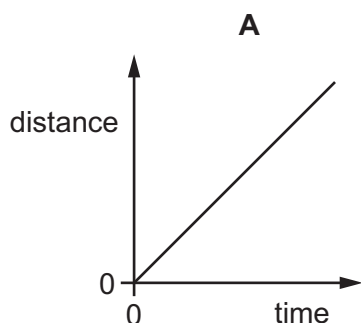


Which statement is **not** correct?

- A The common name for calcium carbonate is limestone.
  - B The common name for calcium oxide is lime.
  - C Calcium oxide is used to neutralise alkaline soil.
  - D Calcium oxide is used to neutralise industrial waste products.
- 27 What are the products of the complete combustion of ethanol?
- A carbon dioxide, carbon monoxide and water
  - B carbon dioxide and water only
  - C carbon dioxide only
  - D carbon monoxide and water only

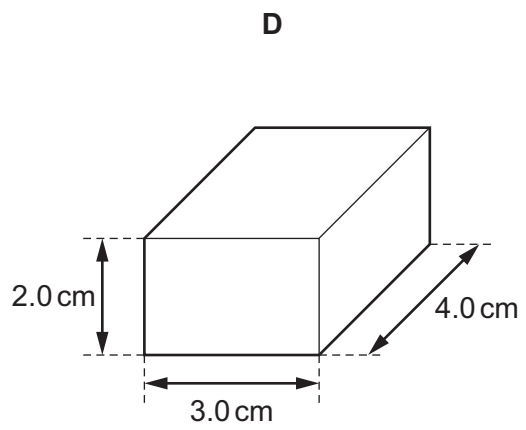
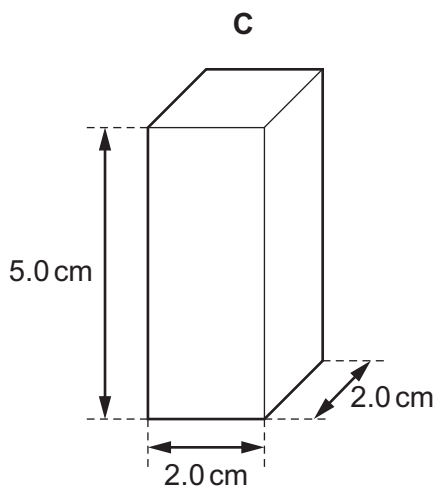
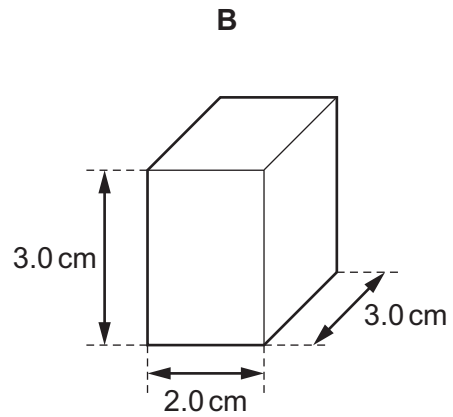
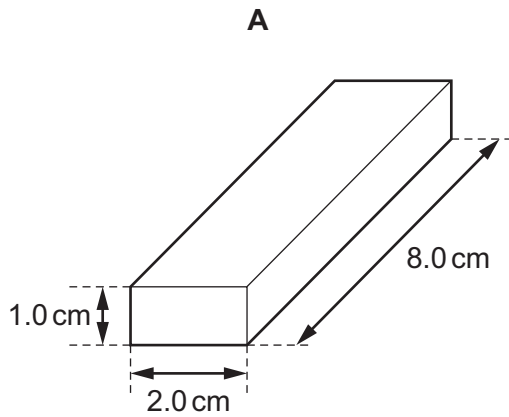
28 The diagrams show two distance-time graphs and two speed-time graphs.

Which graph represents the motion of an object that is accelerating?

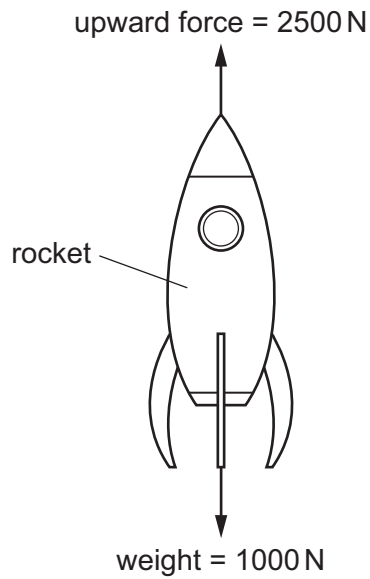


29 The diagrams show four solid blocks with the same mass.

Which block is made from the **least** dense material?



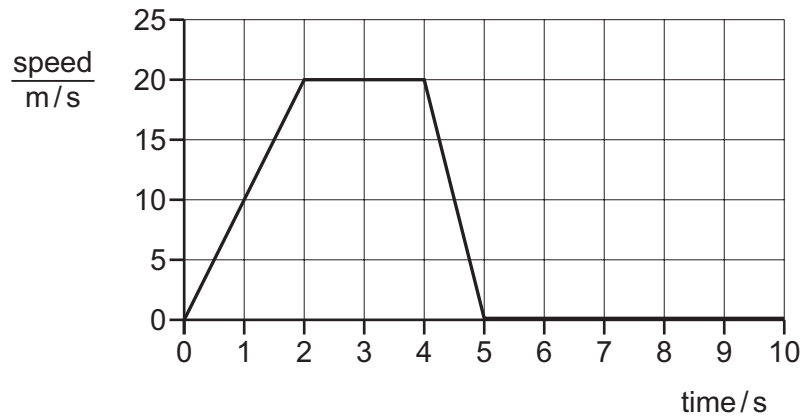
30 The diagram shows the two forces acting on a rocket as it travels upwards.



What is the size of the resultant force acting on the rocket?

- A** 0 N                      **B** 1500 N                      **C** 2500 N                      **D** 3500 N

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



Between which times does the car have the most kinetic energy?

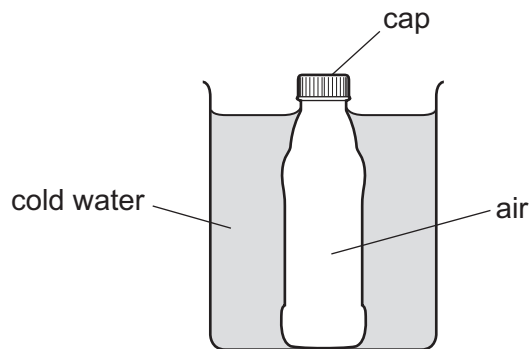
- A** 0 s and 2.0 s  
**B** 2.0 s and 4.0 s  
**C** 4.0 s and 5.0 s  
**D** 5.0 s and 10 s

32 A man does a known amount of work when he climbs up a ladder.

Which other quantity must be known in order to determine the power he produces?

- A the acceleration of free fall
- B the height of the ladder
- C the time taken
- D the weight of the man

33 A glass bottle containing warm air is sealed with a screw cap and then cooled in cold water.



The contraction of the glass bottle can be ignored.

What remains the same during the cooling?

- A the air pressure inside the bottle
  - B the energy of the air molecules in the bottle
  - C the force on the cap made by the air molecules in the bottle
  - D the volume of air in the bottle
- 34 Which change of state is condensation?
- A gas to liquid
  - B liquid to gas
  - C liquid to solid
  - D solid to liquid

35 Light travelling in a glass block strikes the inside surface of the block at the critical angle.

What is the size of the angle of refraction?

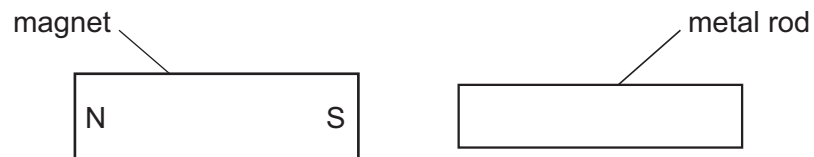
- A equal to the critical angle
- B between the critical angle and  $90^\circ$
- C exactly  $90^\circ$
- D greater than  $90^\circ$

36 Infra-red, microwaves, visible light and X-rays are all electromagnetic waves.

Which list puts these waves in order of wavelength with the greatest wavelength first?

- A infra-red, visible, X-rays, microwaves
- B microwaves, infra-red, visible, X-rays
- C visible, X-rays, microwaves, infra-red
- D X-rays, microwaves, infra-red, visible

37 A bar magnet is brought near to a metal rod.



The magnet is now turned around so that the N-pole is on the right. The magnet is again brought near to the metal rod.

In both cases the metal rod is attracted to the magnet.

What could the metal rod be?

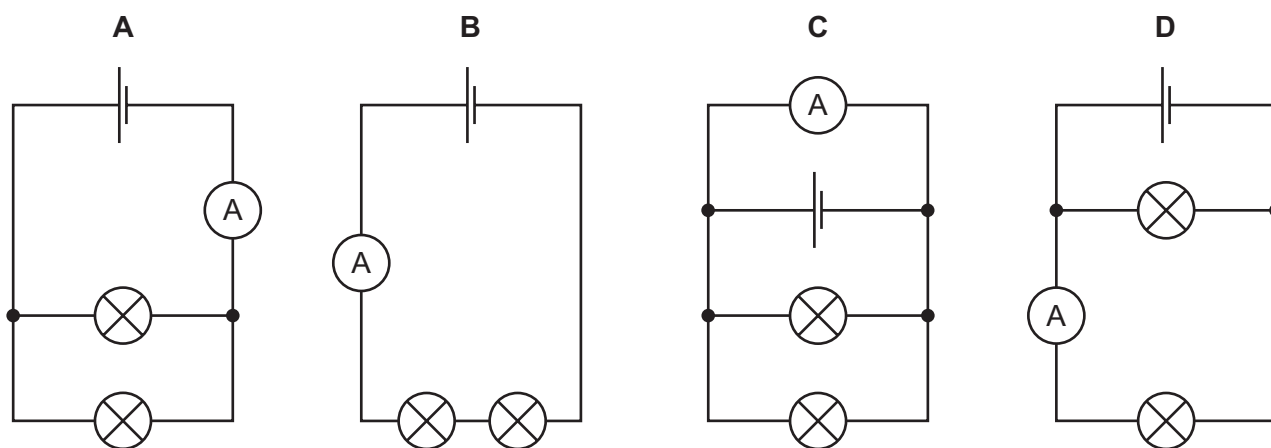
- A another bar magnet
- B a piece of aluminium
- C a piece of copper
- D a piece of iron

- 38 Which row correctly states whether the unit for electromotive force (e.m.f.), mass and weight is the newton?

	electromotive force (e.m.f.)	mass	weight
<b>A</b>	no	no	yes
<b>B</b>	no	yes	yes
<b>C</b>	yes	no	no
<b>D</b>	yes	yes	no

- 39 The diagrams show four circuits.

Which circuit contains two lamps connected in parallel with each other, and contains an ammeter that measures the total current in the two lamps?



- 40 Which statement about radioactive emissions is correct?

- A**  $\alpha$ -particles are the least penetrating and are positively charged.
- B**  $\beta$ -particles are the least penetrating and are negatively charged.
- C**  $\beta$ -particles are the most penetrating and are positively charged.
- D**  $\gamma$ -rays are the most penetrating and are negatively charged.

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The Periodic Table of Elements

Group																		
I	II	III										IV	V	VI	VII	VIII		
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </div>																2 <b>He</b> helium 4
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24																	5 <b>B</b> boron 11
19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulfur 32	17 <b>Cl</b> chlorine 35.5	18 <b>Ar</b> argon 40											
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84											
55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	39 <b>Zn</b> zinc 65	40 <b>Cd</b> cadmium 112	41 <b>In</b> indium 115	42 <b>Sn</b> tin 119	43 <b>Sb</b> antimony 122	44 <b>Xe</b> xenon 131											
87 <b>Fr</b> francium —	88 <b>Ra</b> radium —	45 <b>Fe</b> iron 56	46 <b>Ni</b> nickel 59	47 <b>Cu</b> copper 64	48 <b>Zn</b> zinc 65	49 <b>Ga</b> gallium 70	50 <b>Ge</b> germanium 73											
		51 <b>Mn</b> manganese 55	52 <b>Cr</b> chromium 52	53 <b>Mn</b> manganese 55	54 <b>Fe</b> iron 56	55 <b>Co</b> cobalt 59	56 <b>Ni</b> nickel 59											
		57–71 lanthanoids	58 <b>La</b> lanthanum 139	59 <b>Pr</b> praseodymium 141	60 <b>Nd</b> neodymium 144	61 <b>Pm</b> promethium —	62 <b>Sm</b> samarium 150											
		72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192											
		78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209											
		89–103 actinoids	89 <b>La</b> lanthanum 139	90 <b>Ce</b> cerium 140	91 <b>Pr</b> praseodymium 141	92 <b>Nd</b> neodymium 144	93 <b>Pm</b> promethium —											
		104 <b>Rf</b> rutherfordium —	105 <b>Db</b> dubnium —	106 <b>Sg</b> seaborgium —	107 <b>Bh</b> bohrium —	108 <b>Hs</b> hassium —	109 <b>Mt</b> meitnerium —											
		110 <b>Ds</b> darmstadtium —	111 <b>Rg</b> roentgenium —	112 <b>Cn</b> copernicium —	113 <b>Nh</b> nihonium —	114 <b>Fl</b> flerovium —	115 <b>Mc</b> moscovium —											
		116 <b>Lv</b> livermorium —	117 <b>Ts</b> tennessine —	118 <b>Og</b> oganesson —	119 <b>Uue</b> unbinilium —	120 <b>Uub</b> unbinilium —	121 <b>Uut</b> unbinilium —											

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

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