



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

0653/01

Paper 1 Multiple Choice

May/June 2009

45 minutes

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

* 5 5 0 2 2 8 6 7 5 6 *

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 Which pair of features is found in plant cells but **not** in animal cells?

A	cell membrane	cell sap
B	cell sap	cell wall
C	cell wall	nucleus
D	nucleus	cell membrane

2 Which parts of a plant cell are fully permeable?

	cell surface membrane	cell wall
A	✓	✓
B	✓	x
C	x	✓
D	x	x

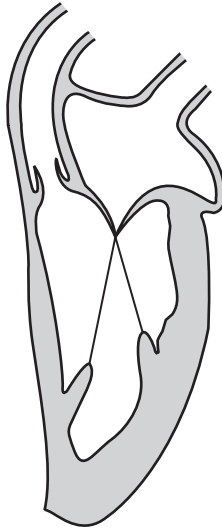
3 The following statements are about enzymes and metabolic reactions.

- 1 Different metabolic reactions are catalysed by different enzymes.
- 2 Enzymes are produced only inside living cells.
- 3 Enzymes cannot be re-used.
- 4 Metabolic reactions take place only inside living cells.

Which two statements are correct?

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

- 4 The diagram shows **only the left side** of the heart as it appears at one particular stage in a heart-beat.



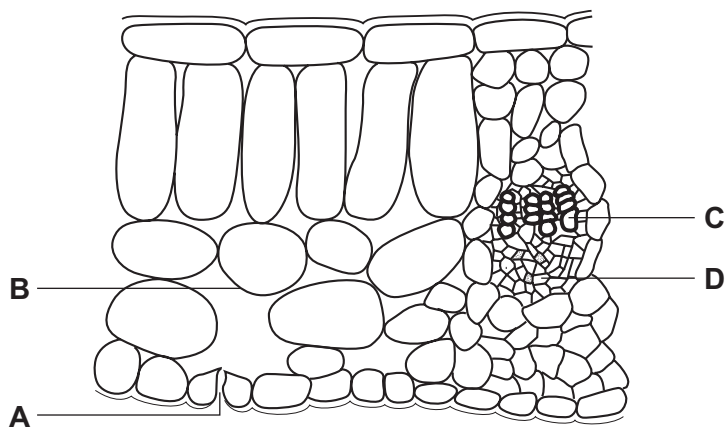
Which statements describe the left side of the heart at this stage?

- 1 The semilunar valve is closed.
- 2 Deoxygenated blood is being pumped to the lungs.
- 3 Oxygenated blood is entering the atrium.
- 4 The bicuspid valve is closed.

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

- 5 The diagram shows a section through a leaf.

Where does evaporation of water take place?



6 The results of tests carried out on four food samples are shown.

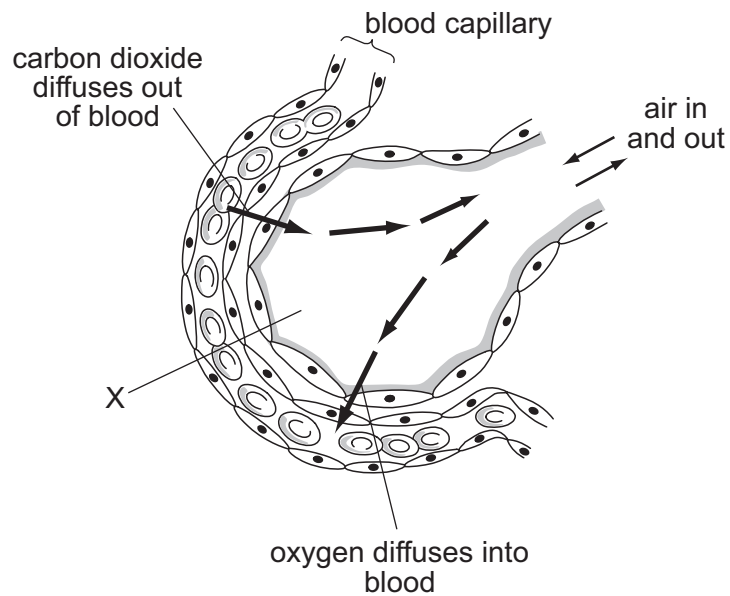
sample	Benedict's test	iodine test	biuret test
1	✓	✓	✗
2	✓	✗	✓
3	✗	✓	✗
4	✗	✗	✓

key
 ✓ = positive test
 ✗ = negative test

Which two samples contain protein?

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

7 The diagram shows a section through part of a lung.



What is structure X?

- A** alveolus
B bronchus
C pleural membrane
D trachea

8 The following statements are about reproduction.

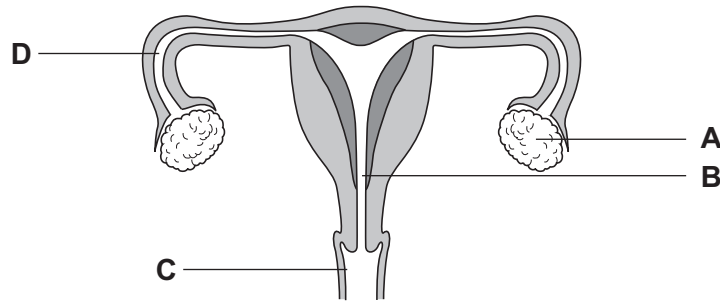
- 1 Clones grown in different environments will always look exactly alike.
- 2 Clones possess identical genes.
- 3 Sexual reproduction produces offspring with different alleles.
- 4 When two gametes fuse they form a clone.

Which two statements are correct?

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

9 The diagram shows the human female reproductive system.

Where is the egg fertilised?



10 After fertilisation, which part of a flower develops into a seed?

- A** egg
B ovary
C ovule
D pollen

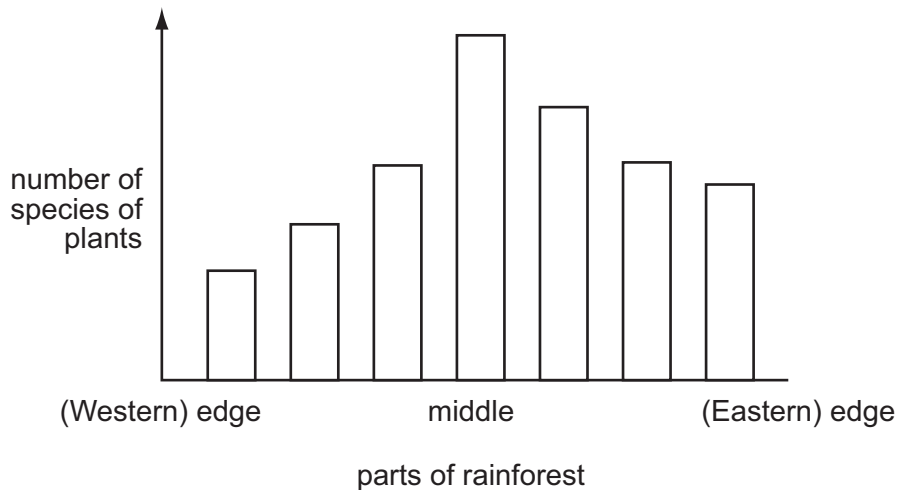
- 11 Ten plants are produced asexually from one parent plant. The diagram shows these ten plants after they have grown for a few weeks in two separate groups.



What is the explanation for the difference between the two groups of plants?

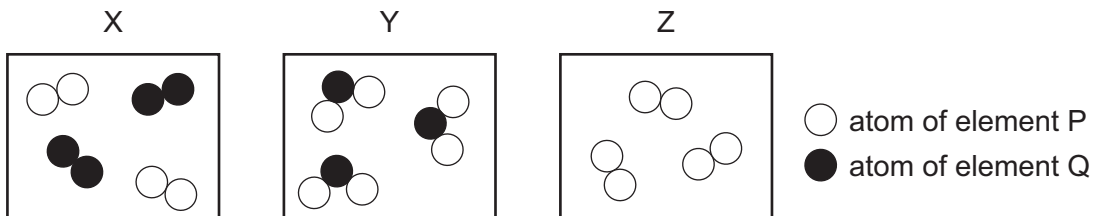
- A All the plants are genetically identical and are growing in the same conditions.
 - B All the plants are genetically identical but are growing in different conditions.
 - C The plants are genetically different and are growing in the same conditions.
 - D The plants are genetically different and are growing in different conditions.
- 12 Which process takes carbon dioxide out of the air?
- A combustion
 - B decomposition
 - C photosynthesis
 - D respiration

- 13 The graph shows the number of species of plants in different parts of a rainforest.



Which statement about species diversity is correct?

- A** It is greatest at the edges of the forest.
B It is greatest in the middle of the forest.
C Is the same at both edges of the forest.
D It is the same throughout the forest.
- 14 Diagrams X, Y and Z represent three different substances.



Which row in the table correctly describes X, Y and Z?

	X	Y	Z
A	compound	element	mixture
B	compound	mixture	element
C	mixture	element	compound
D	mixture	compound	element

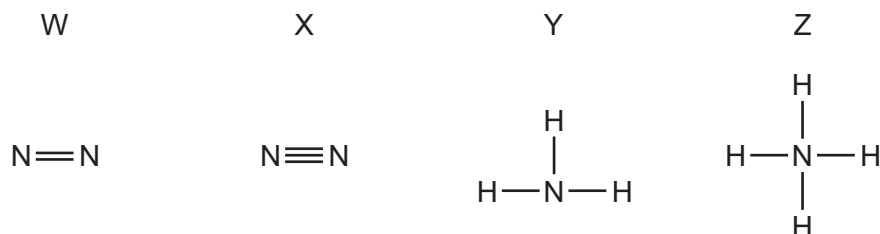
- 15 Two atoms have the symbols ${}^{40}_{18}\text{X}$ and ${}^{40}_{20}\text{Y}$.

It follows that they have the same number of1..... and that they form2..... bond.

Which words correctly complete gaps 1 and 2?

	1	2
A	neutrons	an ionic
B	neutrons	no
C	nucleons	an ionic
D	nucleons	no

- 16 Which diagrams of the structures of nitrogen and ammonia are correct?



- A** W and Y **B** W and Z **C** X and Y **D** X and Z

- 17 The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?

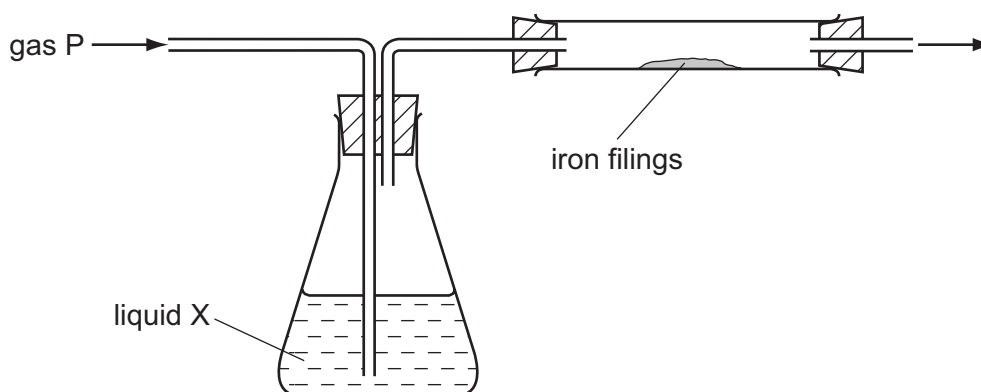
C	D														A										B

- 18 A molecule of phosphoric acid contains three hydrogen atoms, one phosphorus atom and four oxygen atoms.

What is the correct formula for this molecule?

- A** $3\text{HP}_4\text{O}$ **B** 3HPO_4 **C** H_3PO_4 **D** $\text{H}_3(\text{PO})_4$

- 19 The diagram shows apparatus in which gas P can be passed through liquid X and then over iron filings.



Four experiments, each using a different gas P and a different liquid X, are carried out.

In which experiment do the iron filings rust?

	gas P	liquid X
A	nitrogen	concentrated sulfuric acid (a drying agent)
B	nitrogen	water
C	oxygen	concentrated sulfuric acid (a drying agent)
D	oxygen	water

- 20 A firework gives a bright flame in which yellow and red colours are seen.

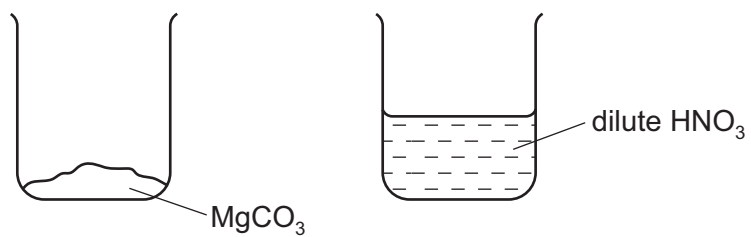
Which two metals are present in the firework?

- A** calcium and copper
B copper and potassium
C potassium and sodium
D sodium and calcium
- 21 Polluted air contains toxic oxides of the elements carbon, C, and sulfur, S, emitted from car exhausts.

Which row in the table is correct?

	toxic oxide is acidic	toxic oxide formula is XO
A	C only	C only
B	C only	S only
C	S only	C only
D	S only	S only

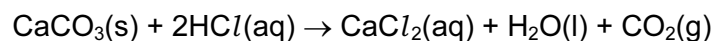
22 The contents of the labelled beakers shown are mixed.



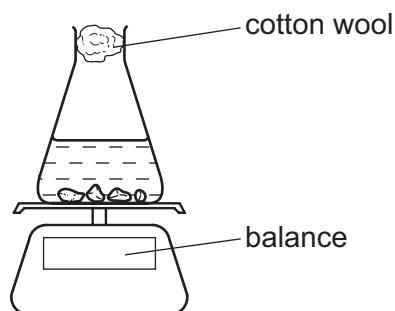
Which salt is formed?

- A magnesium nitrate
- B magnesium sulfate
- C manganese nitrate
- D manganese sulfate

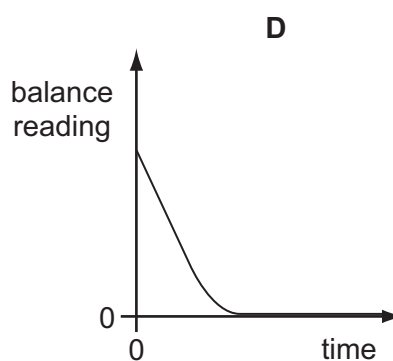
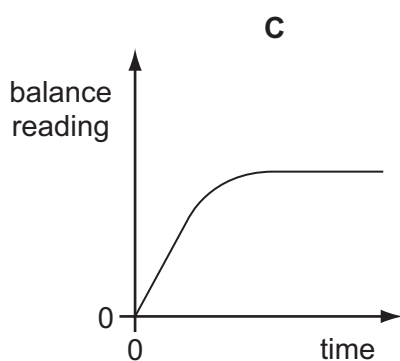
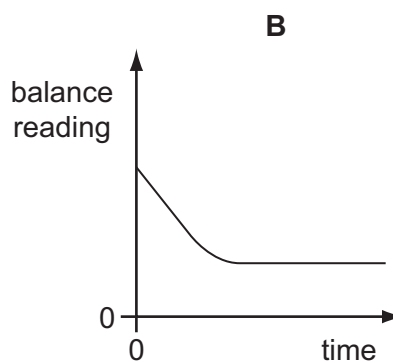
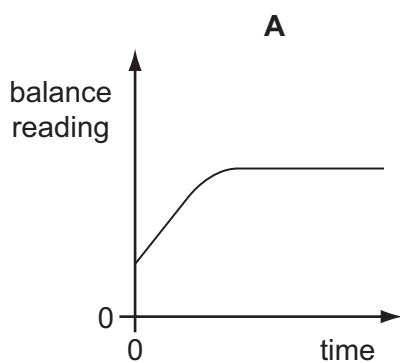
23 Marble chips react with dilute hydrochloric acid as shown.



The progress of this reaction was followed using the apparatus shown.



Which graph shows the results of this experiment?



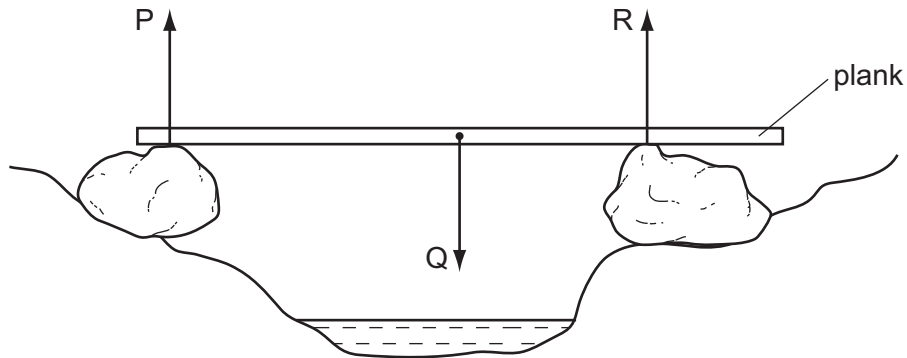
24 Testing for the gases chlorine, hydrogen and oxygen requires different methods.

For which gases is a splint used?

	Cl_2	H_2	O_2
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	x	✓

- 25 Which equation shows the complete combustion of a hydrocarbon?
- A $\text{C}_2\text{H}_4 + 2\text{O}_2 \rightarrow 2\text{CO} + 2\text{H}_2\text{O}$
 - B $\text{C}_2\text{H}_4 + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 2\text{H}_2\text{O}$
 - C $\text{C}_2\text{H}_6\text{O} + 2\text{O}_2 \rightarrow 2\text{CO} + 3\text{H}_2\text{O}$
 - D $\text{C}_2\text{H}_6\text{O} + 3\text{O}_2 \rightarrow 2\text{CO}_2 + 3\text{H}_2\text{O}$
- 26 How can the structure of a plastic be described?
- A a mixture of ions
 - B a mixture of long chain molecules
 - C a mixture of atoms of metals
 - D a mixture of small hydrocarbon molecules
- 27 Which property of the compounds in crude oil is used to separate the oil into useful fractions?
- A boiling point
 - B density
 - C melting point
 - D solubility
- 28 A car travels 100 km. The highest speed of the car is 90 km/h, and the lowest speed is 30 km/h. The journey takes two hours.
- What is the average speed for the journey?
- A 30 km/h
 - B 50 km/h
 - C 60 km/h
 - D 90 km/h
- 29 Which items of apparatus are required to determine the density of a liquid?
- A balance and measuring cylinder
 - B balance and thermometer
 - C metre rule and measuring cylinder
 - D metre rule and thermometer
- 30 Which property of an object **cannot** be changed by a force?
- A its mass
 - B its motion
 - C its shape
 - D its size

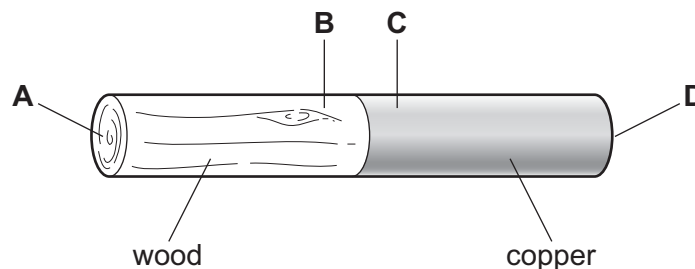
- 31 A wooden plank rests in equilibrium on two boulders on opposite sides of a narrow stream. Three forces of size P, Q and R act on the plank.



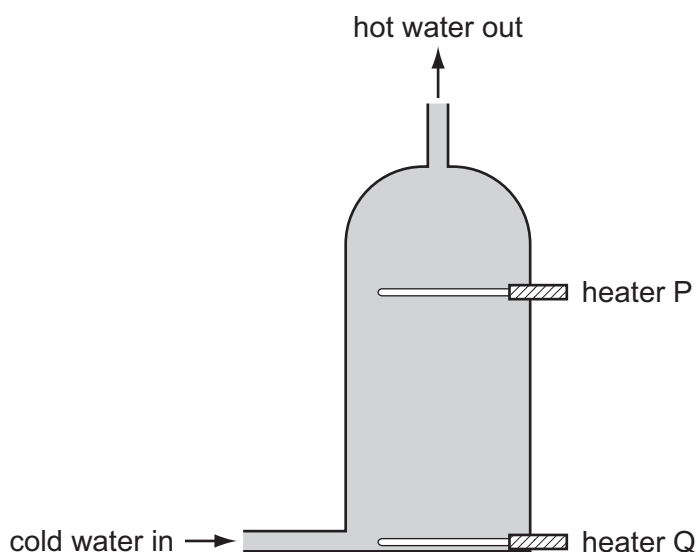
How are the sizes of the forces related?

- A $P + Q = R$
 B $P + R = Q$
 C $P = Q = R$
 D $P = Q + R$
- 32 Electricity can be obtained from different energy resources.
- Which energy resource is used to obtain electricity without producing heat to boil water?
- A coal
 B gas
 C hydroelectric
 D nuclear
- 33 A rod is made up of copper and wood joined together.

After the rod is heated at the join in the centre for about a minute, where would the lowest temperature be?



- 34 A hot water tank is fitted with two identical heaters P and Q. Heater P is two thirds of the way up the tank and heater Q is at the very bottom. The tank is full of cold water.

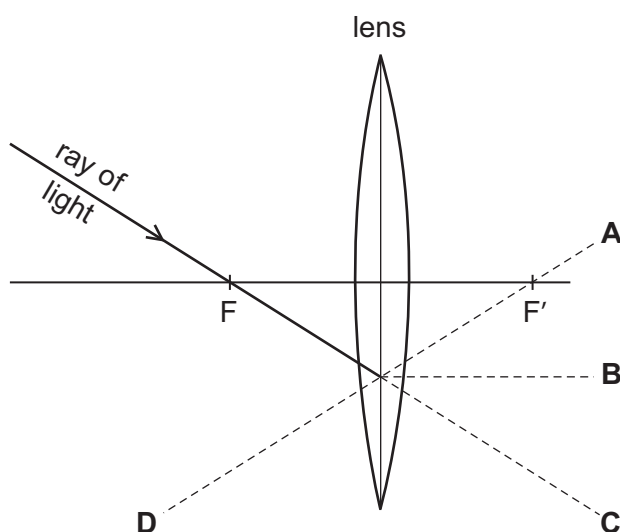


When only heater Q is switched on, it takes a very long time to heat the tank of water to the required temperature of 60°C .

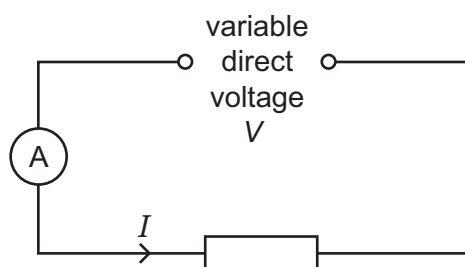
What happens to the tank of cold water if only heater P is switched on?

- A All the water reaches 60°C in less time than before.
 - B All the water reaches 60°C in the same time as before.
 - C The bottom two thirds of the water reaches 60°C in two thirds of the original time
 - D The top one third of the water reaches 60°C in one third of the original time.
- 35 The diagram shows the path of a ray of light passing through the principal focus F of a lens.

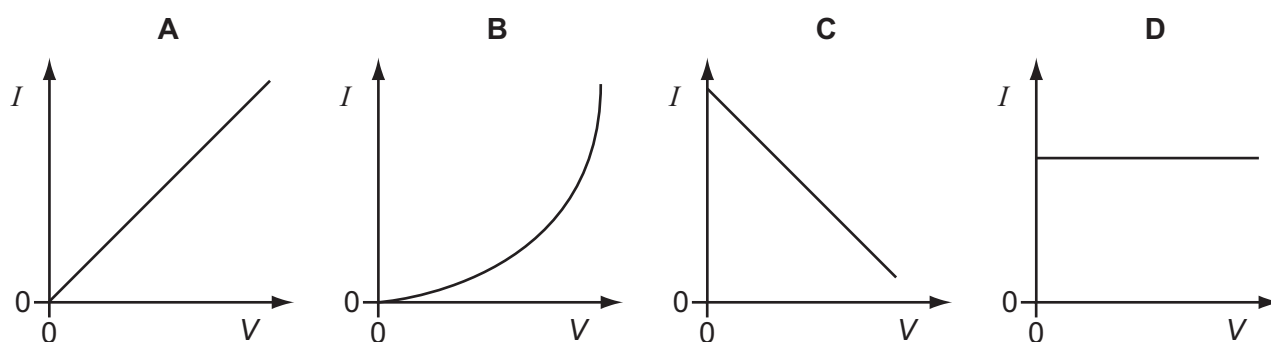
Which broken line shows the direction of the ray after it leaves the lens?



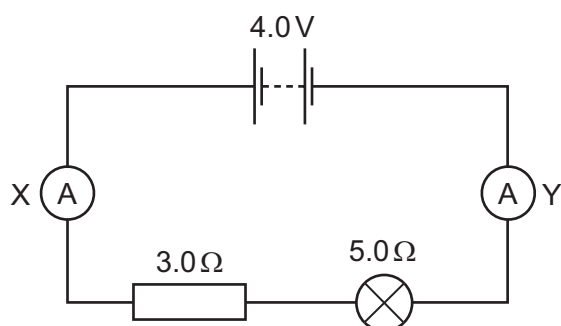
- 36 Using the circuit shown, the current I is found for various voltages V . The temperature of the resistor does not change.



Which graph shows the results obtained?



- 37 In the circuit shown, ammeter X reads 0.5 A.

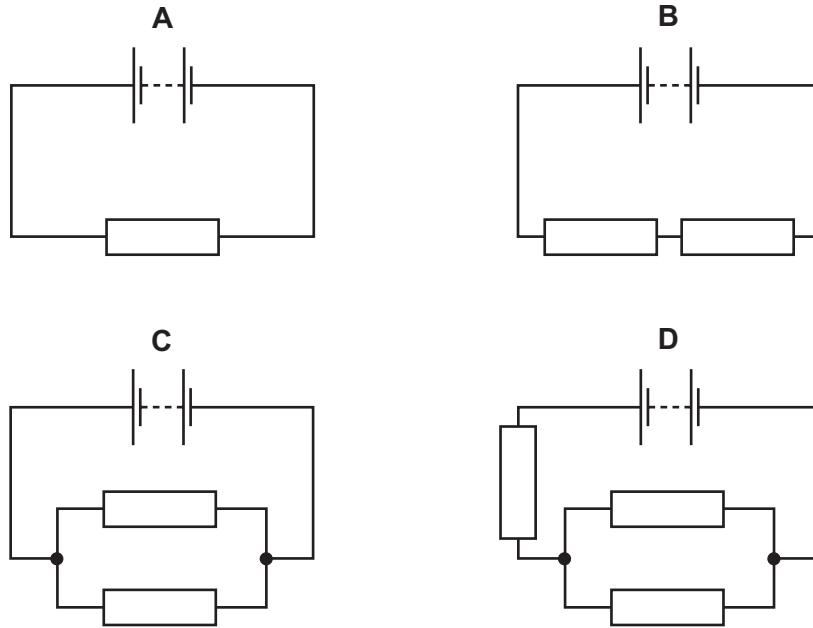


What does ammeter Y read?

- A** 0 **B** 0.5 A **C** 3.5 A **D** 4.0 A

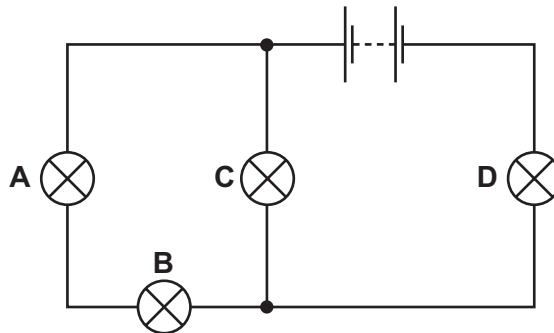
38 In the circuits shown, all the resistors are identical.

Which circuit has the **least** resistance?

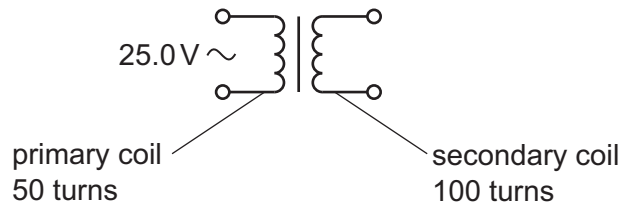


39 In the circuit below, one of the lamps breaks, causing all the other lamps to go out.

Which lamp breaks?



40 A transformer has 50 turns on its primary coil and 100 turns on its secondary coil. An alternating voltage of 25.0V is connected across the primary coil.



What is the voltage across the secondary coil?

- A 12.5V B 50.0V C 175V D 200V

DATA SHEET
The Periodic Table of the Elements

		Group																																																																																												
I	II	III	IV	V	VI	VII	0																																																																																							
7 Li Lithium 3	9 Be Beryllium 4	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	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 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	101 Ru Ruthenium 44	106 Pd Palladium 46	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	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	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	210 Po Polonium 84	210 At Astatine 85	226 Ra Radium 88	227 Ac Actinium 89	227 Fr Francium 87	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71	232 Th Thorium 90	238 U Uranium 92	238 Pa Protactinium 91	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103

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

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.