



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 5 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.

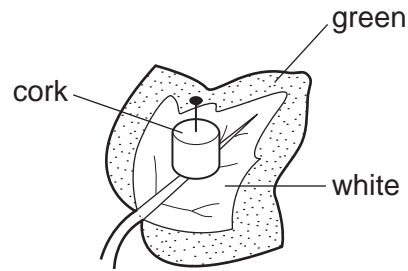
This document consists of **18** printed pages and **2** blank pages.



1 Which feature is characteristic only of birds?

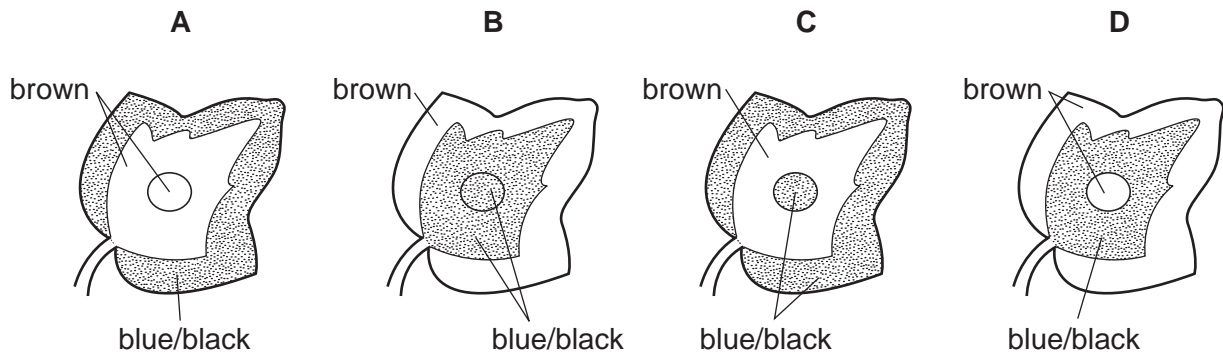
- A feathers and scales
- B fins and hard-shelled eggs
- C hair and scales
- D skin and soft-shelled eggs

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



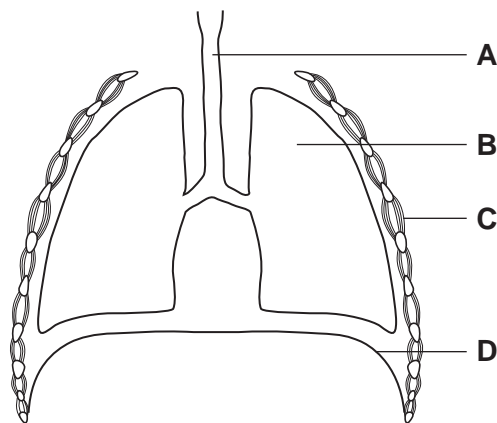
The leaf is then removed from the plant and a starch test carried out on it.

Which diagram shows the result of this starch test?



3 The diagram shows a section through the human thorax.

Which structure contains goblet cells and cilia?

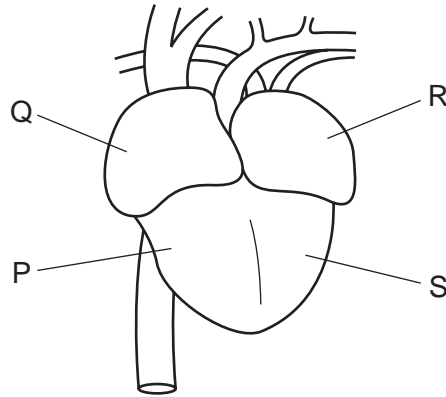


3

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 $P \rightarrow S \rightarrow R \rightarrow Q$
 - B $Q \rightarrow P \rightarrow R \rightarrow S$
 - C $R \rightarrow Q \rightarrow P \rightarrow S$
 - D $S \rightarrow R \rightarrow Q \rightarrow P$
- 6 Which process in living organisms does **not** use energy from respiration?
- A growth
 - B movement
 - C photosynthesis
 - D temperature maintenance

4

7 Food tests are performed on four substances.

Which substance contains fat and protein?

| | test reagent | | | |
|----------|--------------|--------|---------|--------|
| | Benedict's | biuret | ethanol | iodine |
| A | ✓ | x | x | ✓ |
| B | ✓ | ✓ | x | x |
| C | x | ✓ | ✓ | x |
| D | x | x | ✓ | ✓ |

key

✓ = positive test result

x = negative test result

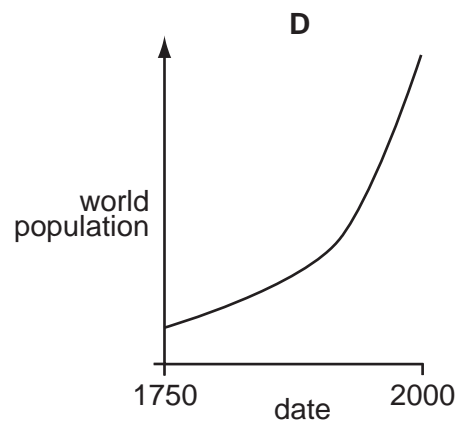
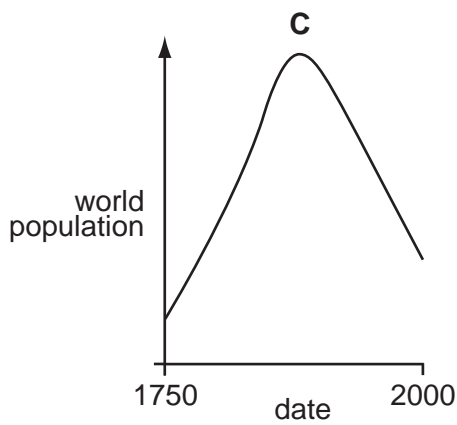
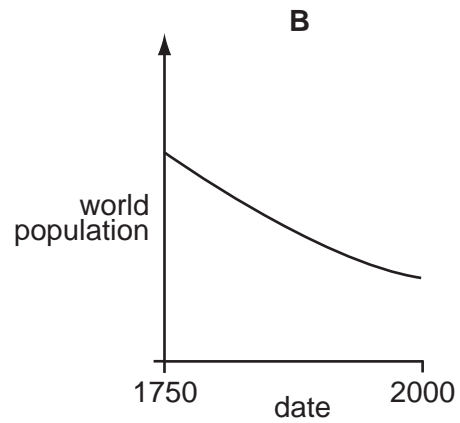
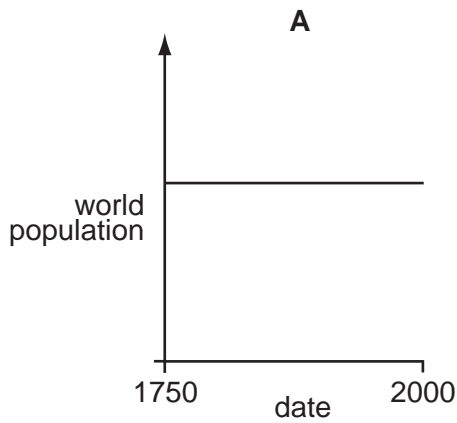
8 What is a cause and a symptom of scurvy?

| | 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 | ✓ | ✓ | ✓ | x |
| B | x | x | ✓ | ✓ |
| C | ✓ | x | ✓ | x |
| D | x | ✓ | x | ✓ |

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.

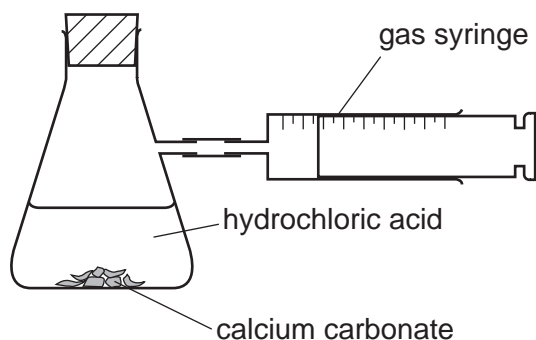
Which element could this atom be?

| | Ca | He |
|----------|----|----|
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

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.

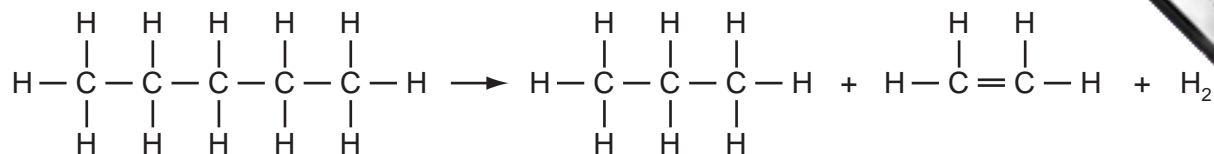
Which change was made in the second experiment?

- 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 | ✓ | ✓ | x |
| C | ✓ | x | ✓ |
| D | x | ✓ | ✓ |

- 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.

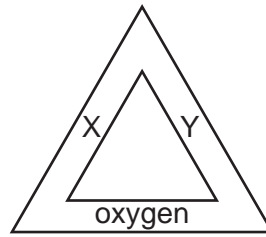
The test shows that the fertiliser contains ammonium ions.

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 |

10

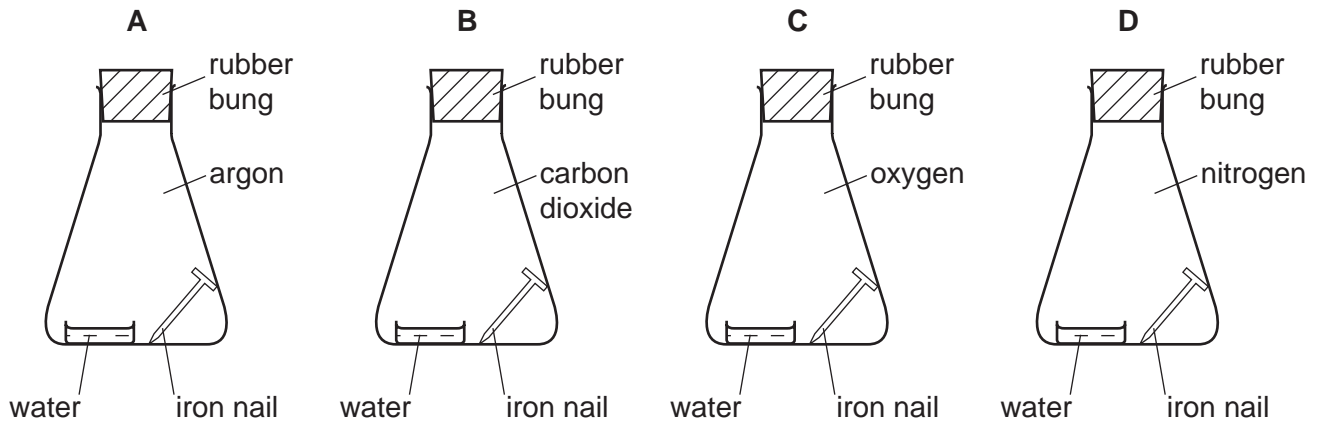
24 The diagram shows a fire triangle.



What are X and Y?

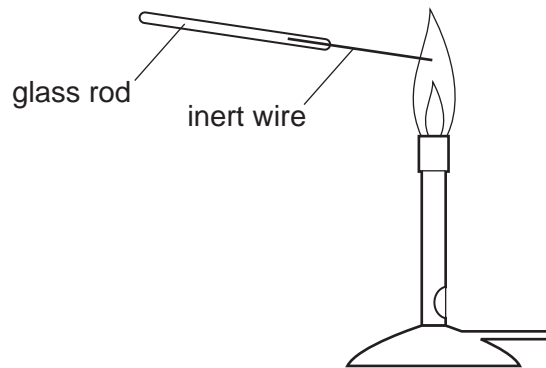
| | X | Y |
|----------|------|----------|
| A | air | catalyst |
| B | air | heat |
| C | fuel | catalyst |
| D | fuel | heat |

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.



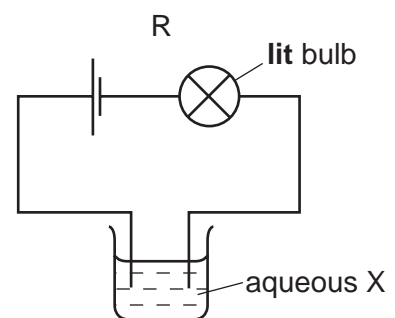
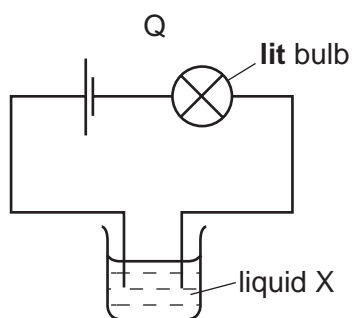
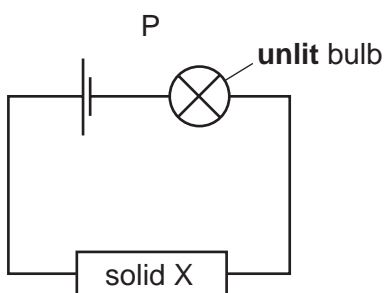
The table shows the results.

| | 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.

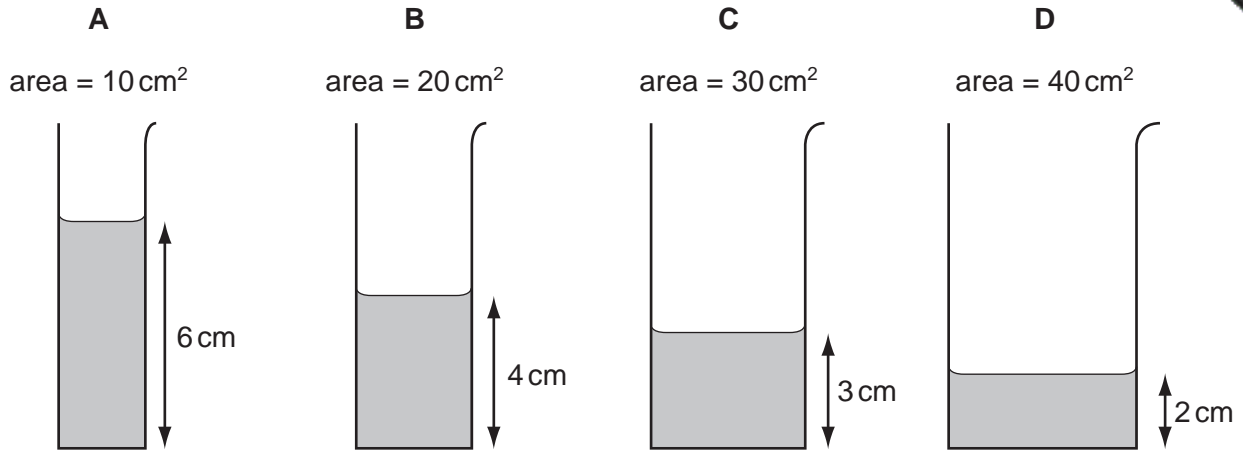


Which diagrams are correct for X?

- 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?

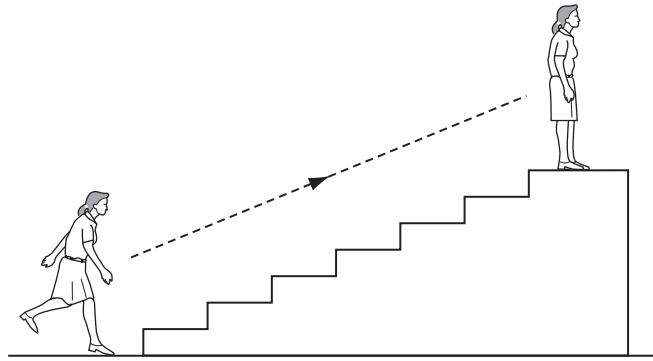
| | force | weight |
|----------|-------|--------|
| A | kg | kg |
| B | kg | N |
| C | N | kg |
| D | N | N |

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

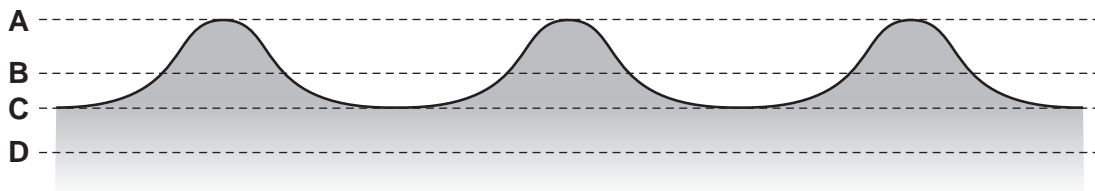
32 Some gas in a sealed plastic bag is cooled.

How do the gas molecules behave when this happens?

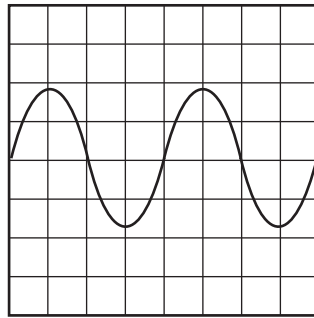
- A They move more quickly and become closer together.
- B They move more quickly and become further apart.
- C They move more slowly and become closer together.
- D They move more slowly and become further apart.

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?



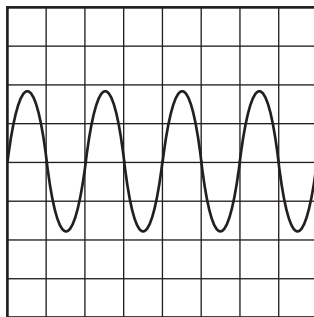
34 The diagram represents a sound wave.



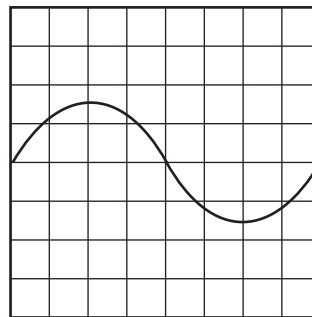
The frequency of the sound is increased.

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

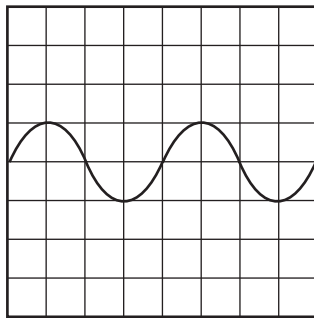
A



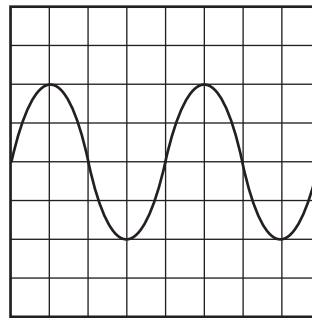
B



C

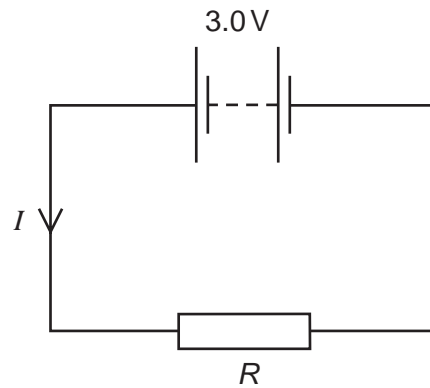


D



15

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



Which line gives possible values of I and R ?

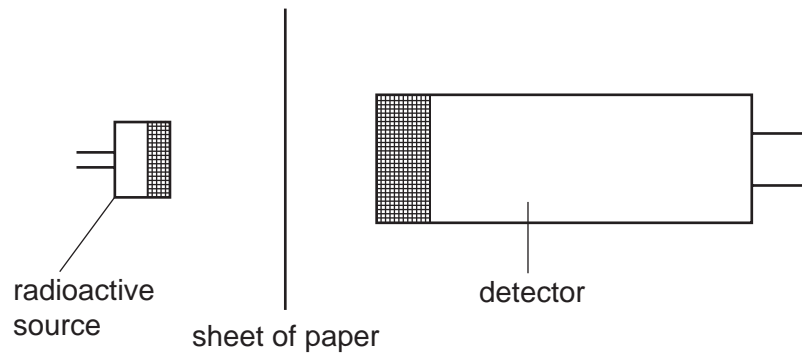
| | I/A | R/Ω |
|----------|-------|------------|
| A | 1.5 | 1.5 |
| B | 1.5 | 2.0 |
| C | 6.0 | 2.0 |
| D | 4.0 | 12 |

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.

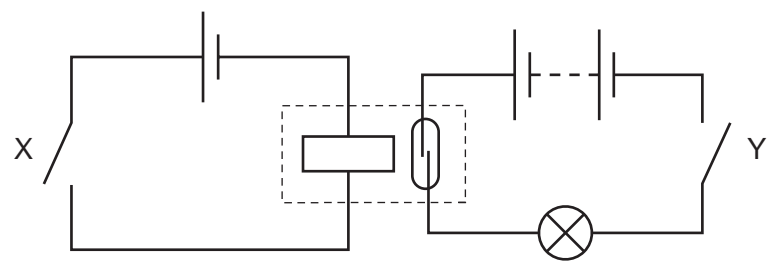
37 A sheet of paper is placed between a radioactive source and a detector.



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 |

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | |
|-----------------------------|------------------------------|-------|----|---|----|-----|------|--|--|--|--|---|
| I | II | III | IV | V | VI | VII | VIII | | | | | 0 |
| 1 H Hydrogen | | | | | | | | | | | | 2 He Helium |
| 3 Li Lithium | 4 Be Beryllium | | | | | | | | | | | 5 B Boron |
| 11 Na Sodium | 12 Mg Magnesium | | | | | | | | | | | 6 C Carbon |
| 19 K Potassium | 20 Ca Calcium | | | | | | | | | | | 7 N Nitrogen |
| 37 Rb Rubidium | 38 Sr Strontium | | | | | | | | | | | 8 O Oxygen |
| 55 Cs Caesium | 56 Ba Barium | | | | | | | | | | | 9 F Fluorine |
| 87 Fr Francium | 88 Ra Radium | | | | | | | | | | | 10 Ne Neon |
| | | | | | | | | | | | | 18 Ar Argon |
| | | | | | | | | | | | | 36 Kr Krypton |
| | | | | | | | | | | | | 54 Xe Xenon |
| | | | | | | | | | | | | 86 Rn Radon |
| | | | | | | | | | | | | 88 Ra Radium |
| | | | | | | | | | | | | 90 Th Thorium |
| | | | | | | | | | | | | 91 Pa Protactinium |
| | | | | | | | | | | | | 92 U Uranium |
| | | | | | | | | | | | | 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 |
| | | | | | | | | | | | | 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 |
| | | | | | | | | | | | | 113 Nh Nihonium |
| | | | | | | | | | | | | 114 Fl Flerovium |
| | | | | | | | | | | | | 115 Mc Moscovium |
| | | | | | | | | | | | | 116 Lv Livermorium |
| | | | | | | | | | | | | 117 Ts Tennessine |
| | | | | | | | | | | | | 118 Og Oganesson |
| | | | | | | | | | | | | 119 Uue Ununennium |
| | | | | | | | | | | | | 120 Uuo Unbinilium |
| | | | | | | | | | | | | 121 Uuq Untrium |
| | | | | | | | | | | | | 122 Uub Unbibium |
| | | | | | | | | | | | | 123 Uut Unbium |
| | | | | | | | | | | | | 124 Uuq Unquadrium |
| | | | | | | | | | | | | 125 Uup Unpentium |
| | | | | | | | | | | | | 126 Uuq Unsextium |
| | | | | | | | | | | | | 127 Uuh Unheptium |
| | | | | | | | | | | | | 128 Uuo Unoctium |
| | | | | | | | | | | | | 129 Uuq Unnonium |
| | | | | | | | | | | | | 130 Uuo Undecium |
| | | | | | | | | | | | | 131 Uuq Untridecium |
| | | | | | | | | | | | | 132 Uuo Unquadecium |
| | | | | | | | | | | | | 133 Uuq Unpentadecium |
| | | | | | | | | | | | | 134 Uuo Unhexadecium |
| | | | | | | | | | | | | 135 Uuq Unseptadecium |
| | | | | | | | | | | | | 136 Uuo Unoctadecium |
| | | | | | | | | | | | | 137 Uuq Unnonadecium |
| | | | | | | | | | | | | 138 Uuo Untriacontium |
| | | | | | | | | | | | | 139 Uuq Unquadraginta |
| | | | | | | | | | | | | 140 Uuo Unquingentium |
| | | | | | | | | | | | | 141 Uuq Unsexcentium |
| | | | | | | | | | | | | 142 Uuo Unseptingentium |
| | | | | | | | | | | | | 143 Uuq Unmillecentium |
| | | | | | | | | | | | | 144 Uuo Unmilletrium |
| | | | | | | | | | | | | 145 Uuq Unmillequingentium |
| | | | | | | | | | | | | 146 Uuo Unmillesexcentium |
| | | | | | | | | | | | | 147 Uuq Unmilleseptingentium |
| | | | | | | | | | | | | 148 Uuo Unmilleoctingentium |
| | | | | | | | | | | | | 149 Uuq Unmillenovecentium |
| | | | | | | | | | | | | 150 Uuo Unmilletriacontium |
| | | | | | | | | | | | | 151 Uuq Unmillequadraginta |
| | | | | | | | | | | | | 152 Uuo Unmillequingentium |
| | | | | | | | | | | | | 153 Uuq Unmillesexcentium |
| | | | | | | | | | | | | 154 Uuo Unmilleseptingentium |
| | | | | | | | | | | | | 155 Uuq Unmilleoctingentium |
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| | | | | | | | | | | | | 157 Uuq Unmilletriacontium |
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| | | | | | | | | | | | | 160 Uuo Unmillesexcentium |
| | | | | | | | | | | | | 161 Uuq Unmilleseptingentium |
| | | | | | | | | | | | | 162 Uuo Unmilleoctingentium |
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| | | | | | | | | | | | | 167 Uuq Unmillesexcentium |
| | | | | | | | | | | | | 168 Uuo Unmilleseptingentium |
| | | | | | | | | | | | | 169 Uuq Unmilleoctingentium |
| | | | | | | | | | | | | 170 Uuo Unmillenovecentium |
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*58-71 Lanthanoid series
†90-103 Actinoid series

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 dm³ at room temperature and pressure (r.t.p.).