UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**COMBINED SCIENCE** **0653/01**

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 16.

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

**1** Which statement about diffusion is correct?

**A** Changing temperature has no effect on the diffusion of molecules.

**B** Diffusion involves the random movement of molecules.

**C** Small molecules enter but do not leave cells by diffusion.

**D** Small molecules diffuse through cell membranes but not through cell walls.

**2** A test-tube contains a solution of the enzyme catalase.

Which colour is obtained when this solution is tested with biuret solution?

**A** blue

**B** blue-black

**C** orange

**D** violet-mauve

**3** In what form is carbohydrate stored in a leaf?

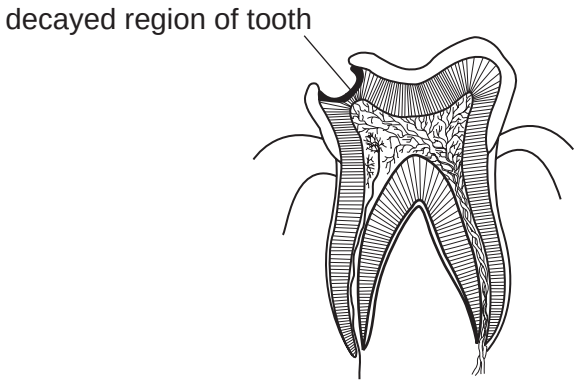
**A** fat

**B** protein

**C** starch

**D** Vitamin C

**4** The diagram shows a section through a decaying tooth.




Which parts of the tooth have decayed?

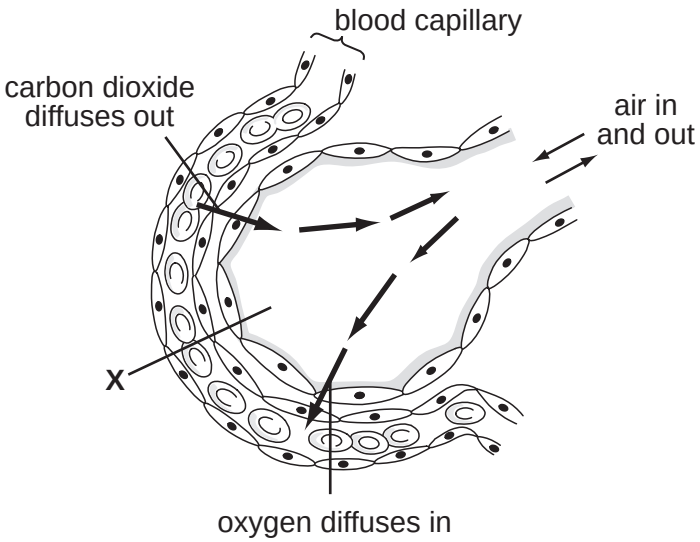
**A** dentine and enamel

**B** enamel and pulp cavity

**C** pulp cavity and root

**D** root and dentine

**5** The diagram shows a section through part of a lung.




What is structure **X**?

**A** alveolus

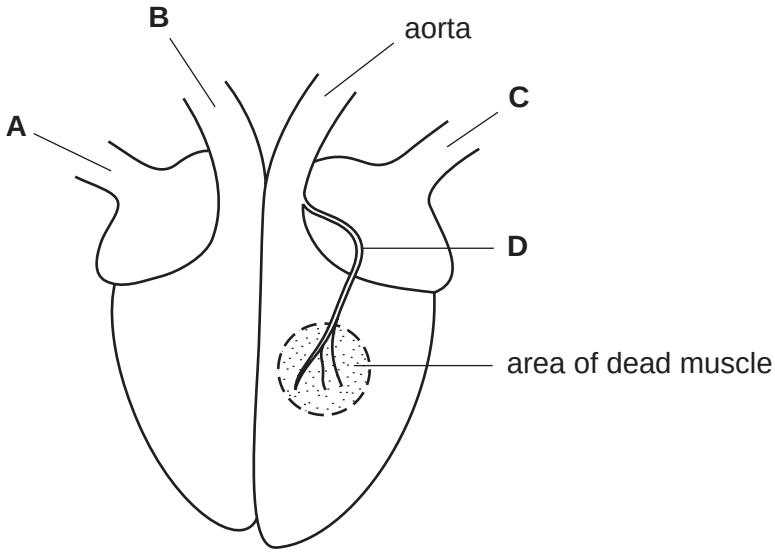
**B** bronchus

**C** pleural membrane

**D** trachea

**6** The diagram shows an external view of the heart of a man who has recently had a heart attack.

Which blood vessel was blocked by a blood clot to cause the attack?






[Turn over

**7** There are four stages in testing a leaf for starch.

1 soften in hot water
2 stain with iodine
3 boil in alcohol
4 boil in water

What is the correct order for these stages?

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

**8** A person is touched on the back of a hand and they decide to move their arm.

What is the path of nerve signals, when the skin is touched, that causes this response?

**A** effector → spinal cord → brain → spinal cord → receptor

**B** effector → spinal cord → receptor → spinal cord → brain

**C** receptor → spinal cord → brain → spinal cord → effector

**D** receptor → spinal cord → effector → spinal cord → brain

**9** In family planning, what acts as a barrier between eggs and sperms?

**A** cap

**B** IUD

**C** pill

**D** rhythm

**10** During pollination, pollen grains are transferred from

**A** anther to ovule.

**B** anther to stigma.

**C** stigma to anther.

**D** stigma to ovule.

**11** In the nineteenth century, August Weissmann removed the tails of two mice before breeding from them. He then removed the tails of their offspring before breeding from them again. He repeated this for many generations. All the offspring had tails when they were born.

Why were new mice without tails never born?

**A** Asexual reproduction does not produce new varieties.

**B** Genes are not passed on from parents to offspring.

**C** The results of asexual reproduction are not predictable.

**D** Variation due to the environment is not inherited.

**12** In the carbon cycle, several different processes may release carbon dioxide from dead organisms.

Which process does **not** do so?

**A** combustion

**B** decomposition

**C** photosynthesis

**D** respiration

**13** Deforestation in tropical rain forests can lead to

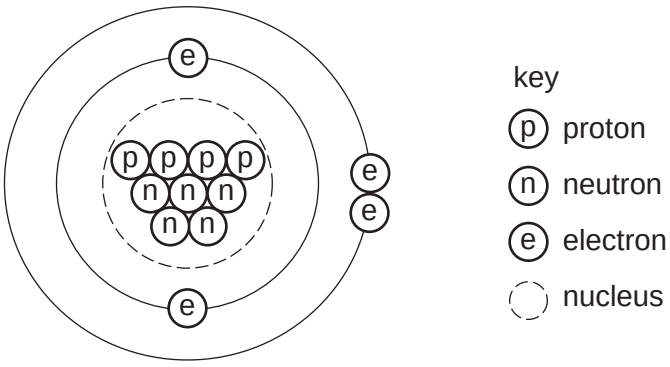
**A** decreased carbon dioxide in the air.

**B** decreased species diversity.

**C** increased number of habitats.

**D** increased oxygen in the air.

**14** The diagram represents an atom.




What is the nucleon number of this atom?

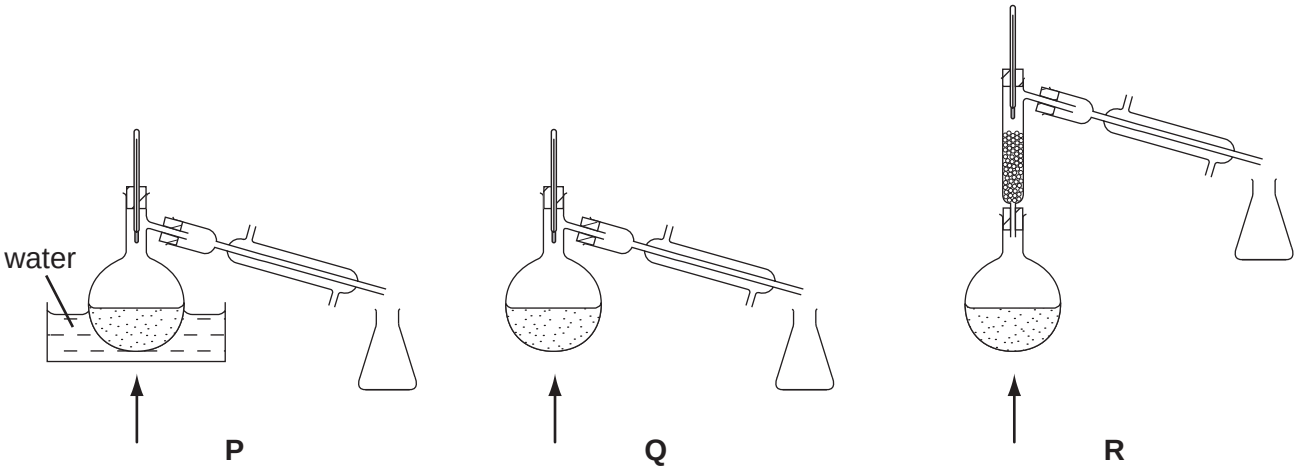
**A** 2 **B** 4 **C** 9 **D** 13

**15** Metals and non-metals can each form ions.

Which charges do these ions have?

| | metal ion | non-metal ion |
|---|---|---|
| **A** | negative | negative |
| **B** | negative | positive |
| **C** | positive | negative |
| **D** | positive | positive |

**16** A mixture contains two liquids. One liquid has a boiling point of 120 °C and the other boils at 160 °C.




Which apparatus should be used to separate the two liquids?

**A** P only

**B** Q only

**C** R only

**D** P, Q or R

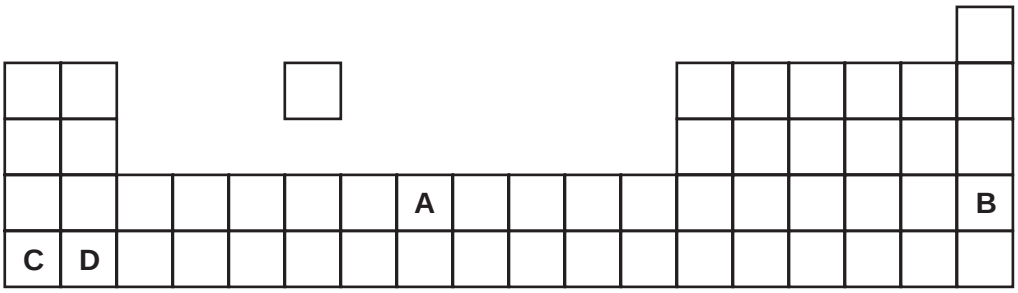
**17** Argon is a gas used to fill lamp bulbs.

What are sources of this argon?

| | the air | seawater |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**18** 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?




**19** Two properties of a white solid are shown.

- The solid dissolves in water forming an alkaline solution.
- The solid gives a yellow flame test.

Which solid has both of these properties?

**A** calcium chloride

**B** calcium hydroxide

**C** sodium chloride

**D** sodium hydroxide

**20** Which two elements do **not** form an alloy?

**A** carbon and sulphur

**B** carbon and iron

**C** copper and zinc

**D** silver and gold

**21** Which property of a metal determines the method used to extract the metal from its ore?

**A** the melting point of the metal

**B** the position of the metal in the Periodic Table

**C** the reactivity of the metal

**D** the relative atomic mass, $A_r$, of the metal



[Turn over

**22** Aqueous sodium hydrogensulphate reacts with aqueous sodium hydroxide as shown. In this reaction, the sodium hydrogensulphate loses hydrogen.

sodium hydrogensulphate + sodium hydroxide → sodium sulphate + water

$$NaHSO_4 + NaOH \rightarrow Na_2SO_4 + H_2O$$

Which terms apply to sodium hydrogensulphate in this reaction?

| | acid | alkali | salt |
|---|---|---|---|
| **A** | ✓ | ✗ | ✗ |
| **B** | ✓ | ✗ | ✓ |
| **C** | ✗ | ✓ | ✗ |
| **D** | ✗ | ✓ | ✓ |

**23** When glucose, $C_6H_{12}O_6$, is heated in a test-tube, it can form carbon and water.

This change is an example of

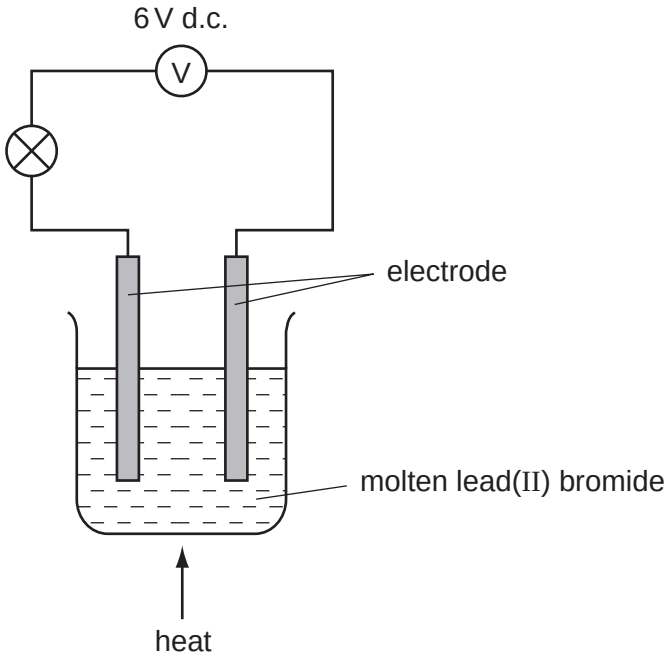
**A** combustion.

**B** decomposition.

**C** distillation.

**D** evaporation.

**24** Molten lead(II) bromide conducts electricity and the bulb lights up in the experiment shown.




The bulb goes out soon after the heat is removed.

1 Lead and bromide ions can no longer move freely.

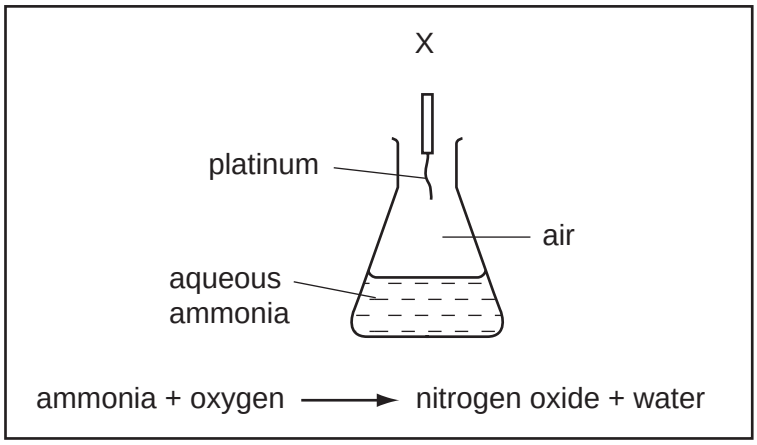
2 Lead and bromide ions have all reacted.

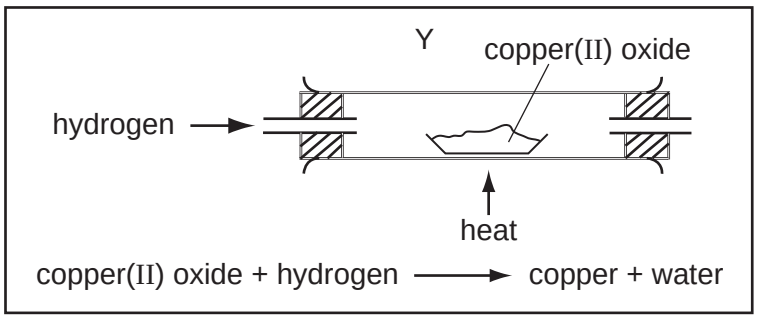
3 Lead(II) bromide has fully melted.

Which reasons explain this?

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

**25** The diagrams show two experiments X and Y.




Which experiments involve a catalyst?

| | X | Y |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**26** Plastics and wood can each be used to make doors and window frames.

Which row in the table shows two correct statements?

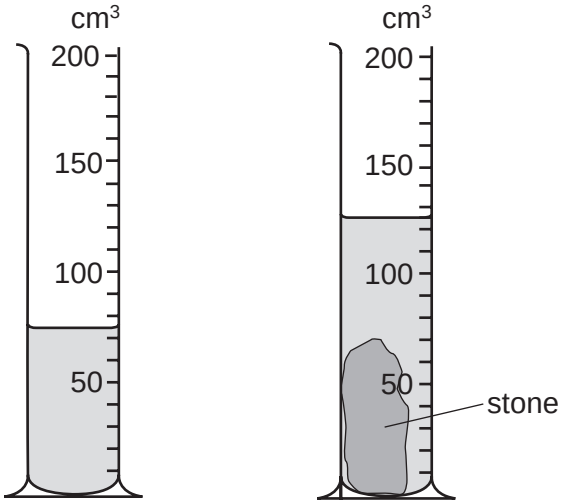
| | requires painting for maintenance | obtained from a renewable resource |
|---|---|---|
| **A** | plastics | plastics |
| **B** | plastics | wood |
| **C** | wood | plastics |
| **D** | wood | wood |

**27** Some man-made polymers, for example, poly(ethene), are made from monomers that join together by forming carbon-to-carbon bonds.

From what source are the monomers obtained and what type of carbon-to-carbon bonds form?

| | source of monomers | carbon-to-carbon bonds |
|---|---|---|
| **A** | coal | covalent |
| **B** | coal | ionic |
| **C** | oil | covalent |
| **D** | oil | ionic |

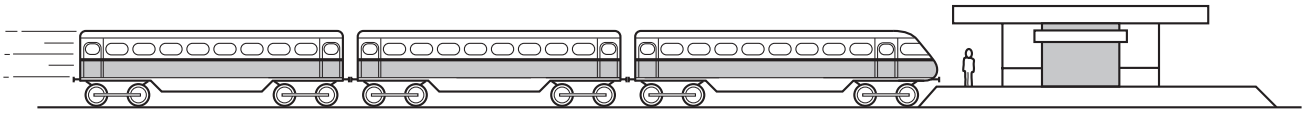
**28** A measuring cylinder contains some water. When a stone is put in the water, the level rises.




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** A person measures the length, width, height and mass of a rectangular metal block.

Which of these measurements are needed in order to calculate the density of the metal?

**A** mass only

**B** height and mass only

**C** length, width and height only

**D** length, width, height and mass

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

**A** chemical

**B** light

**C** nuclear

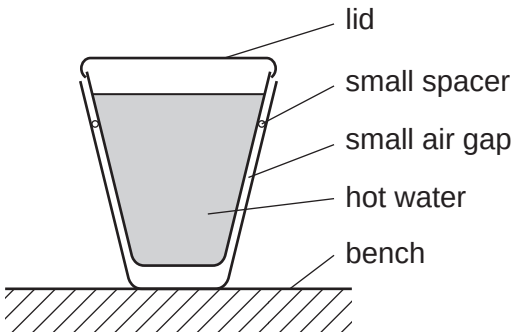
**D** sound

**32** A labourer on a building site lifts a heavy concrete block onto a lorry. He then lifts a light block the same distance in the same time.

Which of the following is true?

| | work done in lifting the blocks | power exerted by labourer |
|---|---|---|
| **A** | less for the light block | less for the light block |
| **B** | less for the light block | the same for both blocks |
| **C** | more for the light block | more for the light block |
| **D** | the same for both blocks | more for the light block |

**33** 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.

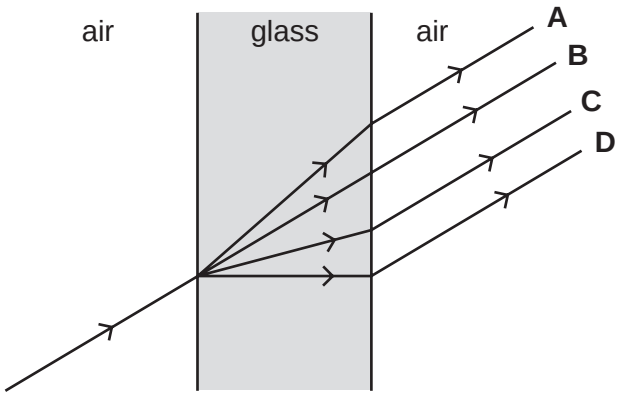
**B** No heat passes through the sides of either cup.

**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.

**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.



[Turn over

**36** What are the symbols used for the units of current and resistance?

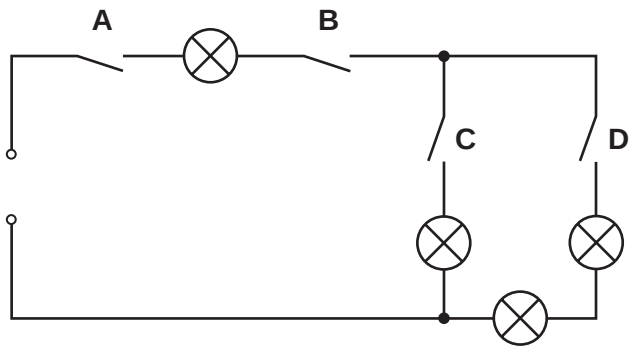
| | unit of current | unit of resistance |
|---|---|---|
| **A** | A | W |
| **B** | A | Ω |
| **C** | V | W |
| **D** | V | Ω |

**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?

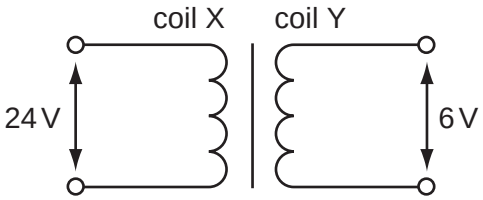
**A** The cable gets hot and causes burns.

**B** The circuit-breaker cuts off the current.

**C** The current passes through water and causes a shock.

**D** The tool rusts.

**39** A transformer is to be used to produce a 6 V output from a 24 V input.

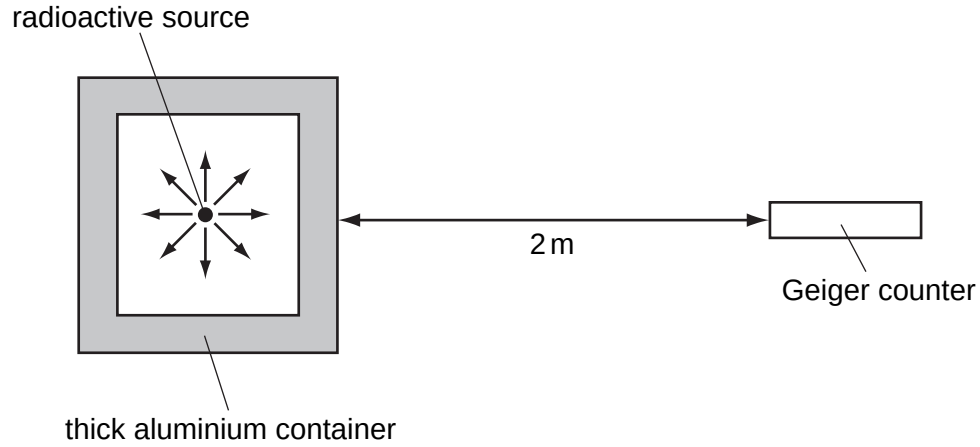



What are suitable numbers of turns for coil X and for coil Y?

| | number of turns on coil X | number of turns on coil Y |
|---|---|---|
| **A** | 240 | 60 |
| **B** | 240 | 240 |
| **C** | 240 | 960 |
| **D** | 960 | 60 |

**40** 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

**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 | | | | | | | | | | |
| | 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | 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 Phosphonus 15 | 32 S Sulphur 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 | 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.).