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?

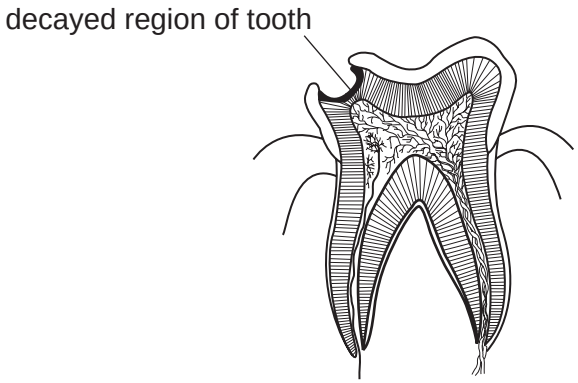
A fat

B protein

C starch

D Vitamin C

4 The diagram shows a section through a decaying tooth.



Which parts of the tooth have decayed?

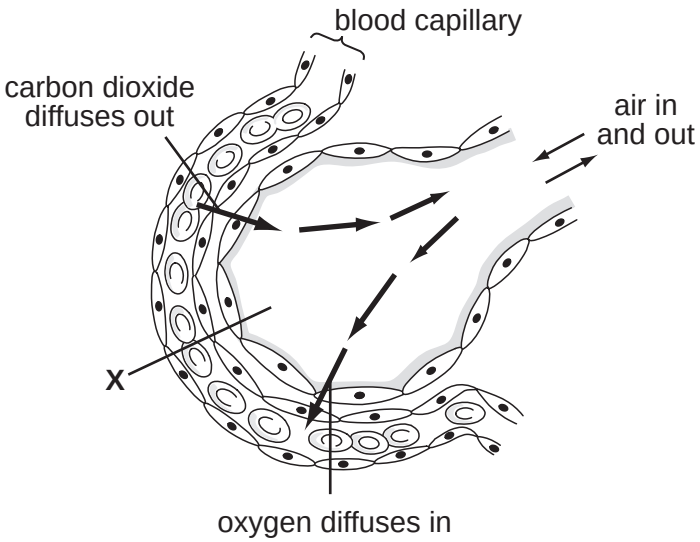
A dentine and enamel

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

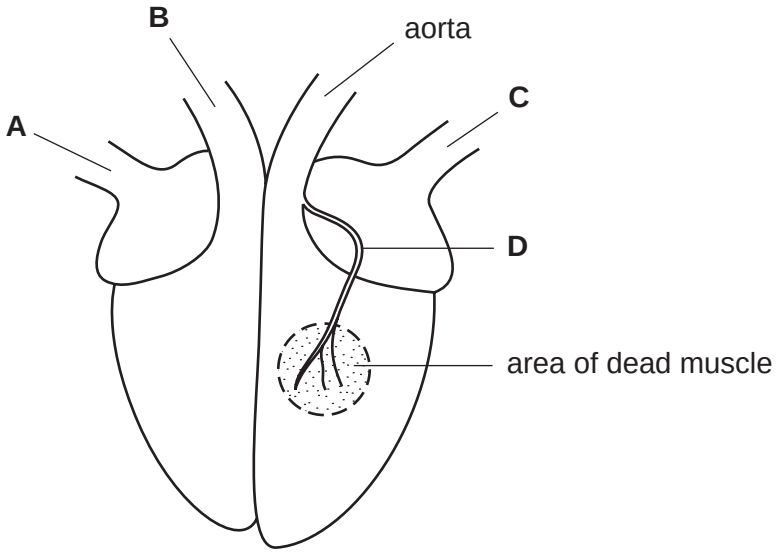
B bronchus

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?



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 b… them. He then removed the tails of their offspring before breeding from them again. He… 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

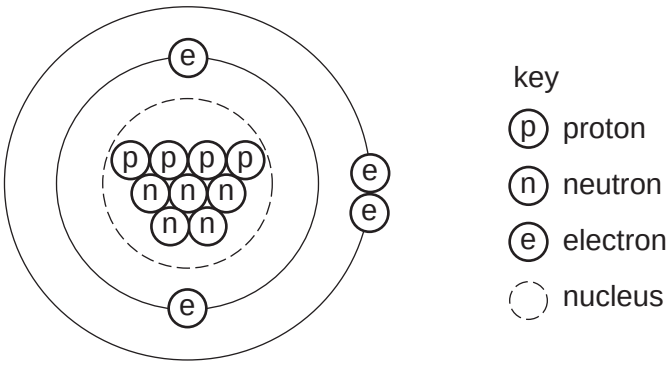
A decreased carbon dioxide in the air.

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?

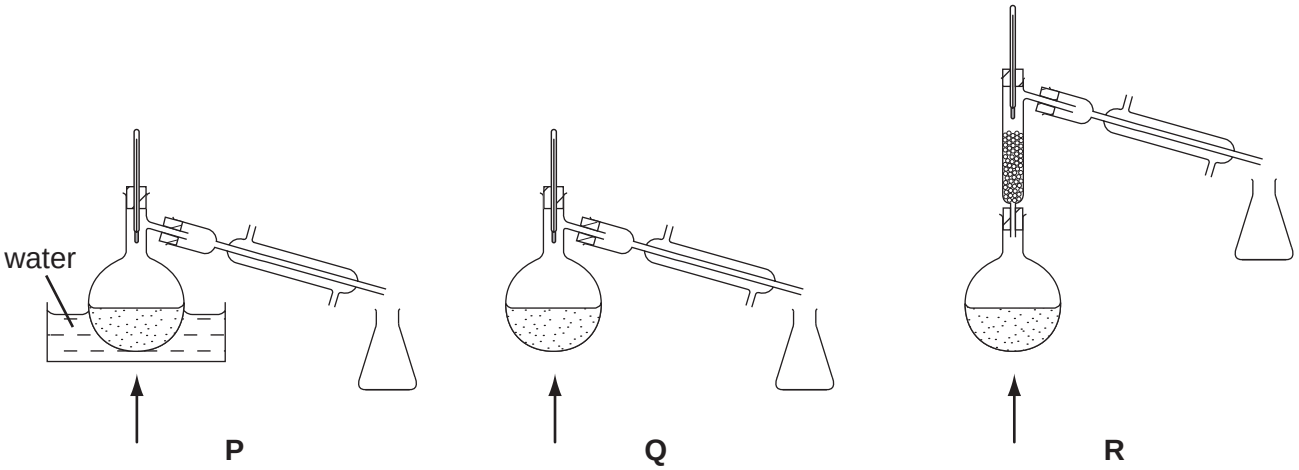
A 2 **B** 4 **C** 9 **D** 13

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

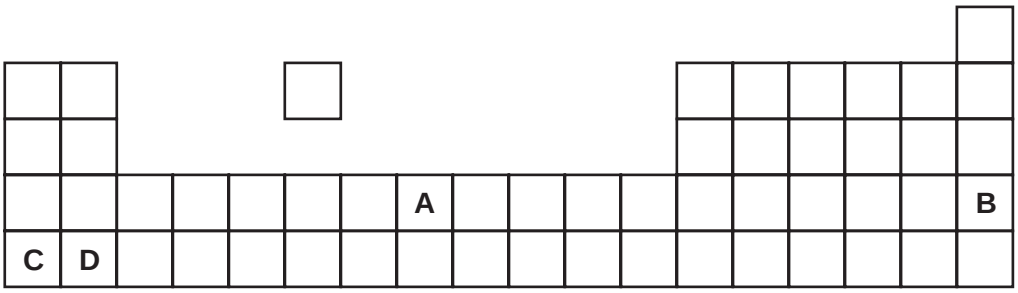
17 Argon is a gas used to fill lamp bulbs.

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

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

$NaHSO_4$ + $NaOH$ → 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

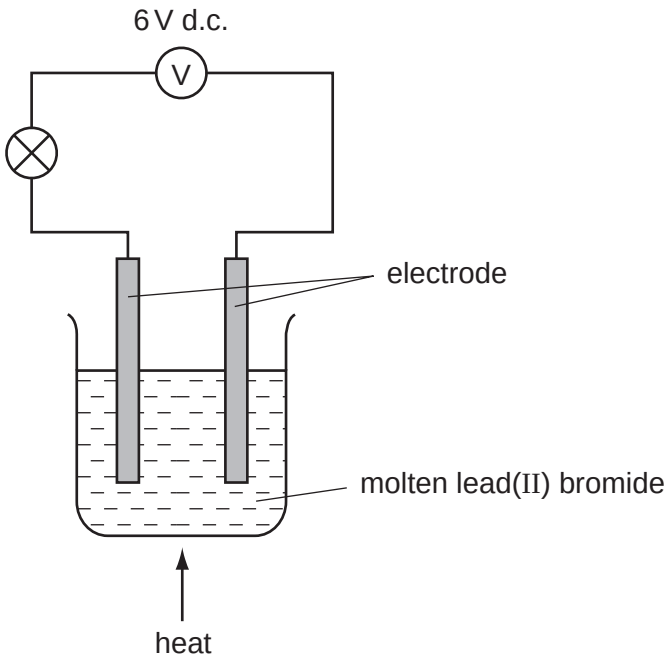
A combustion.

B decomposition.

C distillation.

D evaporation.

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



The bulb goes out soon after the heat is removed.

1 Lead and bromide ions can no longer move freely.

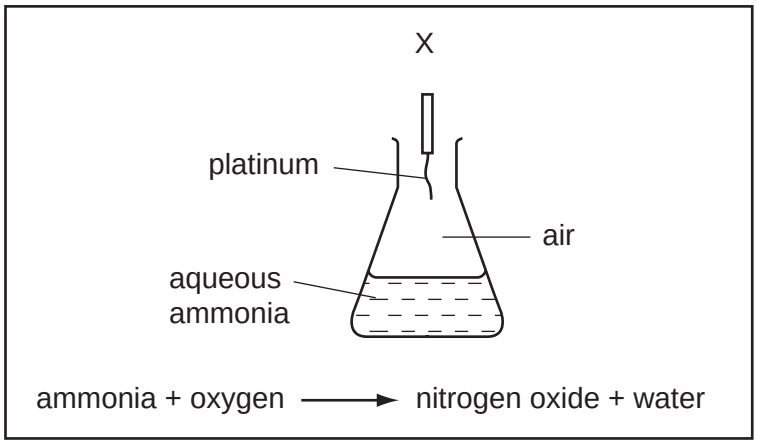
2 Lead and bromide ions have all reacted.

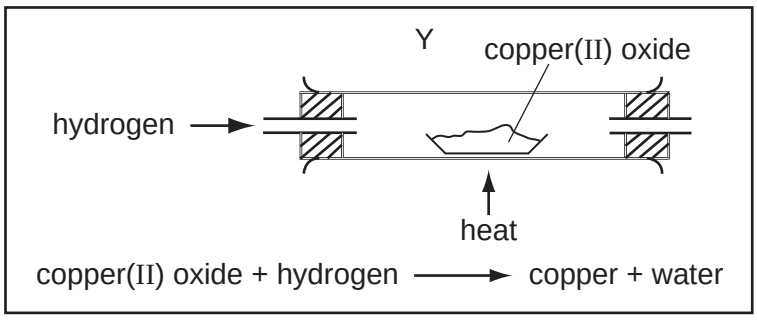
3 Lead(II) bromide has fully melted.

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?

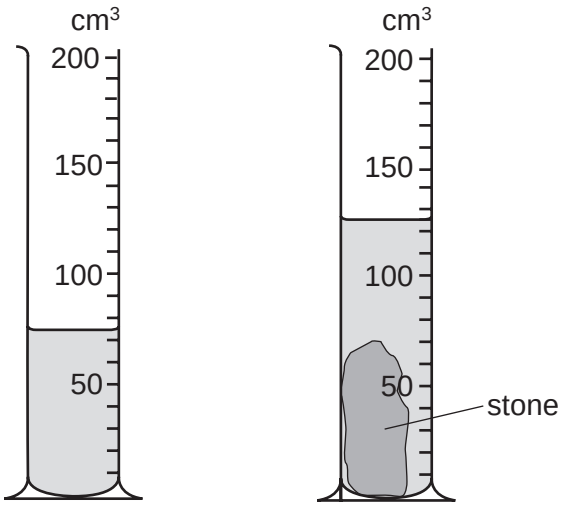
	requires painting for maintenance	obtained from a renewable resource
A	plastics	plastics
B	plastics	wood
C	wood	plastics
D	wood	wood

27 Some man-made polymers, for example, poly(ethene), are made from monomers obtained 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

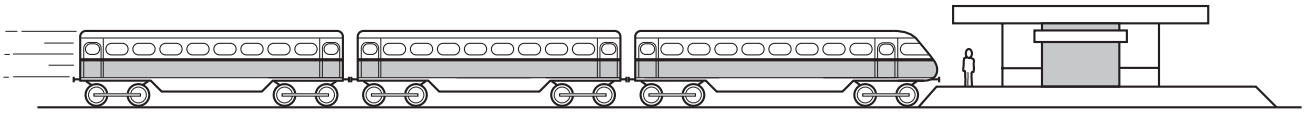
28 A measuring cylinder contains some water. When a stone is put in the water, the level rises.



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

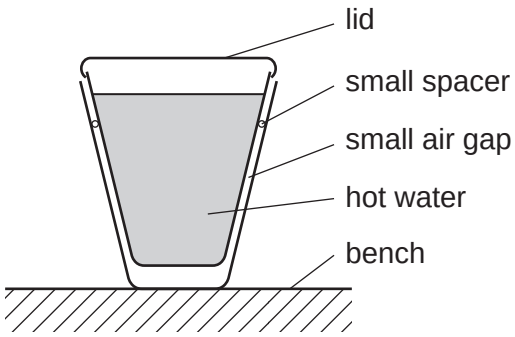
D sound

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.

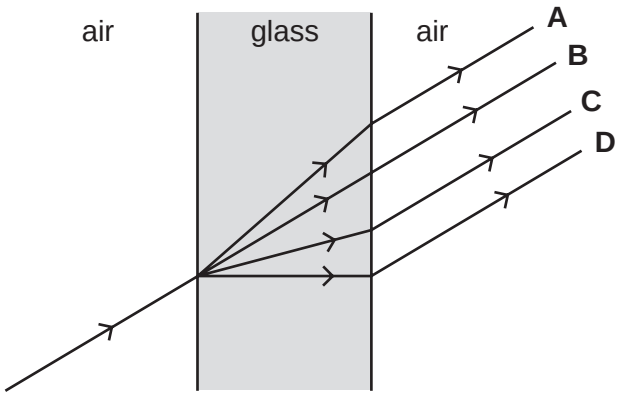
B No heat passes through the sides of either cup.

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.

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

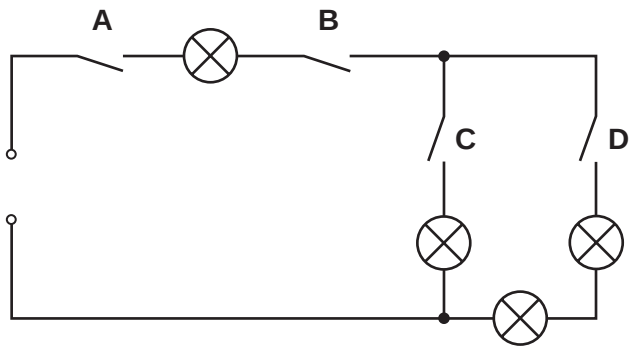
	unit of current	unit of resistance
A	A	W
B	A	Ω
C	V	W
D	V	Ω

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?

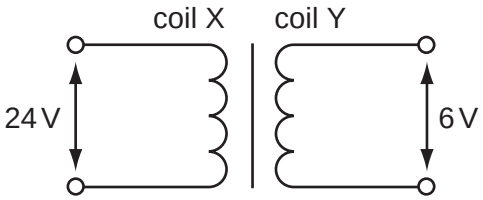
A The cable gets hot and causes burns.

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.

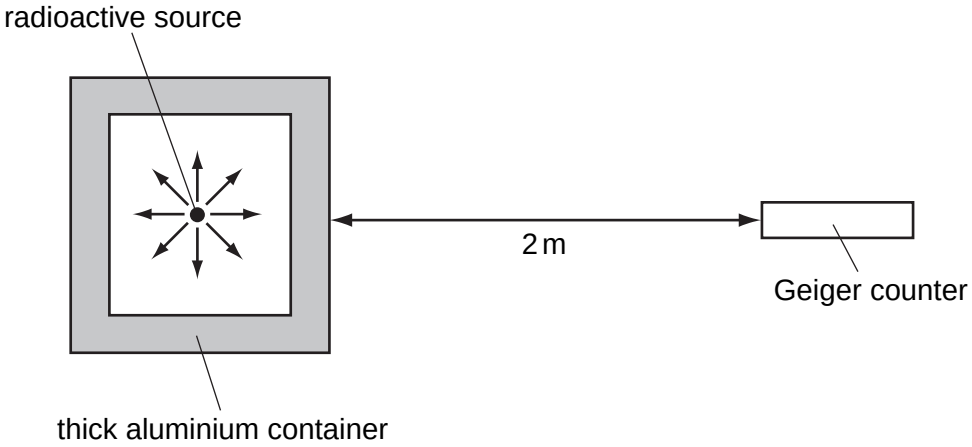


What are suitable numbers of turns for coil X and for coil Y?

	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
							1 H Hydrogen 1									4 He Helium 2
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 Phosphorus 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 †															

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
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

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

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

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