



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/01**

Paper 1 Multiple Choice

**October/November 2007**

**45 minutes**

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

\* 5 5 0 4 5 2 8 3 0 3 \*

**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.

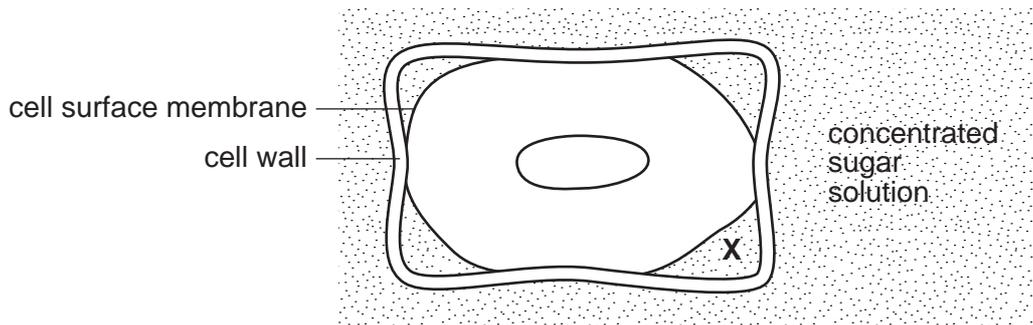


1 Which cell has **no** DNA?

- A goblet cell
- B red blood cell
- C sperm cell
- D spongy mesophyll cell

2 A plant cell is placed in a sugar solution that is more concentrated than the cell sap.

The diagram shows the appearance of the cell after 10 minutes.



Why does space **X** become filled with sugar solution?

- A The cell wall and cell surface membrane are both fully permeable.
  - B The cell wall and cell surface membrane are both partially permeable.
  - C The cell wall is fully permeable and the cell surface membrane is partially permeable.
  - D The cell wall is partially permeable and the cell surface membrane is fully permeable.
- 3 Which gas is given off when the enzyme catalase is added to a solution of hydrogen peroxide?
- A carbon dioxide
  - B carbon monoxide
  - C hydrogen
  - D oxygen

- 4 A water plant is exposed to sunlight. After a short period of time bubbles are given off from the plant.

Which gas do the bubbles contain, and which process produces this gas?

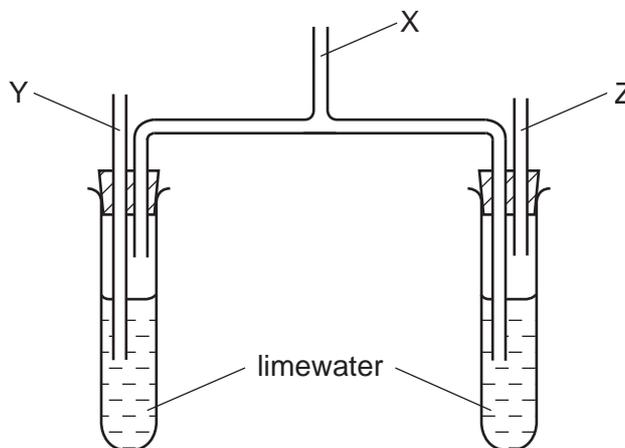
	gas	process
<b>A</b>	carbon dioxide	photosynthesis
<b>B</b>	carbon dioxide	respiration
<b>C</b>	oxygen	photosynthesis
<b>D</b>	oxygen	respiration

- 5 What is a symptom of vitamin C deficiency?

- A** bleeding from skin and gums
- B** developing soft bones
- C** low red blood cell count
- D** teeth decay easily

- 6 The diagram shows apparatus that can be used to demonstrate that the air breathed out by a person contains more carbon dioxide than the air breathed in.

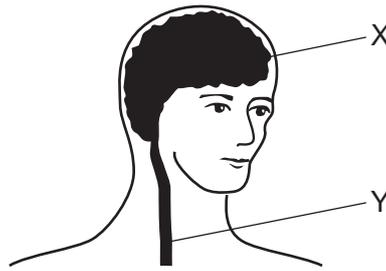
The person breathes in and out at X.



Where does air enter and leave the apparatus?

	air enters at	air leaves at
<b>A</b>	Y	Y
<b>B</b>	Y	Z
<b>C</b>	Z	Y
<b>D</b>	Z	Z

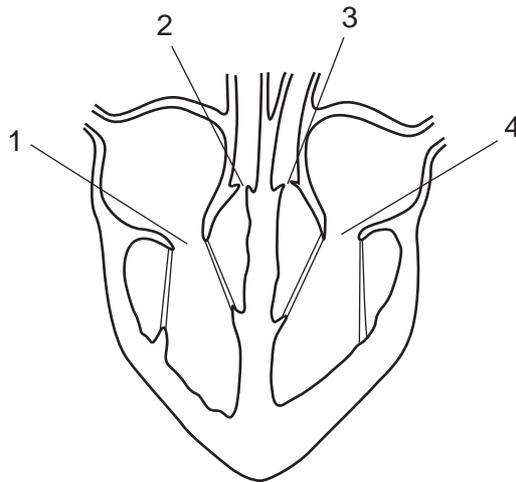
7 The diagram shows part of the human nervous system.



What are X and Y?

	X	Y
<b>A</b>	brain	effector
<b>B</b>	brain	spinal cord
<b>C</b>	receptor	effector
<b>D</b>	receptor	spinal cord

8 The diagram shows a section through the heart.



The ventricles contract and blood is forced into the arteries.

What is the state of valve 3 and 4 when this happens?

	valve 3	valve 4
<b>A</b>	closed	closed
<b>B</b>	closed	open
<b>C</b>	open	closed
<b>D</b>	open	open

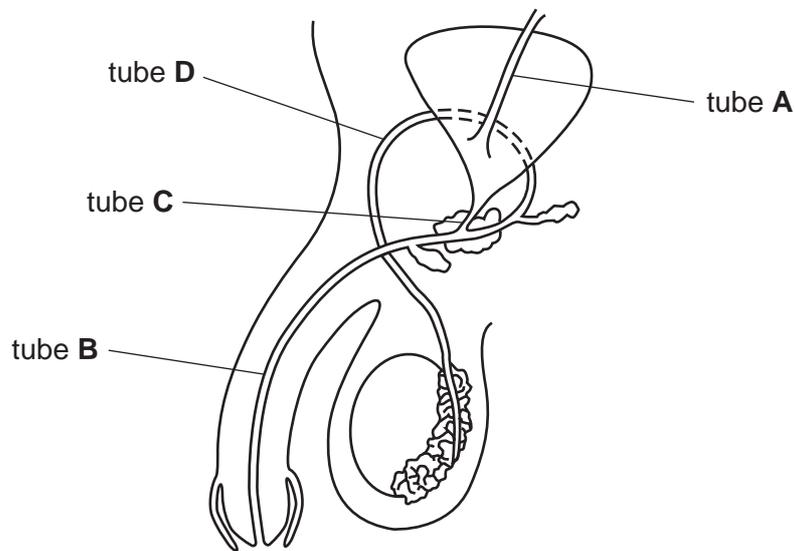
9 It is possible to grow plants that are genetically identical.

What are plants grown in this way called?

- A clones
- B gametes
- C seeds
- D zygotes

10 The diagram shows the male reproductive system.

Which tube is cut when carrying out male sterilisation (a vasectomy)?



11 In which part of a plant is the embryo found?

- A anther
- B pollen grain
- C seed
- D stigma

12 Jamal and Javan are identical twins, but Jamal is 10 kg heavier than Javan.

What will have caused the difference in their weights?

	genes	environment
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key  
 ✓ = yes  
 x = no

13 The diagram shows a food chain.



What is represented by the black arrows and by the white arrows?

	black arrows	white arrows
<b>A</b>	chemical energy	heat
<b>B</b>	chemical energy	sunlight
<b>C</b>	heat	chemical energy
<b>D</b>	sunlight	chemical energy

14 When a metal X is added to water, it reacts and two ions are formed.

What could these ions be?

- A**  $\text{Cu}^{2+}$ ,  $\text{H}^+$
- B**  $\text{Cu}^{2+}$ ,  $\text{OH}^-$
- C**  $\text{Na}^+$ ,  $\text{H}^+$
- D**  $\text{Na}^+$ ,  $\text{OH}^-$

15 Which two elements combine to form an ionic compound?

- A** carbon and oxygen
- B** chlorine and magnesium
- C** copper and zinc
- D** hydrogen and oxygen

16 Which displayed formulae correctly represent a molecule of carbon dioxide and of nitrogen?

	carbon dioxide, $\text{CO}_2$	nitrogen, $\text{N}_2$
<b>A</b>	$\text{O}-\text{C}-\text{O}$	$\text{N}-\text{N}$
<b>B</b>	$\text{O}-\text{C}-\text{O}$	$\text{N}\equiv\text{N}$
<b>C</b>	$\text{O}=\text{C}=\text{O}$	$\text{N}-\text{N}$
<b>D</b>	$\text{O}=\text{C}=\text{O}$	$\text{N}\equiv\text{N}$

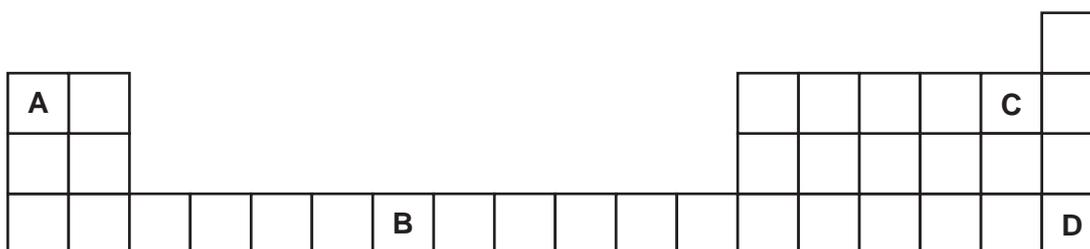
17 Two products, X and Y, are formed in the complete combustion of methane.

What are X and Y?

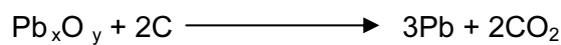
- A carbon and hydrogen
- B carbon and water
- C carbon dioxide and hydrogen
- D carbon dioxide and water

18 The diagram shows a simplified outline of the Periodic Table.

Which letter shows the position of a metal with a low melting point?



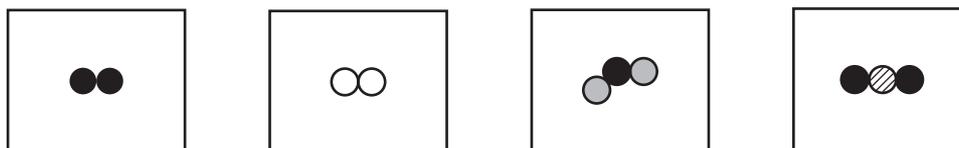
19 An oxide of lead is changed to lead by heating it with carbon.



What is the formula of this oxide of lead?

- A  $\text{Pb}_2\text{O}_3$
- B  $\text{Pb}_3\text{O}_2$
- C  $\text{Pb}_3\text{O}_4$
- D  $\text{Pb}_4\text{O}_3$

20 The diagrams show molecules of four gases present in clean air. Different circles represent atoms of different elements.



Which elements could be shown as ● and ○?

	●	○
A	hydrogen	nitrogen
B	hydrogen	oxygen
C	oxygen	hydrogen
D	oxygen	nitrogen

21 Which substance has a dangerously explosive reaction with sodium?

- A ammonia
- B hydrogen
- C hydrochloric acid
- D nitrogen

22 Aluminium oxide, dissolved in melted cryolite, is electrolysed.

Aluminium is produced by .....1..... and energy is .....2..... .

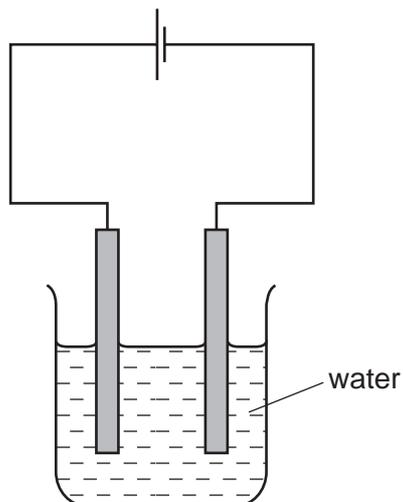
Which words correctly complete the gaps?

	gap 1	gap 2
<b>A</b>	oxidation	given out
<b>B</b>	oxidation	used up
<b>C</b>	reduction	given out
<b>D</b>	reduction	used up

23 Which word equation shows a thermal decomposition?

- A ammonia + nitric acid → ammonium nitrate
- B hydrogen + oxygen → water
- C magnesium carbonate → magnesium oxide + carbon dioxide
- D potassium chloride + silver nitrate → potassium nitrate + silver chloride

24 The diagram shows an apparatus used for electrolysis.



Which substance, when added to water, would act as an electrolyte?

- A calcium carbonate
- B copper(II) chloride
- C graphite
- D sugar

25 Are iron and sodium hydroxide obtained by electrolysis?

	iron	sodium hydroxide
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

26 The description below of a plastic is incomplete.

To make a plastic, .....1..... of a .....2..... combine to form a long chain .....3..... .

Which words correctly complete the gaps?

	gap 1	gap 2	gap 3
<b>A</b>	atoms	monomer	polymer
<b>B</b>	atoms	polymer	monomer
<b>C</b>	molecules	monomer	polymer
<b>D</b>	molecules	polymer	monomer

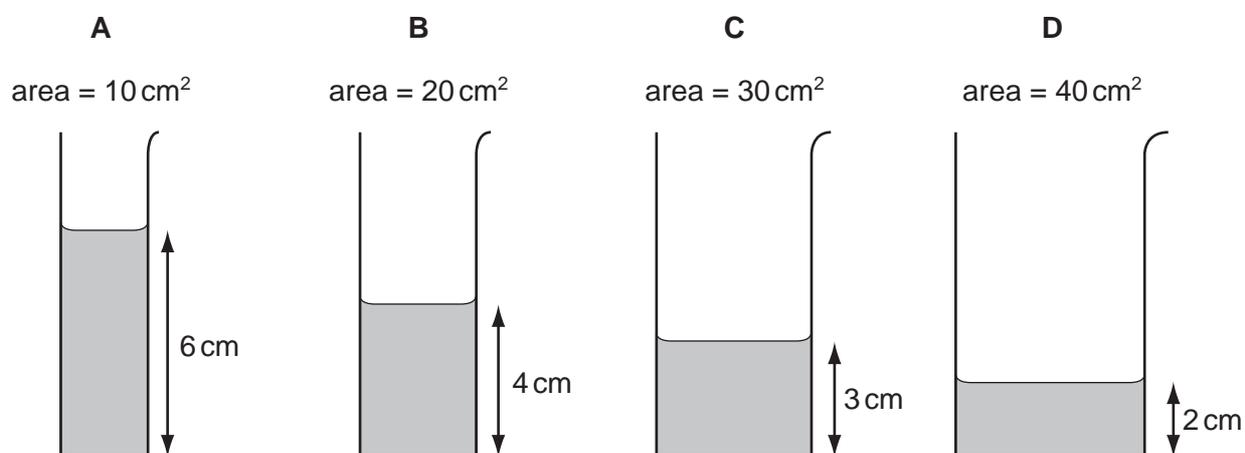
27 Ethanol, hydrogen and methane are used as fuels.

Which line in the table is correct?

	ethanol	hydrogen	methane
<b>A</b>	solid	gas	gas
<b>B</b>	solid	liquid	liquid
<b>C</b>	liquid	gas	gas
<b>D</b>	liquid	liquid	liquid

28 Some water is poured into four tubes of different cross-sectional areas.

Which tube contains the largest volume of water?



29 Four students try to explain what is meant by acceleration.

Which student makes a correct statement?

- A** It is related to the changing speed of an object.
- B** It is the distance an object travels in one second.
- C** It is the force acting on an object divided by the distance it travels in one second.
- D** It is the force acting on an object when it is near to the Earth.

30 What are the correct units for force and for weight?

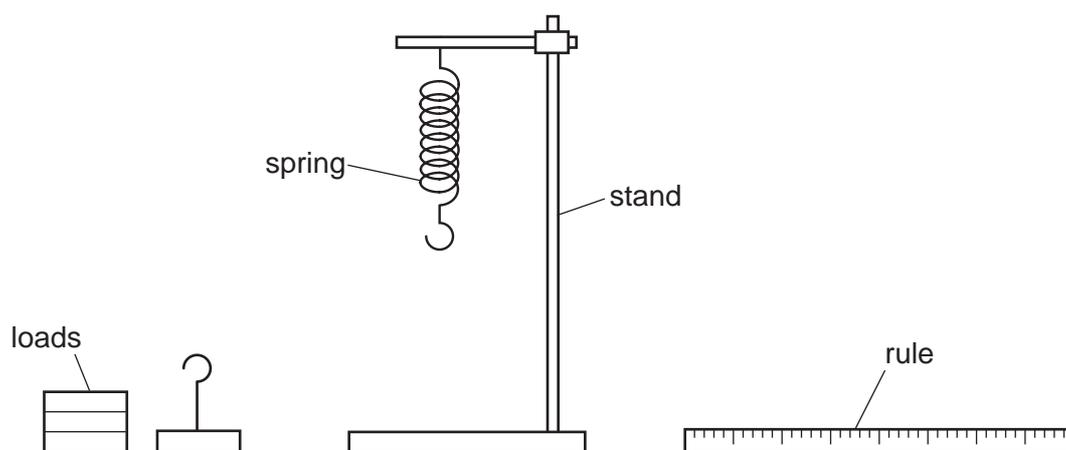
	force	weight
<b>A</b>	kg	kg
<b>B</b>	kg	N
<b>C</b>	N	kg
<b>D</b>	N	N

- 31 A metal drum has a mass of 200 kg when empty and 1000 kg when filled with  $1.0 \text{ m}^3$  of methylated spirit.

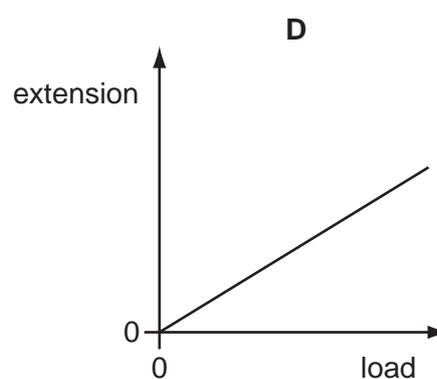
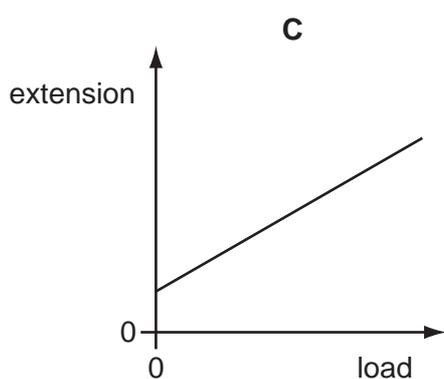
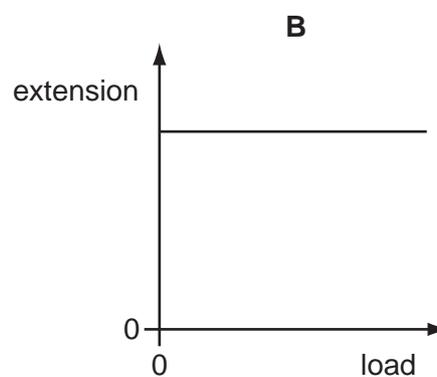
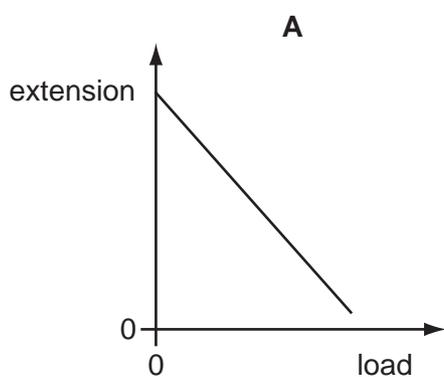
What is the density of methylated spirit?

- A  $0.0050 \text{ kg/m}^3$   
 B  $0.11 \text{ kg/m}^3$   
 C  $800 \text{ kg/m}^3$   
 D  $1000 \text{ kg/m}^3$

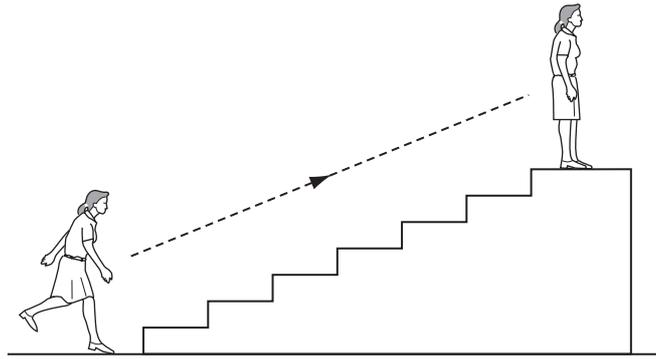
- 32 A spring is suspended from a stand. Loads are added and the extensions are measured.



Which graph shows the result of plotting extension against load?



33 A person uses chemical energy to run up some stairs.

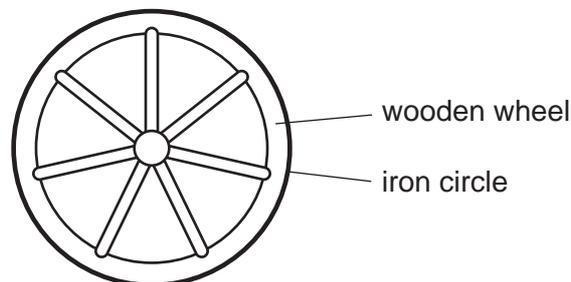


She stops at the top of the stairs.

What has the chemical energy been converted to when she is at the top of the stairs?

- A kinetic energy and potential energy
- B kinetic energy and nuclear energy
- C potential energy and heat energy
- D nuclear energy and heat energy

34 A wooden wheel can be strengthened by putting a tight circle of iron around it.



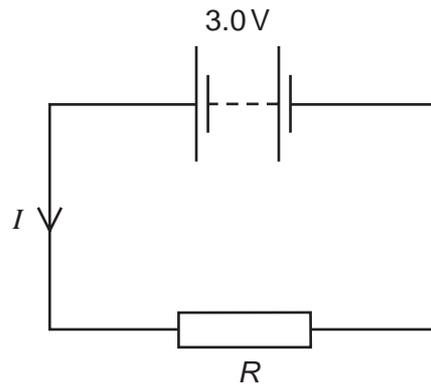
Which action would make it easier to fit the circle over the wood?

- A cooling the iron circle
- B heating the iron circle
- C heating the wooden wheel
- D heating the wooden wheel and cooling the iron circle

35 Which statement refers to convection?

- A It does not involve energy transfer.
- B It is the transfer of heat energy without the movement of particles.
- C It only occurs in liquids or gases.
- D It only occurs in solids.

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

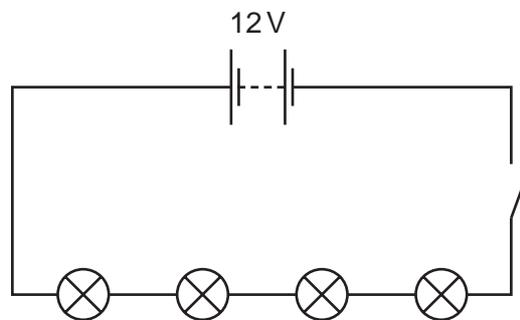


Which line gives possible values of  $I$  and  $R$ ?

	$I/A$	$R/\Omega$
<b>A</b>	1.5	1.5
<b>B</b>	1.5	2.0
<b>C</b>	6.0	2.0
<b>D</b>	4.0	12

37 Four lamps are connected in a circuit as shown in the diagram.

Each lamp is designed to operate at 12V.



The circuit is now switched on.

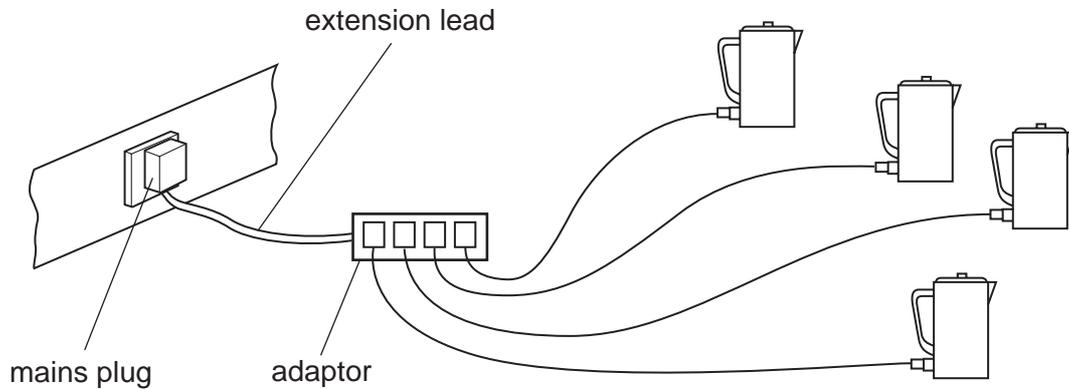
Which statement is correct?

- A** Each lamp can be switched off independently.
- B** If one lamp breaks all the others will stay alight.
- C** The current is the same in all the lamps.
- D** The lamps will all light at normal brightness.

38 The diagram shows four electric kettles plugged into a 4-way adaptor.

An extension lead connects the adaptor to a single mains plug.

The mains plug is designed to work without a fuse.



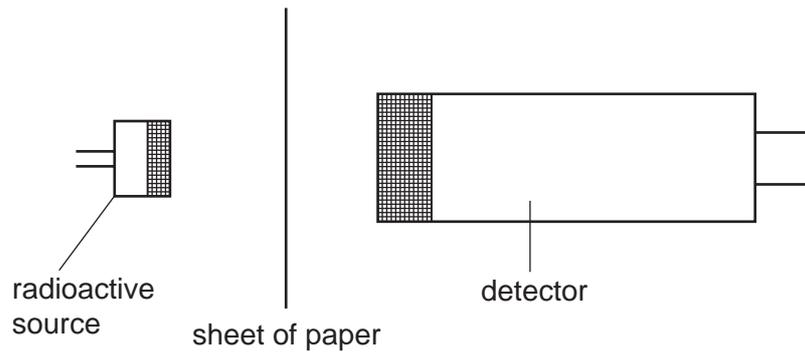
Why is this use of the adaptor dangerous?

- A The heating elements in the kettle will overheat.
- B The extension lead connecting the adaptor to the mains plug will overheat.
- C The leads connecting the kettles to the adaptor will overheat.
- D The water in the kettles will overheat.

39 How is electricity transmitted over large distances and why is it transmitted in this way?

	how	why
A	at high voltage	for safety
B	at high voltage	to reduce energy loss
C	at low voltage	for safety
D	at low voltage	to reduce energy loss

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



Which types of radiation can pass through the paper?

- A alpha-particles and beta-particles only
- B alpha-particles and gamma-rays only
- C beta-particles and gamma-rays only
- D alpha-particles, beta-particles and gamma-rays

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																				
		I	II	III	IV	V	VI	VII	VIII	IX	X											
		1 <b>H</b> Hydrogen 1																				
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4																			
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12																			
39	40	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	51 <b>V</b> Vanadium 23	48 <b>Ti</b> Titanium 22	45 <b>Sc</b> Scandium 21	59 <b>Co</b> Cobalt 27	56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36				
85	88	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	93 <b>Nb</b> Niobium 41	91 <b>Zr</b> Zirconium 40	89 <b>Y</b> Yttrium 39	103 <b>Rh</b> Rhodium 45	101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54					
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	181 <b>Ta</b> Tantalum 73	178 <b>Hf</b> Hafnium 72	139 <b>La</b> Lanthanum 57	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	222 <b>Rn</b> Radon 86					
		<b>Fr</b> Francium 87	<b>Ra</b> Radium 88																			
												226 <b>Ac</b> Actinium 89										
													*58-71 Lanthanoid series †90-103 Actinoid series									
		a		X		b																
		a = relative atomic mass		X = atomic symbol		b = proton (atomic) number																
		Key																				
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	146 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71								
		232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	244 <b>Pu</b> Plutonium 94	244 <b>Am</b> Americium 95	244 <b>Cm</b> Curium 96	244 <b>Bk</b> Berkelium 97	244 <b>Cf</b> Californium 98	244 <b>Es</b> Einsteinium 99	244 <b>Fm</b> Fermium 100	244 <b>Md</b> Mendelevium 101	244 <b>No</b> Nobelium 102	244 <b>Lr</b> Lawrencium 103							

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