



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

PHYSICAL SCIENCE

Paper 1 Multiple Choice

0652/11

October/November 2011

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.

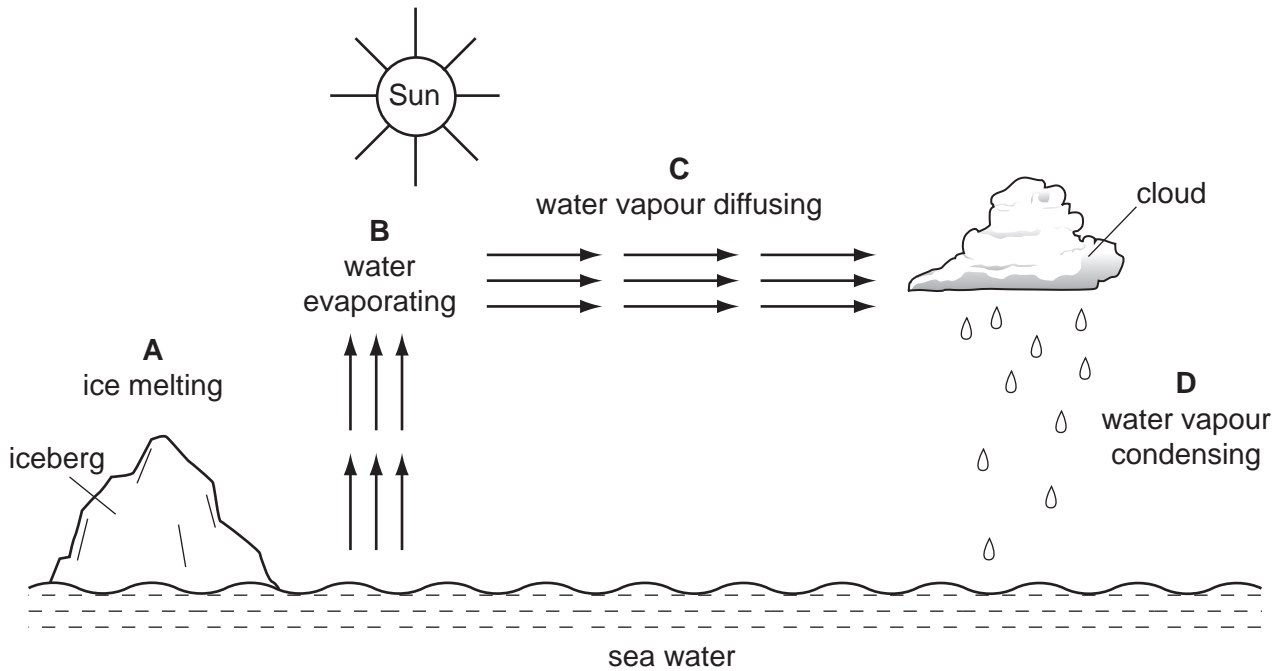
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page **20**.

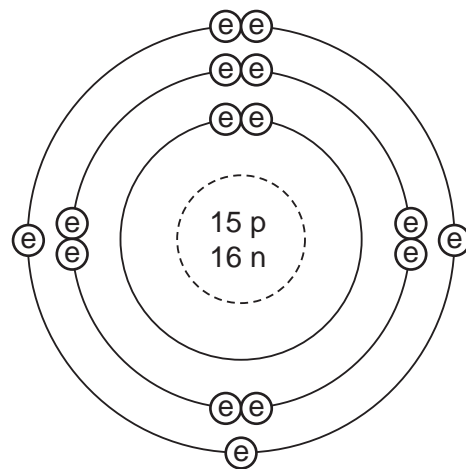
This document consists of **19** printed pages and **1** blank page.



1 In which process is heat energy neither given out nor taken in?



2 The diagram shows the structure of an atom.



key

e = electron

n = neutron

p = proton

What are the nucleon number and proton number of the atom?

	nucleon number	proton number
A	15	30
B	16	31
C	31	15
D	31	16

- 3 The following statements are about covalent bonding.

Covalent bonds are formed by the1..... of electrons.

Covalent substances have2..... electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
A	sharing	high
B	sharing	low
C	transfer	high
D	transfer	low

- 4 Ethyl ethanoate has the formula $\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$.

What is the relative molecular mass M_r of this compound?

- A** 48 **B** 72 **C** 88 **D** 124

- 5 The diagram shows wood burning in air.

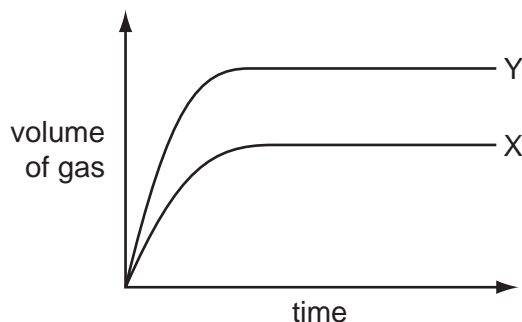


Which two words describe what happens to the wood and the type of reaction taking place?

	wood is	type of reaction
A	oxidised	endothermic
B	oxidised	exothermic
C	reduced	endothermic
D	reduced	exothermic

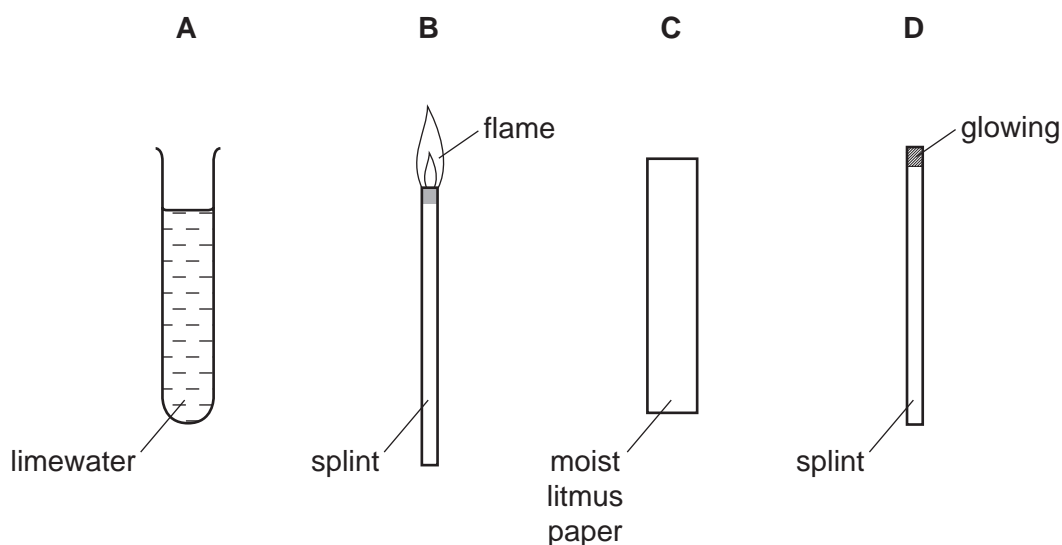
- 6 A student reacts 10 cm^3 of hydrochloric acid with two large lumps of calcium carbonate. The calcium carbonate is in excess. He measures the rate of reaction by collecting the gas given off and measuring the volume every fifteen seconds.

The results are shown by curve X in the graph.



Which change to the experiment would give the curve Y?

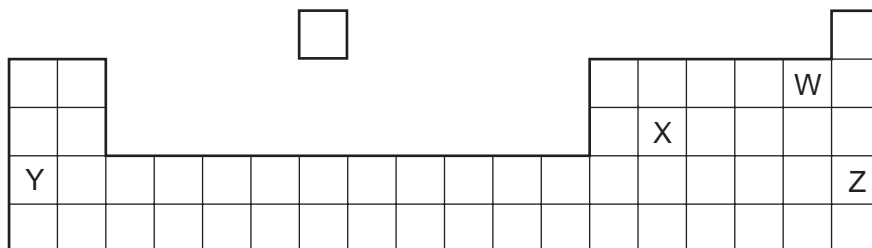
- A Heat the acid before adding it.
 - B Use 10 cm^3 of more concentrated acid.
 - C Use larger pieces of calcium carbonate.
 - D Use twice as much acid of the same concentration.
- 7 Which gas is produced when sodium carbonate reacts with hydrochloric acid?
- A carbon dioxide
 - B chlorine
 - C hydrogen
 - D oxygen
- 8 Which can be used to show that a gas is ammonia?



9 What must be formed when an acid reacts with a base?

- A carbon dioxide
- B hydrogen
- C oxygen
- D a salt

10 The diagram shows an outline of part of the Periodic Table.



Which two elements could form a covalent compound?

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

11 The following statements are about rubidium, which is below potassium in Group I of the Periodic Table.

The melting point of rubidium is1..... than that of potassium.

The reaction of rubidium with water is2..... than that of potassium.

Which words correctly complete gaps 1 and 2?

	1	2
A	higher	faster
B	higher	slower
C	lower	faster
D	lower	slower

12 The element technetium, Tc (proton number 43), does not exist in nature.

From its position in the Periodic Table, which description of technetium is most likely to be correct?

- A It is a brittle solid of low melting point.
- B It is a metal with a high melting point.
- C It is a soft, very reactive metal.
- D It is an unreactive gas.

- 13 Metal M is only present in its ores as a compound.

M is extracted from these compounds by heating them with carbon.

In which position in the reactivity series shown is M most likely to be found?

potassium

A

sodium

calcium

B

magnesium

zinc

C

iron

copper

D

- 14 **A**, **B**, **C** and **D** are the properties of four metals produced from iron ore.

Which properties are most suitable for making cutlery?

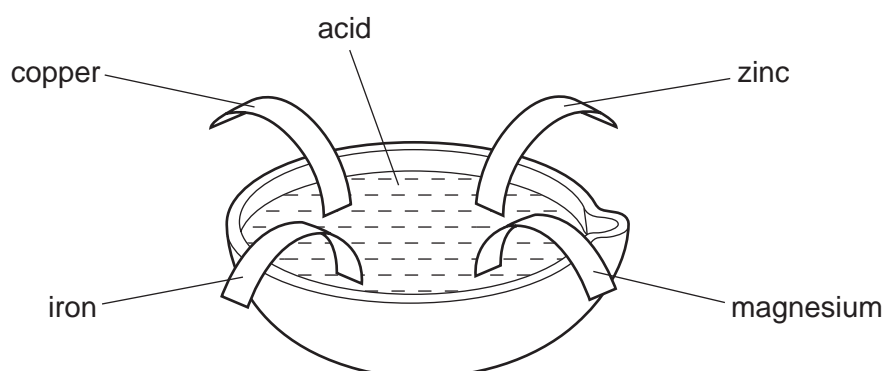
A brittle and hard

B easily shaped and soft

C malleable and rusts

D resists corrosion and hard

- 15 Four different metals were placed in dilute hydrochloric acid.



Which metal would **not** react?

A copper

B iron

C magnesium

D zinc

16 Which statements about water are correct?

- 1 Water can be used as a solvent.
- 2 Water can be used to prevent iron from rusting.
- 3 Water is a compound that contains two parts of oxygen to one part of hydrogen.

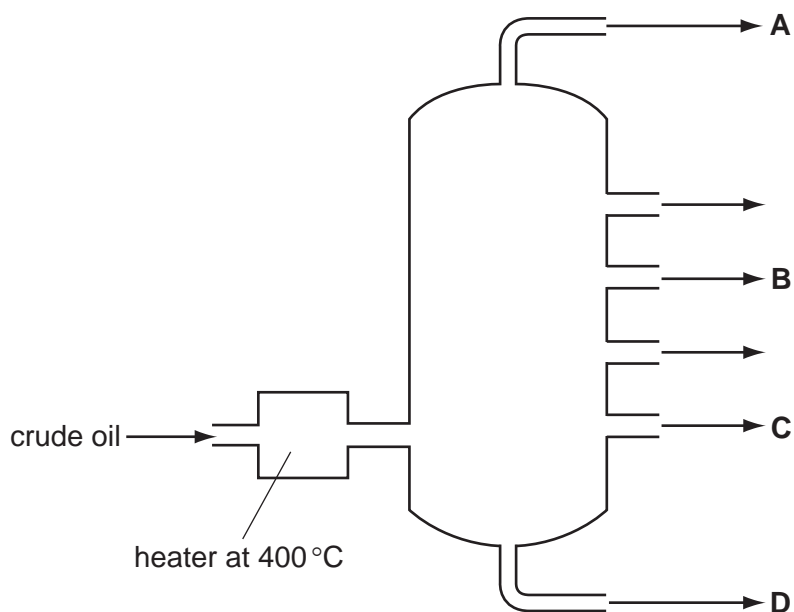
A 1 only **B** 2 only **C** 1 and 3 **D** 2 and 3

17 Which gases are released into the air from burning coal?

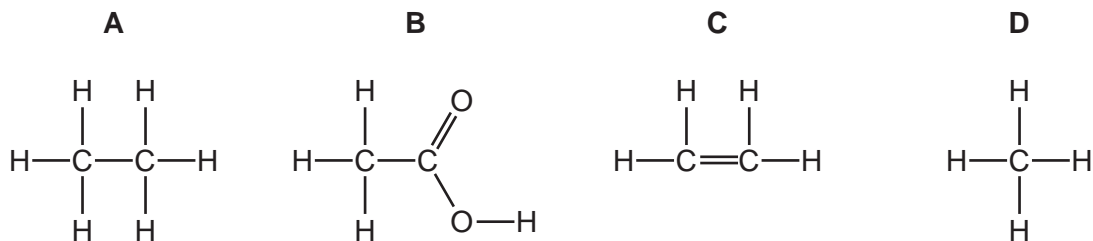
	carbon monoxide	carbon dioxide	sulfur dioxide
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	x

18 The diagram represents an apparatus used in the fractional distillation of crude oil.

From which position is methane obtained?

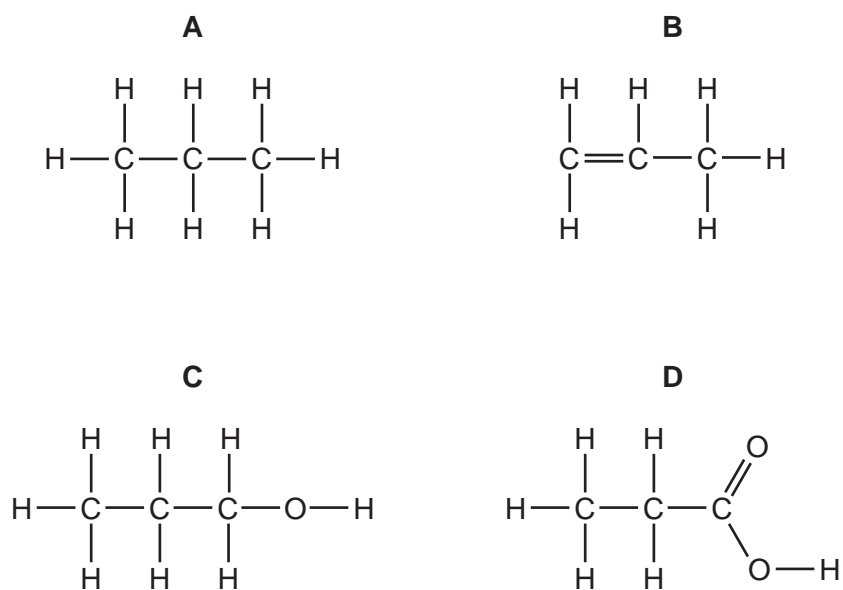


19 Which structure represents an unsaturated hydrocarbon?



20 Propene, C_3H_6 , follows ethene in the alkene homologous series.

Which molecule could be made by the catalytic addition of steam to propene?



- 21 A stopwatch is used to time a runner in a race. The diagrams show the stopwatch at the start and at the end of the last lap.



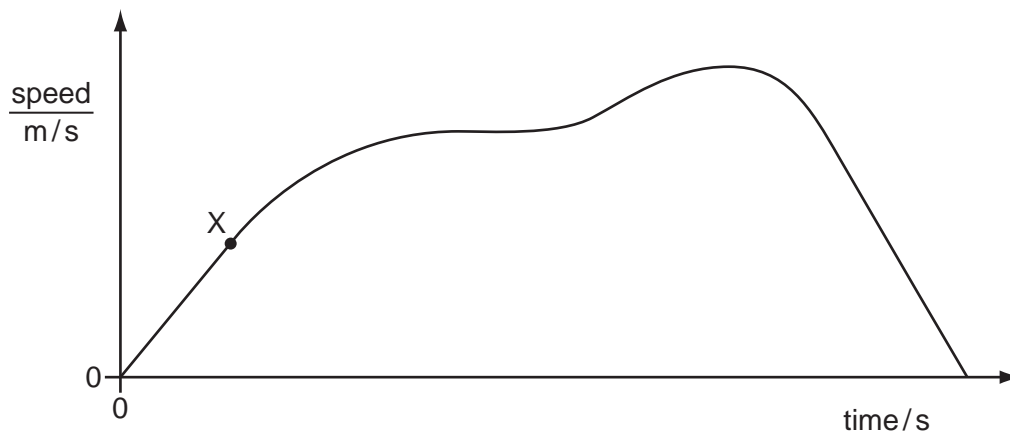
start of last lap



end of last lap

How long did the runner take to finish the last lap of the race?

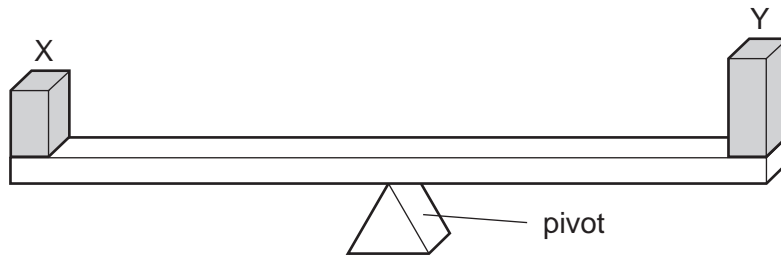
- A 50.00 seconds
 - B 50.10 seconds
 - C 100.00 seconds
 - D 100.10 seconds
- 22 The diagram shows the change in speed of a car with time.



Which is the correct description of the motion of the car at point X?

- A It is moving at a constant speed.
- B It is moving at a decreasing speed.
- C It is moving at an increasing speed.
- D It is not moving.

- 23 Two blocks X and Y are placed on a uniform beam. The beam balances on a pivot at its centre as shown.

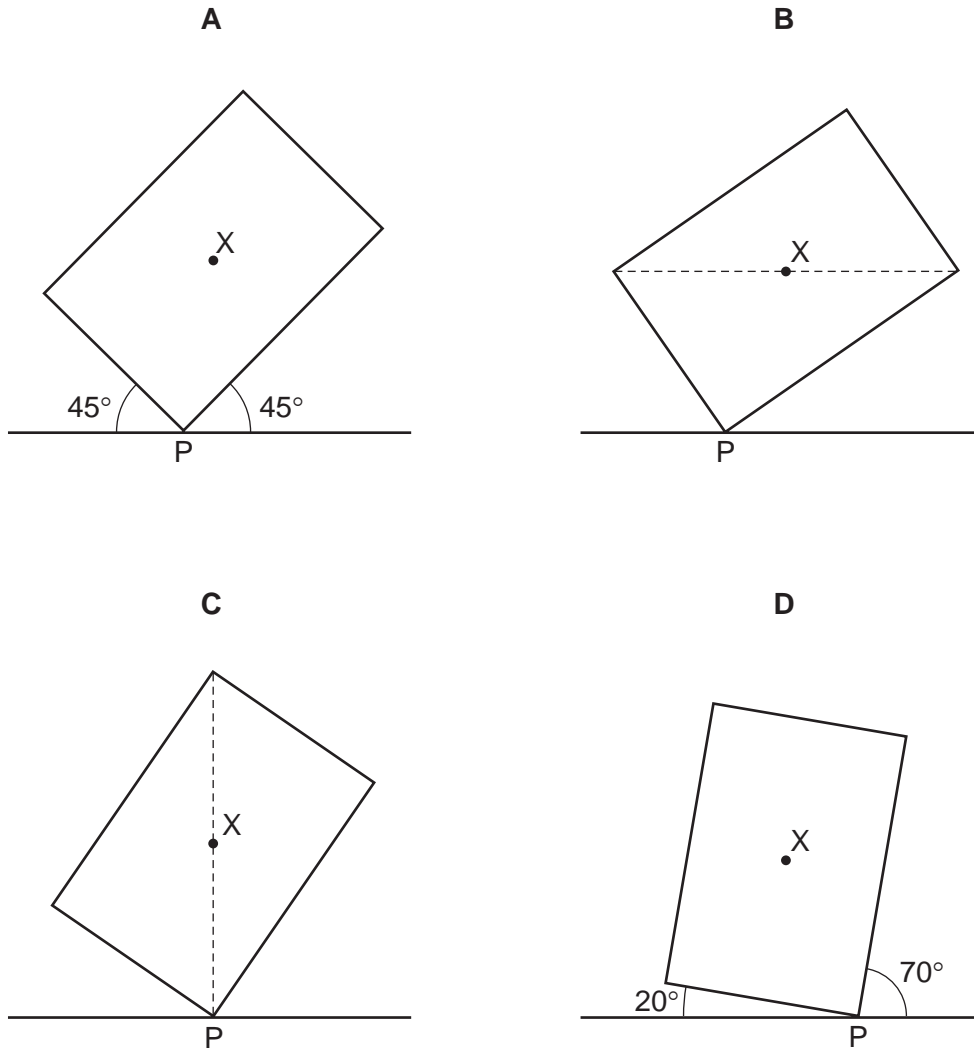


What does this show about X and Y?

- A They have the same mass and the same density.
- B They have the same mass and the same weight.
- C They have the same volume and the same density.
- D They have the same volume and the same weight.

24 A plane lamina with centre of mass X touches the ground at point P .

Which diagram shows the lamina in equilibrium?



25 A coal-fired power station generates electricity. Coal is burnt and the energy released is used to boil water. The steam from the water makes the generator move and this produces electricity.

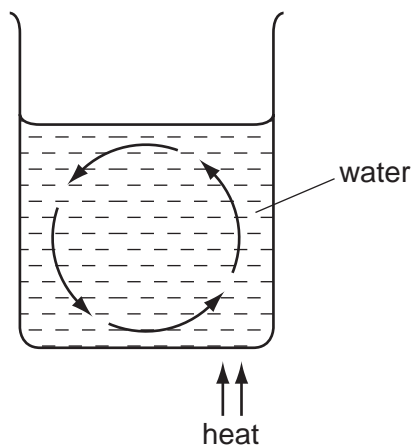
Which forms of energy are involved in this process?

- A** chemical, heat, hydroelectric, electrical
- B** chemical, heat, kinetic, electrical
- C** geothermal, heat, kinetic, electrical
- D** geothermal, kinetic, hydroelectric, electrical

26 Which physical property **cannot** be used for temperature measurement?

- A activity of a radioactive source
- B electrical resistance of a solid
- C pressure of a gas
- D volume of a liquid

27 The diagram shows a convection current in water in a beaker.



Which property of the water is changing and causing the convection current?

- A boiling point
- B density
- C mass
- D surface area

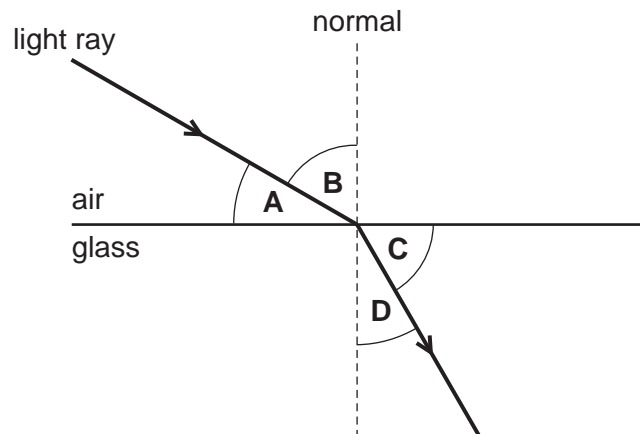
28 Waves hit the edge of a lake, one every 2.0 seconds. The distance between one wave crest and the next is 0.5 metres.

What are the frequency and the wavelength of the waves?

	frequency / Hz	wavelength / m
A	0.5	0.5
B	0.5	2.0
C	2.0	0.5
D	2.0	2.0

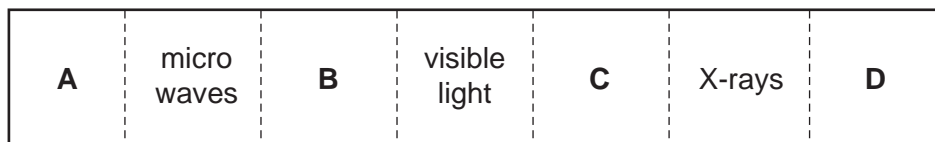
29 A light ray passes from air into glass.

Which labelled angle is the angle of refraction?



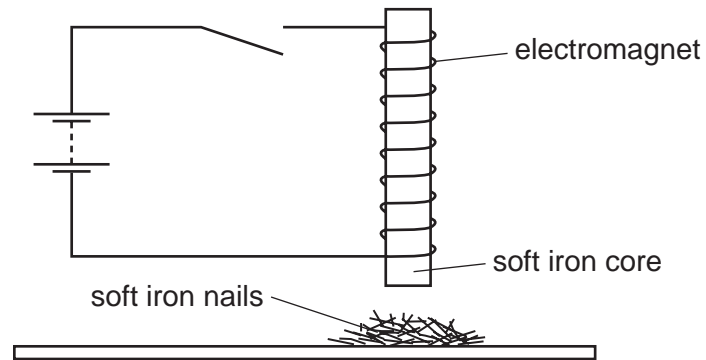
30 The diagram shows the spectrum of electromagnetic waves.

Which labelled region represents radio waves?



increasing frequency →

- 31 An electromagnet with a soft iron core is connected to battery through an open switch. The soft iron core lies just above some small soft iron nails.

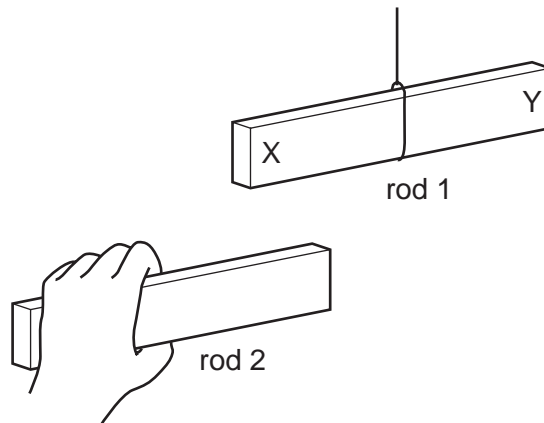


The switch is now closed, left closed for a few seconds, and then opened.

What do the soft iron nails do as the switch is closed and what do they do as the switch is then opened?

	as switch is closed	as switch is opened
A	nails jump up	nails fall down
B	nails jump up	nails stay up
C	nails stay down	nails jump up
D	nails stay down	nails stay down

- 32 Two plastic rods, 1 and 2, are negatively charged. Rod 1 hangs freely.

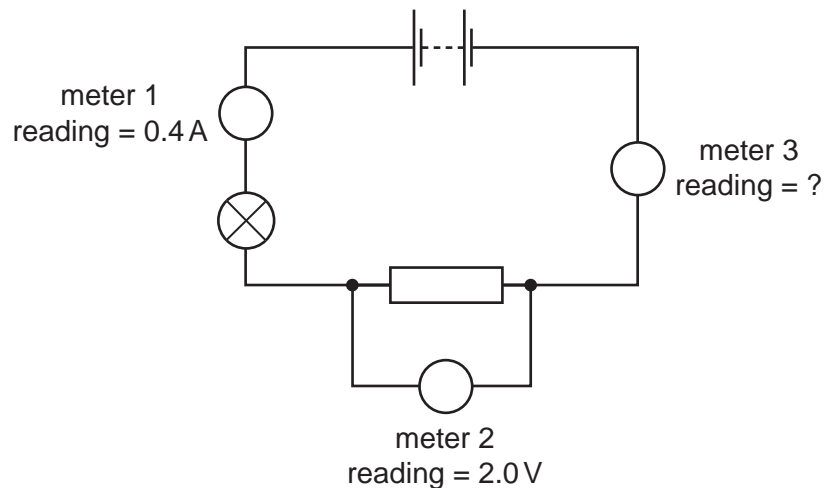


Rod 2 is brought near to end X of rod 1 and then near to end Y of rod 1.

What happens to the rods in each position?

	near end X	near end Y
A	they attract	they attract
B	they attract	they repel
C	they repel	they attract
D	they repel	they repel

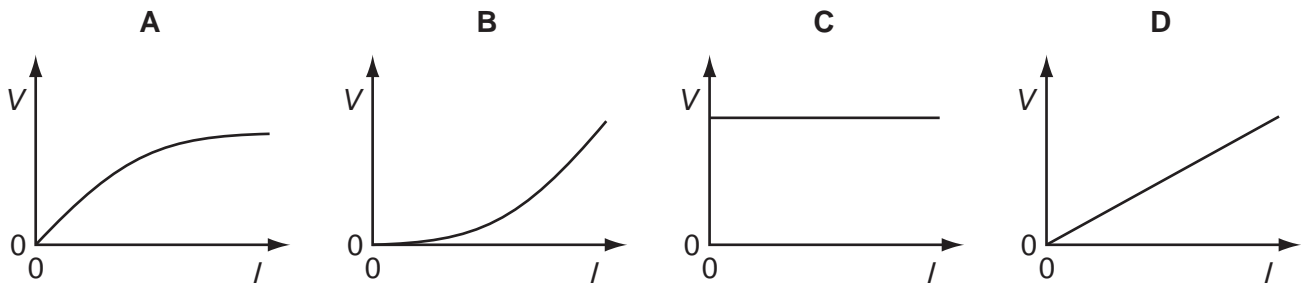
- 33 The diagram shows an electric circuit with three meters, connected correctly.



What is the reading on meter 3?

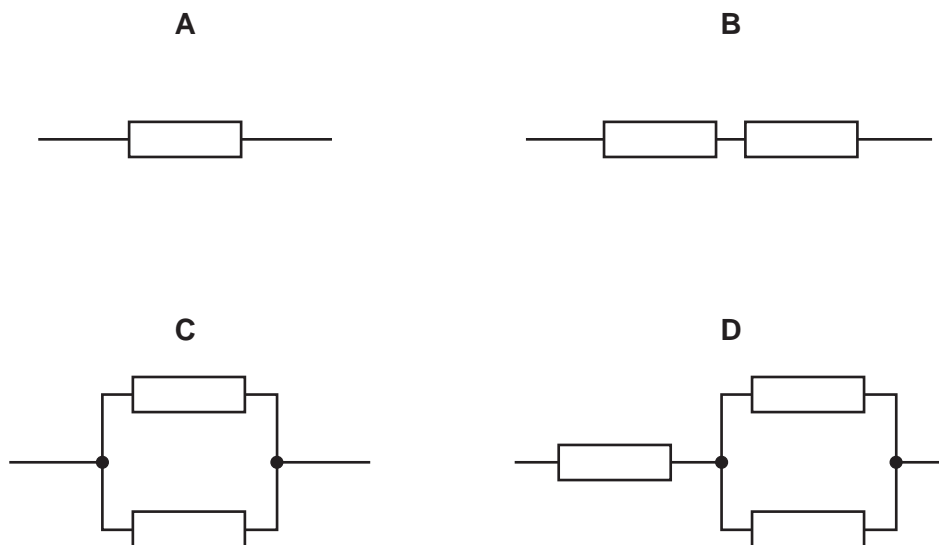
- A** 0.0 A **B** 0.4 A **C** 2.0 V **D** 2.4 V

34 Which diagram is the V/I characteristic graph for a metallic conductor at constant temperature?



35 The diagram shows different ways of arranging identical resistors.

Which arrangement has the smallest resistance?



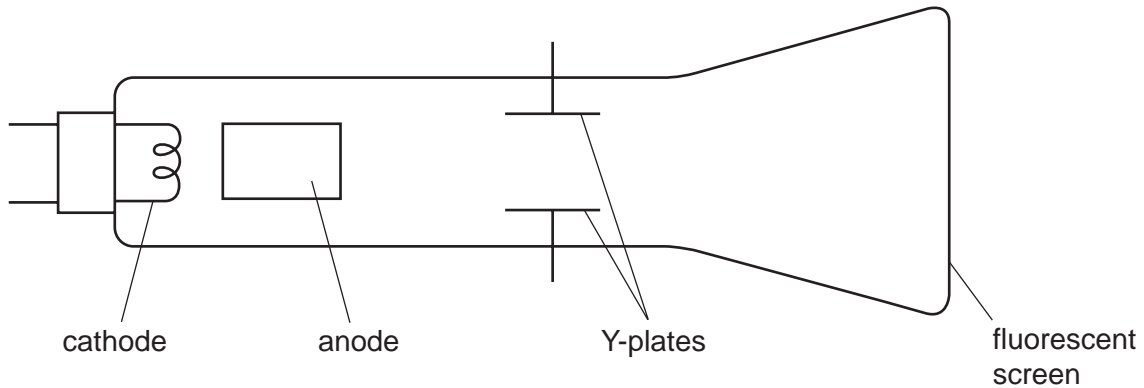
36 The current in an electric heater is 10 A. The heater is connected to the power supply using wire which is designed to carry a current of 5 A.

Why is this a hazard?

- A** The heater could explode.
- B** The wire could explode.
- C** The heater could become too hot and cause a fire.
- D** The wire could become too hot and cause a fire.

37 The diagram shows a cathode-ray oscilloscope.

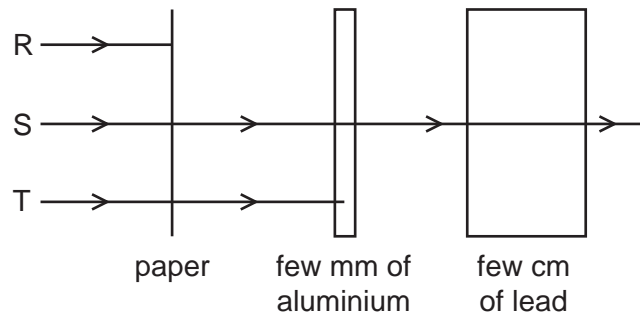
Cathode rays are fast-moving electrons.



From where are the electrons released?

- A the anode
- B the cathode
- C the fluorescent screen
- D the Y-plates

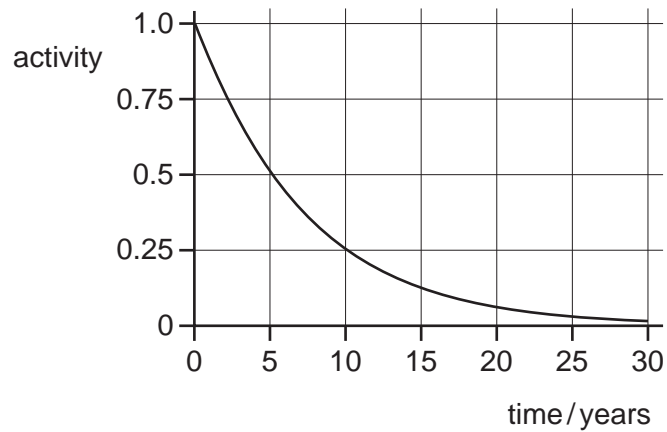
38 The diagram shows an experiment set up to study the penetrating properties of three types of radiation R, S and T from a radioactive source.



What types of radiation are R, S and T?

	R	S	T
A	alpha-particles	beta-particles	gamma-rays
B	alpha-particles	gamma-rays	beta-particles
C	beta-particles	alpha-particles	gamma-rays
D	gamma-rays	beta-particles	alpha-particles

- 39 The graph shows the radioactive decay curve of a substance.



What is the half-life of this substance?

- A** 0.5 years **B** 5 years **C** 15 years **D** 30 years
- 40 A lithium nucleus contains 3 protons and 4 neutrons.

What is its nuclide notation?

- A** ${}^3_4\text{Li}$ **B** ${}^4_3\text{Li}$ **C** ${}^7_3\text{Li}$ **D** ${}^7_4\text{Li}$

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
		<div>1 H Hydrogen</div>															
3 7 Li Lithium	4 9 Be Beryllium											5 11 B Boron	6 12 C Carbon	7 14 N Nitrogen	8 16 O Oxygen	9 19 F Fluorine	2 4 He Helium
11 23 Na Sodium	12 24 Mg Magnesium											13 27 Al Aluminium	14 28 Si Silicon	15 31 P Phosphorus	16 32 S Sulfur	17 35.5 Cl Chlorine	18 40 Ar Argon
19 39 K Potassium	20 40 Ca Calcium	21 45 Sc Scandium	22 48 Ti Titanium	23 51 V Vanadium	24 52 Cr Chromium	25 55 Mn Manganese	26 56 Fe Iron	27 59 Co Cobalt	28 59 Ni Nickel	29 64 Cu Copper	30 65 Zn Zinc	31 70 Ga Gallium	32 73 Ge Germanium	33 75 As Arsenic	34 79 Se Selenium	35 80 Br Bromine	36 84 Kr Krypton
37 85 Rb Rubidium	38 88 Sr Strontium	39 89 Y Yttrium	40 91 Zr Zirconium	41 93 Nb Niobium	42 96 Mo Molybdenum	43 101 Tc Technetium	44 101 Ru Ruthenium	45 103 Rh Rhodium	46 106 Pd Palladium	47 108 Ag Silver	48 112 Cd Cadmium	49 115 In Indium	50 119 Sn Tin	51 122 Sb Antimony	52 128 Te Tellurium	53 127 I Iodine	54 131 Xe Xenon
55 133 Cs Caesium	56 137 Ba Barium	57 139 La Lanthanum	72 178 Hf Hafnium	73 181 Ta Tantalum	74 184 W Tungsten	75 186 Re Rhenium	76 190 Os Osmium	77 192 Ir Iridium	78 195 Pt Platinum	79 197 Au Gold	80 201 Hg Mercury	81 204 Tl Thallium	82 207 Pb Lead	83 209 Bi Bismuth	84 209 Po Polonium	85 209 At Astatine	86 209 Rn Radon
87 Fr Francium	88 226 Ra Radium	89 227 Ac Actinium															
58-71 Lanthanoid series																	
90-103 Actinoid series																	
<div>150 152 157 159 162 165 167 169 173 175</div> <div>Sm Samarium</div> <div>Eu Europium</div> <div>Gd Gadolinium</div> <div>Tb Terbium</div> <div>Dy Dysprosium</div> <div>Ho Holmium</div> <div>Er Erbium</div> <div>Tm Thulium</div> <div>Yb Ytterbium</div> <div>Lu Lutetium</div>																	
<div>90 91 92 93 94 95 96 97 98 99 100 101 102 103</div> <div>Th Thorium</div> <div>Pa Protactinium</div> <div>U Uranium</div> <div>Np Neptunium</div> <div>Pu Plutonium</div> <div>Am Americium</div> <div>Cm Curium</div> <div>Bk Berkelium</div> <div>Cf Californium</div> <div>Es Einsteinium</div> <div>Fm Fermium</div> <div>Md Mendelevium</div> <div>No Nobelium</div> <div>Lr Lawrencium</div>																	
Key	X	a	a = relative atomic mass X = atomic symbol b = proton (atomic) number														

a	X	b
Key		
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.).

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