



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice

October/November 2014

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, 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.

DO NOT WRITE IN ANY BARCODES.

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.

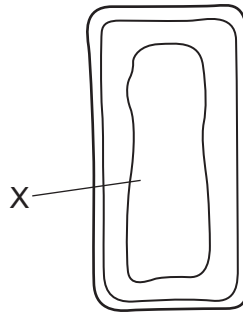
Electronic calculators may be used.

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



- 1 Which statement about cells is correct?
- A Cell membranes are found only in animal cells.
 - B Cell membranes are found only in plant cells.
 - C Cell walls are found only in animal cells.
 - D Cell walls are found only in plant cells.

- 2 The diagram shows parts of a mesophyll cell.

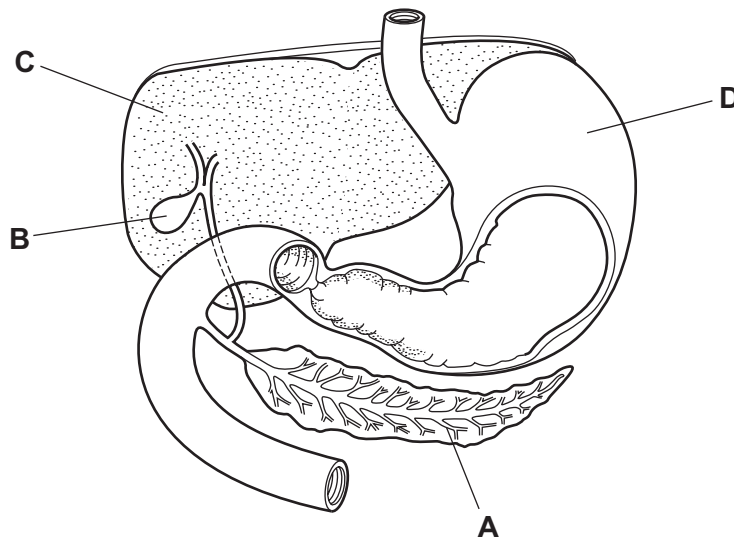


What will be found in the part labelled X?

- A chloroplasts and nucleus
 - B chloroplasts only
 - C nucleus only
 - D watery solution
- 3 What is the correct word equation for photosynthesis?
- A carbon dioxide + sugar → oxygen + water
 - B carbon dioxide + water → oxygen + sugar
 - C oxygen + sugar → carbon dioxide + water
 - D oxygen + water → carbon dioxide + sugar

- 4 The diagram shows part of the digestive system.

Where is lipase produced?

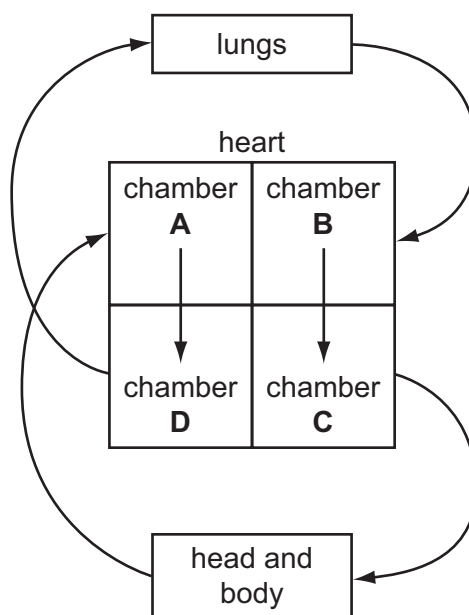


- 5 Which statement about the pulmonary vein is correct?

- A It carries deoxygenated blood away from the heart.
- B It carries deoxygenated blood towards the heart.
- C It carries oxygenated blood away from the heart.
- D It carries oxygenated blood towards the heart.

- 6 The diagram represents the human blood system.

Which chamber of the heart is the left ventricle?

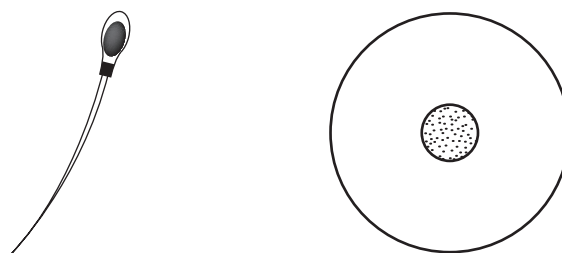


- 7 Why does oxygen move from an alveolus to a blood capillary?
- A It diffuses through because of a difference in concentration.
 - B It is forced through the wall of the alveolus by air pressure.
 - C It passes through because carbon dioxide is coming out.
 - D It is pulled in by movement of blood in the capillary.
- 8 When a plant organ grows towards a stimulus, its response is described as 'positive'. When it grows away from a stimulus, its response is described as 'negative'.

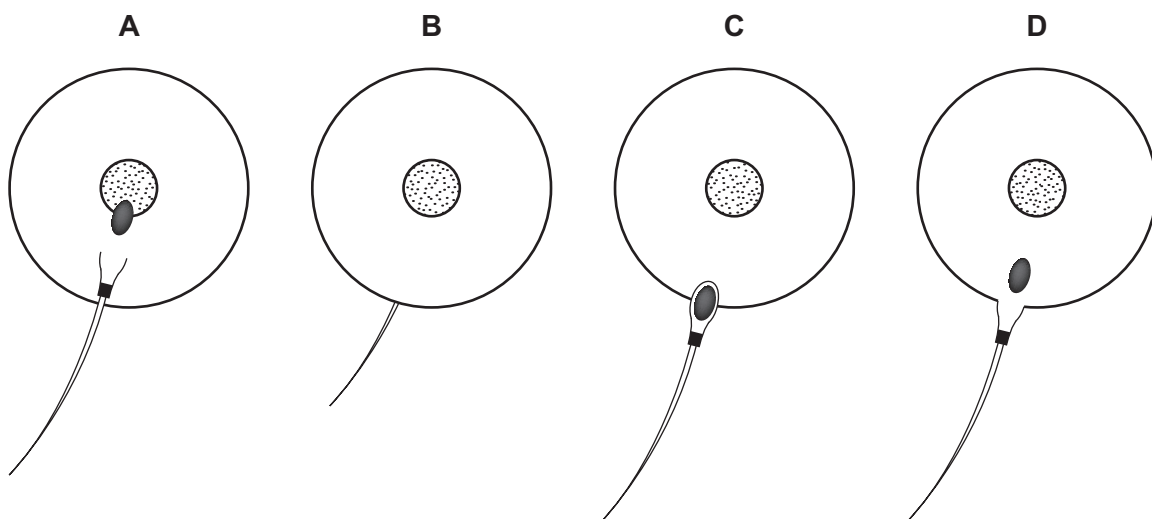
A plant root is placed horizontally in the dark.

Which response would it show?

- A negative geotropism
 - B negative phototropism
 - C positive geotropism
 - D positive phototropism
- 9 The diagram shows a sperm and an egg.



Which diagram shows fertilisation?



10 Cystic fibrosis is an inherited disease.

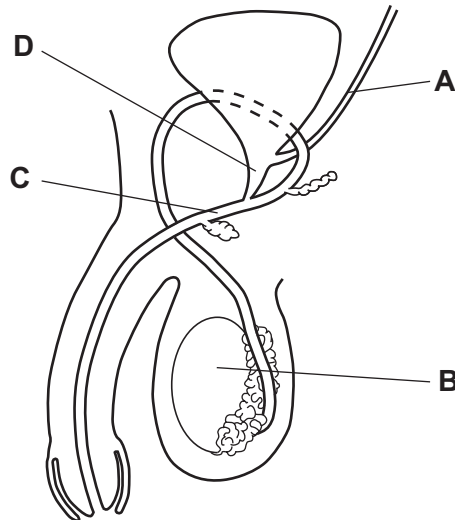
Only people who are homozygous recessive, ff, have this disease.

Which cross could **not** give rise to a child suffering from cystic fibrosis?

- A** $ff \times ff$ **B** $Ff \times ff$ **C** $Ff \times Ff$ **D** $FF \times ff$

11 The diagram shows the male reproductive system of a human.

Which labelled part is found only in a male?



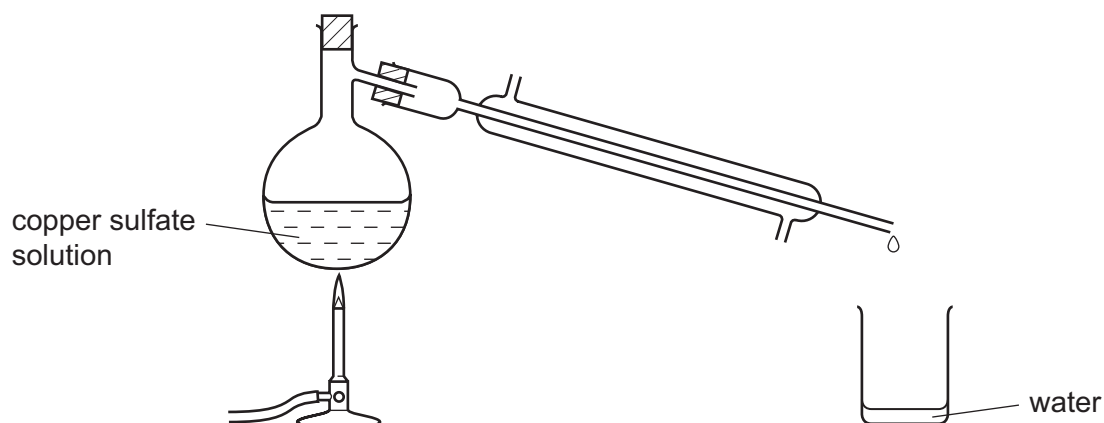
12 Which statements about X chromosomes are correct?

	present in body cells in males	present in body cells of females	carry genes
A	✓	✓	✓
B	✓	x	✓
C	✓	x	x
D	x	✓	x

13 In an ecosystem, how do producers get most of their energy?

- A** absorbing sunlight
B eating other organisms
C feeding on dead matter
D using nutrients recycled by decay

- 14 Water can be separated from copper sulfate solution using the apparatus shown.



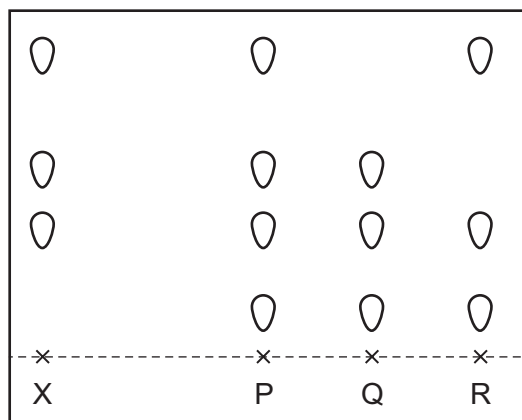
What is the name of the process?

- A chromatography
 - B crystallisation
 - C distillation
 - D filtration
- 15 Which process can be used to produce sodium and chlorine from the compound sodium chloride?
- A cracking
 - B distillation
 - C electrolysis
 - D filtration

16 Dye X is a mixture of different coloured substances.

Chromatography is used to compare X with three other mixtures, P, Q and R.

The results are shown in the diagram.



Which other mixtures contain the dye X?

- A** P only **B** R only **C** P and Q only **D** P, Q and R

17 Sodium chloride (salt) has an ionic structure.

Which compound could be sodium chloride?

	melting point /°C	boiling point /°C	electrical conductivity
A	–114	–85	conducts when dissolved in water
B	98	880	conducts when solid
C	801	1413	conducts when dissolved in water
D	1610	2230	conducts when solid

18 Which statement describes the particles in a gas?

- A** As the particles move quicker the pressure of the gas decreases.
B The movement of the particles is unaffected by temperature.
C The particles are in random motion.
D The particles are ordered.

- 19** Metal X is extracted from its oxide by heating with carbon.

The oxide of X reacts with hydrochloric acid.

Which row shows the type of oxide and the type of reaction that occurs to the oxide when it is heated with carbon?

	type of oxide	type of reaction
A	acidic	oxidation
B	acidic	reduction
C	basic	oxidation
D	basic	reduction

- 20** When a match is struck, heat and light energy are produced.

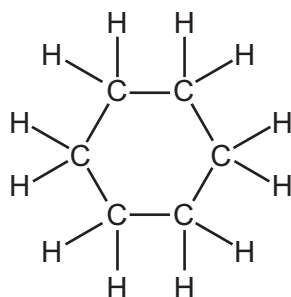
Which row describes the type of change and the type of reaction taking place?

	type of change	type of reaction
A	chemical	endothermic
B	chemical	exothermic
C	physical	endothermic
D	physical	exothermic

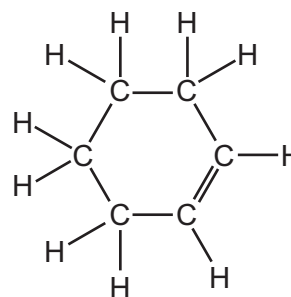
- 21** Which statement about the trends in the Periodic Table is correct?

- A** Elements are arranged in order of nucleon number.
- B** Elements on the left hand side form acidic oxides.
- C** The melting point of the Group I elements increases down the group.
- D** The proton number increases from left to right across the table.

22 The structures of compounds X and Y are shown.



compound X

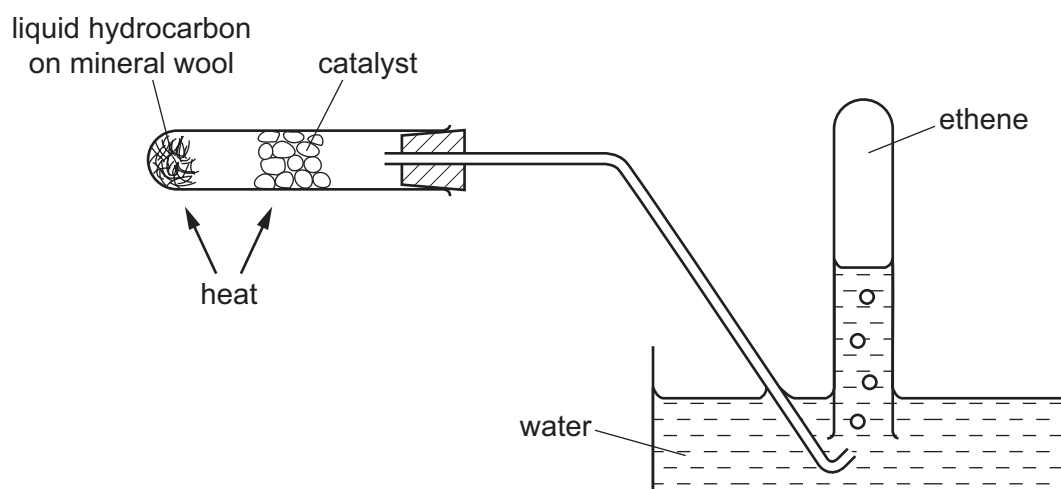


compound Y

What are the correct formulae for these two compounds?

	compound X	compound Y
A	C_6H_{14}	C_6H_{10}
B	C_6H_{14}	C_6H_{12}
C	C_6H_{12}	C_6H_{10}
D	C_6H_{12}	C_6H_{12}

23 The diagram shows an experiment on a liquid hydrocarbon.



Which change takes place?

- A** combustion
- B** cracking
- C** fractional distillation
- D** polymerisation

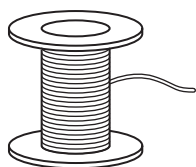
24 The first row of the transition elements is shown.

Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn
----	----	---	----	----	----	----	----	----	----

Which statement about transition metals is **not** correct?

- A They are often used as catalysts.
- B They form colourless compounds.
- C They have high densities.
- D They have high melting points.

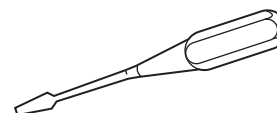
25 Some uses of alloys are shown.



solder



coins

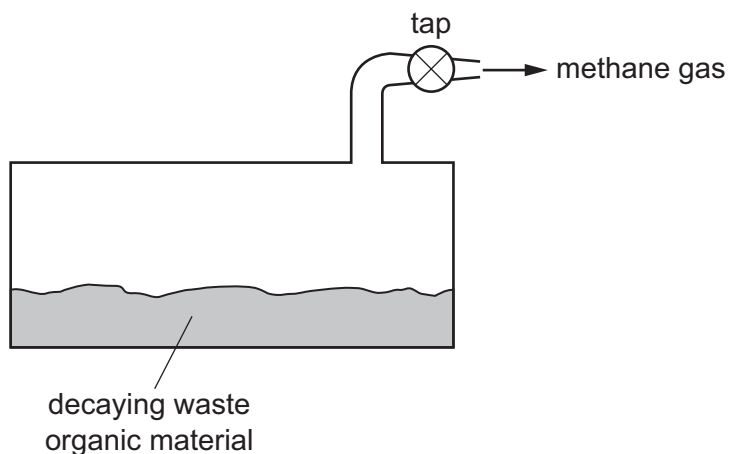


tools

Which statement about alloys is correct?

- A They are always stronger than the metals from which they are made.
- B They are made from metals because metals are poor electrical conductors.
- C They contain mixtures of compounds that contain metals.
- D They have different properties to the metals from which they are made.

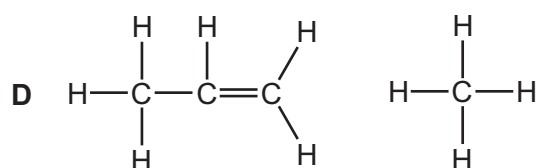
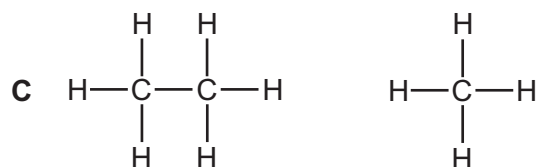
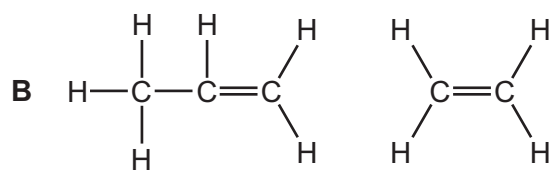
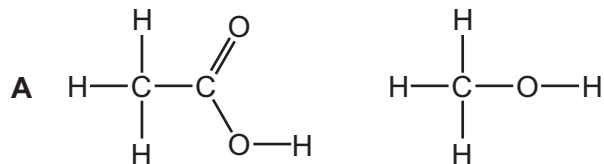
26 The diagram shows waste organic material decaying.



What is formed when the gas, methane, is burned?

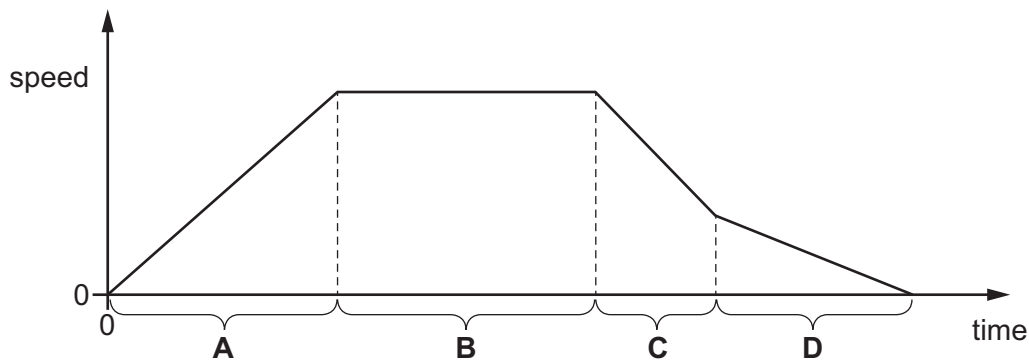
- A carbon dioxide and water
- B carbon dioxide only
- C carbon monoxide
- D water only

27 In which pair are **both** molecules unsaturated?



28 The diagram shows the speed/time graph for a car.

During which period is the car moving at constant speed?



29 Which energy resource does **not** provide energy originally derived from the Sun?

- A coal
- B geothermal
- C tides
- D waves

30 Three forces act on a block.



What is the resultant force and what is its direction?

- A 3 N to the right
- B 6 N to the left
- C 15 N to the left
- D 18 N to the right

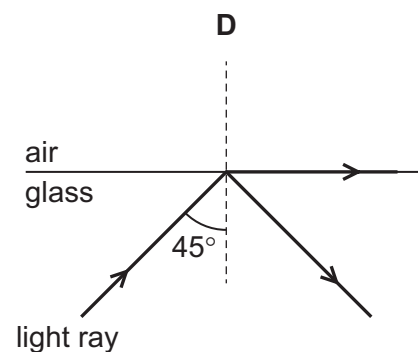
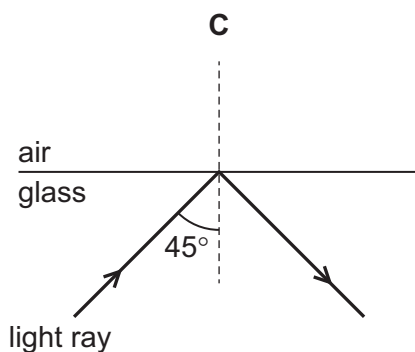
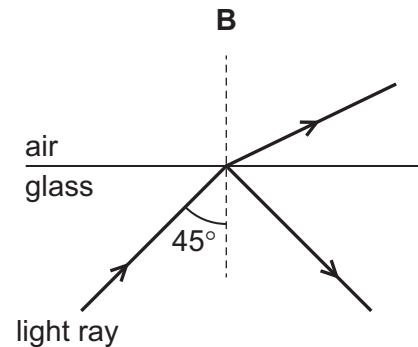
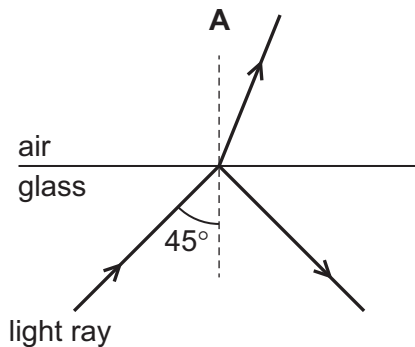
31 A flask contains a hot liquid. The flask has double walls with a vacuum between them. The vacuum reduces loss of thermal energy from the hot liquid.

Which types of thermal energy transfer **cannot** occur through the vacuum?

- A conduction and convection only
- B conduction and radiation only
- C convection and radiation only
- D conduction, convection and radiation

- 32** A ray of light travels in glass towards a glass/air boundary. The critical angle for glass is 42° .

Which diagram shows what happens to the ray?



- 33** Which waves are longitudinal?

- A** light waves from a lamp
- B** sound waves from a piano
- C** ultraviolet waves from the Sun
- D** X-rays from a security scanner

- 34** Music is produced by the loudspeaker of a radio.

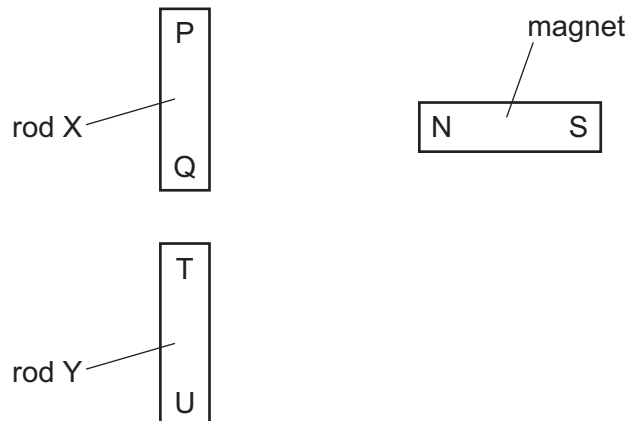
Which property of the sound waves from the loudspeaker increases when the music is made louder?

- A** amplitude
- B** frequency
- C** speed
- D** wavelength

35 Which type of waves are used for intruder alarms?

- A γ -rays
- B infra-red waves
- C ultraviolet waves
- D X-rays

36 Two rods, X and Y, look the same.



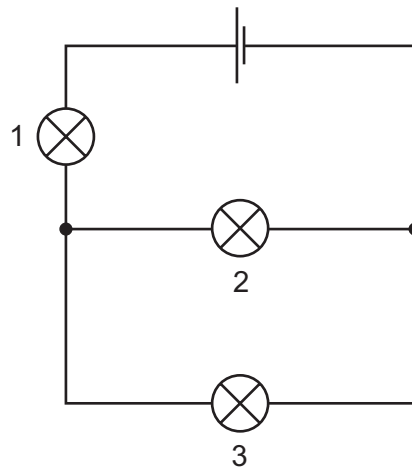
The N pole of a magnet is brought close, in turn, to P, Q, T and U. The results of these four actions are shown in the table.

end tested	result
P	attraction
Q	attraction
T	attraction
U	repulsion

Which of the rods is a permanent magnet, with a pole at each end?

- A both of the rods
- B neither of the rods
- C rod X only
- D rod Y only

37 In the circuit all the lamps are lit.

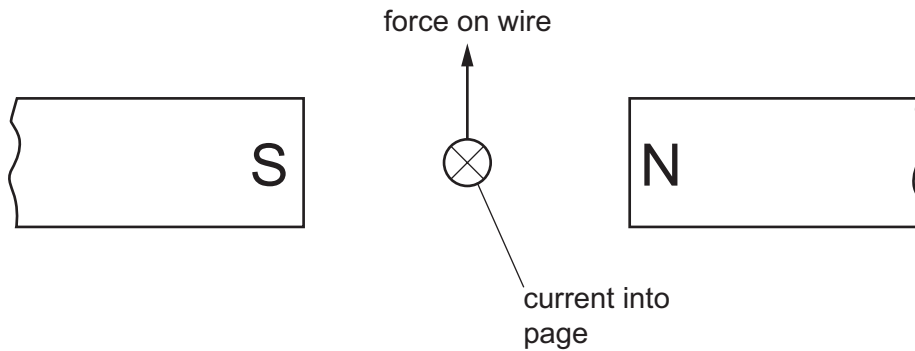


Lamp 2 is removed.

What happens to each of the other lamps?

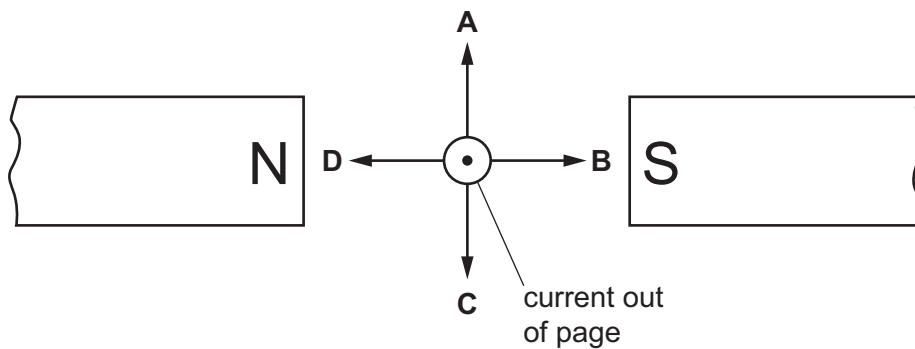
	lamp 1	lamp 3
A	goes out	goes out
B	goes out	stays lit
C	stays lit	goes out
D	stays lit	stays lit

- 38 A wire carries an electric current. The wire is placed between the poles of a magnet. This causes a force that pushes the wire upwards.



The poles of the magnet and the direction of the current are both reversed.

Which arrow now shows the direction of the force on the wire?

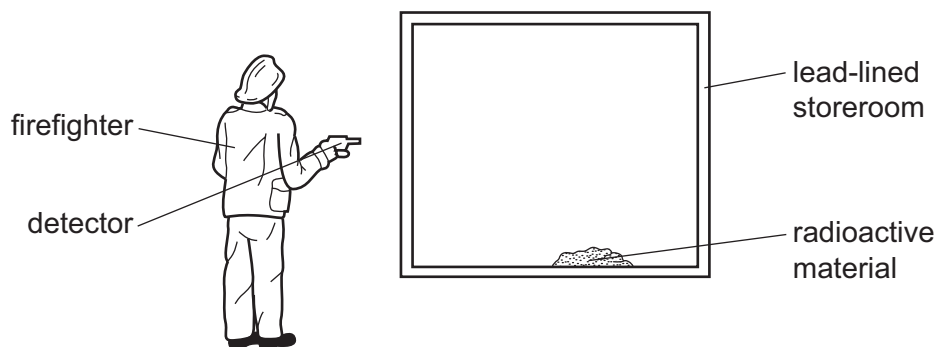


- 39 The current in a resistor is 0.50 A and the potential difference across the resistor is 4.6 V .

What is the resistance of the resistor?

- A** $0.11\ \Omega$ **B** $2.3\ \Omega$ **C** $5.1\ \Omega$ **D** $9.2\ \Omega$

- 40 During a fire in a laboratory storeroom, some radioactive material is spilt. A firefighter detects radiation through the lead-lined walls of the storeroom. The radiation is emitted by the radioactive material.



Which type of radiation from the radioactive material is detected?

- A α -particles
- B β -particles
- C γ -rays
- D X-rays

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
		<div>1 H Hydrogen</div>															
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminium	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Caesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium															
58-71 Lanthanoid series																	
90-103 Actinoid series																	
<div><div><div>a</div><div>X</div><div>Key</div></div><div>a = relative atomic mass X = atomic symbol b = proton (atomic) number</div></div>																	
			140 Ce Cerium	141 Pr Praseodymium	144 Nd Neodymium	150 Sm Samarium		152 Eu Europium	157 Gd Gadolinium	159 Tb Terbium	162 Dy Dysprosium	165 Ho Holmium	167 Er Erbium	169 Tm Thulium	173 Yb Ytterbium	175 Lu Lutetium	
			232 Th Thorium	238 Pa Protactinium		238 Pu Plutonium		238 Am Americium		238 Cm Curium		238 Bk Berkelium		238 Es Einsteinium		238 Lr Lawrencium	

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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