



**CO-ORDINATED SCIENCES**

**0654/13**

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.**

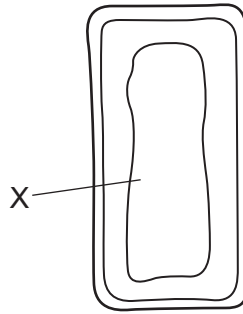
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.  
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

**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 **17** printed pages and **3** blank pages.

- 1 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
- 2 A carbon dioxide molecule diffuses into a plant cell.

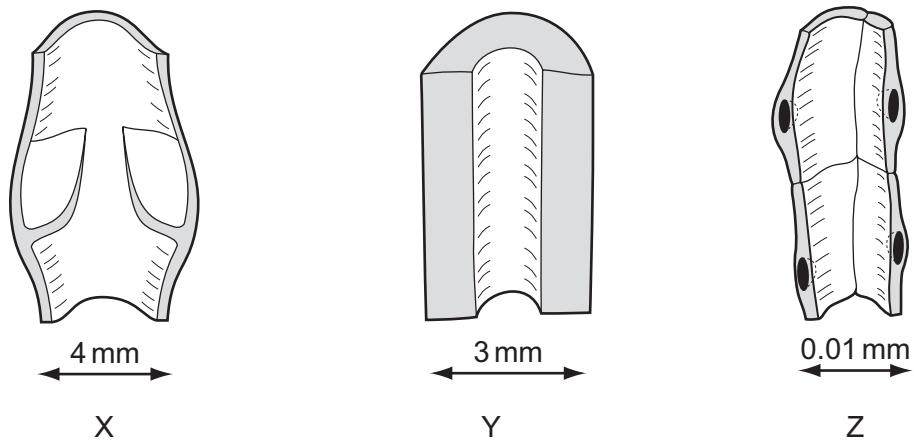
In which order does it pass through these structures?

- A cell membrane → cell wall → cytoplasm
  - B cell wall → cell membrane → cytoplasm
  - C cytoplasm → cell membrane → cell wall
  - D cytoplasm → cell wall → cell membrane
- 3 Four statements about enzymes in the human body are listed.
- 1 They are all proteins.
  - 2 They catalyse reactions in the body.
  - 3 They stop working at temperatures over 75°C.
  - 4 They work faster at 30°C than at 10°C.

Which statements are correct?

- A 1, 2, 3 and 4    B 1 and 3 only    C 2 and 3 only    D 2 and 4 only

4 The diagram shows three blood vessels in longitudinal section.

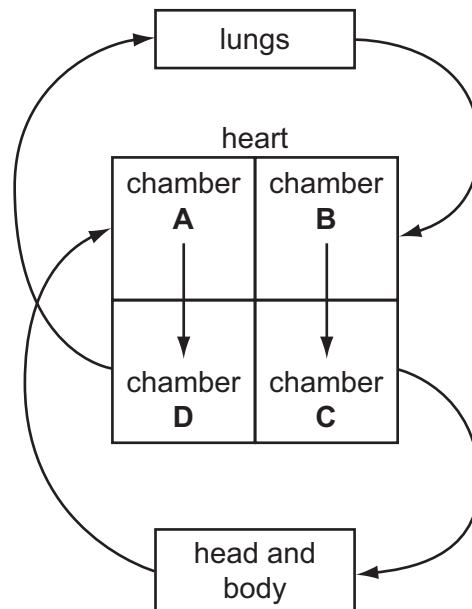


What are X, Y and Z?

	X	Y	Z
<b>A</b>	artery	capillary	vein
<b>B</b>	artery	vein	capillary
<b>C</b>	vein	artery	capillary
<b>D</b>	vein	capillary	artery

5 The diagram represents the human blood system.

Which chamber of the heart is the left ventricle?



- 6 During expiration, in which order does air pass through these structures?
- A alveoli → bronchi → bronchiole → larynx  
 B alveoli → bronchiole → bronchi → larynx  
 C larynx → bronchi → bronchiole → alveoli  
 D larynx → bronchiole → bronchi → alveoli
- 7 Which structure carries nerve impulses away from the central nervous system?
- A motor neurone  
 B relay neurone  
 C sensory neurone  
 D spinal cord
- 8 A student observes some grass seedlings which have light coming from one side only. He believes that the tips of the seedlings have a receptor for light. He removes the tips of the seedlings and waits for a day.

Which change in the seedlings would show that he is right?

- A They grow away from the light.  
 B They grow towards the light.  
 C They stop growing.  
 D They grow straight up.
- 9 When a woman ovulates, into which structure is the egg first released?
- A ovary  
 B oviduct  
 C uterus  
 D vagina
- 10 In human reproduction, which cells are haploid?

	gametes	zygotes
A	✓	✓
B	✓	x
C	x	✓
D	x	x

11 Which statement about human gametes is correct?

- A 50% of egg cells contain a Y chromosome.
- B 50% of sperm cells contain a Y chromosome.
- C 100% of egg cells contain a Y chromosome.
- D 100% of sperm cells contain a Y chromosome.

12 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 × ff
- B Ff × ff
- C Ff × Ff
- D FF × ff

13 The diagram shows a food chain.

grass → gnu → lion → flea

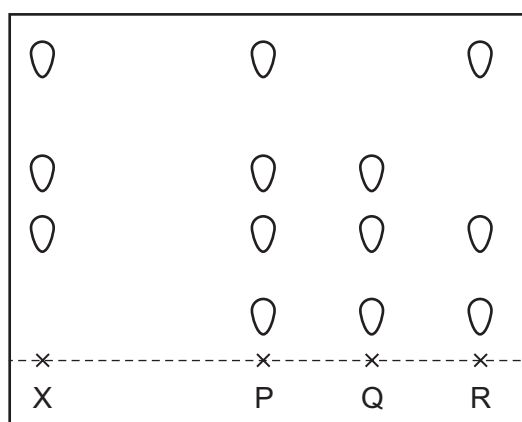
Which statement describes a member of this food chain?

- A The flea is a consumer.
- B The gnu is a producer.
- C The grass is a consumer.
- D The lion is a producer.

14 Dye X is a mixture of different coloured substances.

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

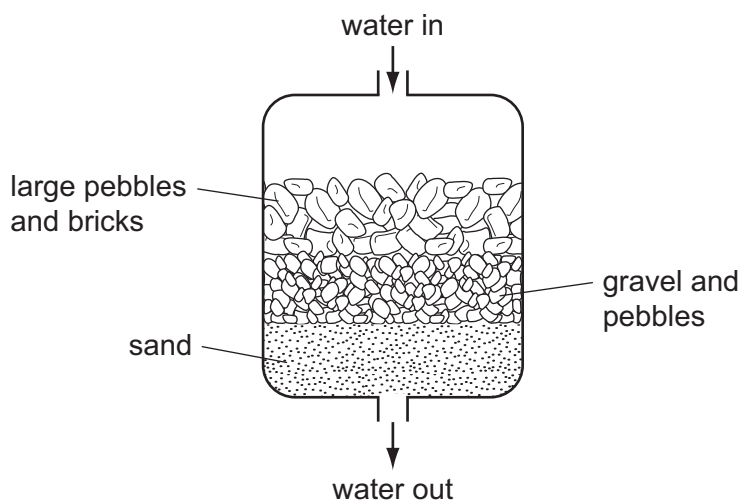
The results are shown in the diagram.



Which other mixtures contain the dye X?

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

- 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 The diagram shows one of the steps needed to make drinking water.



Which method of separation is being used?

- A chromatography  
 B crystallisation  
 C distillation  
 D filtration
- 17 Diagrams 1, 2, 3 and 4 represent atoms and molecules.

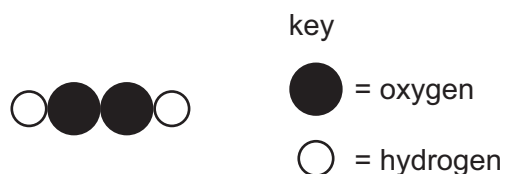


Which statement is correct?

- A 1, 2 and 3 are molecules and 4 is an atom.  
 B 1, 2 and 4 are molecules and 3 is an atom.  
 C 1, 3 and 4 are molecules and 2 is an atom.  
 D 2, 3 and 4 are molecules and 1 is an atom.

18 Hydrogen peroxide is a compound.

A molecule of hydrogen peroxide can be represented as shown.



What is the correct formula of hydrogen peroxide?

- A** HO                      **B** H<sub>2</sub>O<sub>2</sub>                      **C** (OH)<sub>2</sub>                      **D** 2OH

19 Some properties of three substances are shown.

substance	melting point /°C	boiling point /°C	electrical conductivity when solid
W	801	1413	poor
X	-111	-78	poor
Y	1610	2230	good

What are W, X and Y?

	metallic	ionic	covalent
<b>A</b>	W	Y	X
<b>B</b>	X	W	Y
<b>C</b>	Y	W	X
<b>D</b>	Y	X	W

20 When sodium is added to water it reacts violently and melts.

Which row describes the type of reaction and how the temperature of the water changes during the reaction?

	type of reaction	temperature of the water
<b>A</b>	endothermic	decreases
<b>B</b>	endothermic	increases
<b>C</b>	exothermic	decreases
<b>D</b>	exothermic	increases

21 Solid copper(II) carbonate reacts with dilute nitric acid producing carbon dioxide.

Which change causes the carbon dioxide to be given off more slowly?

- A Increase the concentration of nitric acid.
- B Increase the size of the particles of copper(II) carbonate.
- C Increase the temperature of the nitric acid.
- D Use a catalyst.

22 Which element can be used as a catalyst?

- A palladium (proton number 46)
- B phosphorus (proton number 15)
- C polonium (proton number 84)
- D potassium (proton number 19)

23 Why is aluminium used to make food containers?

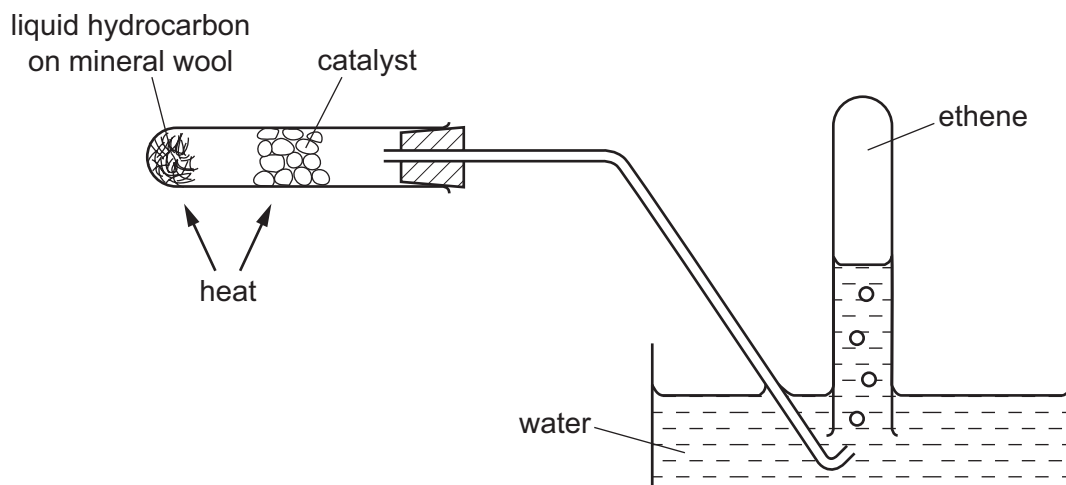
- A It has a low melting point.
- B It has a high density.
- C It is strong.
- D It resists corrosion.

24 Why is argon used to fill electric lamps?

- A Argon has a low boiling point.
- B Argon is more dense than air.
- C Argon is only found in a small amount in the atmosphere.
- D Argon is unreactive.



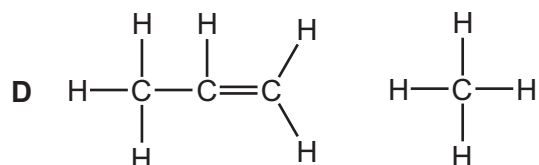
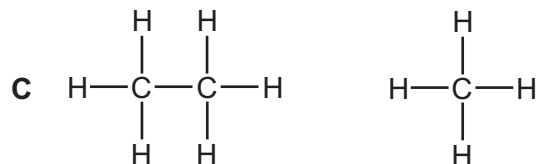
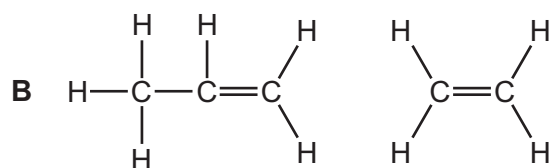
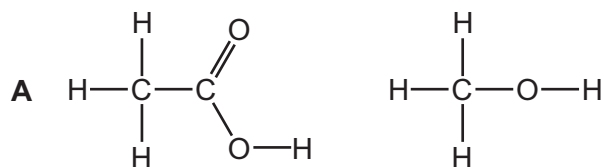
25 The diagram shows an experiment on a liquid hydrocarbon.



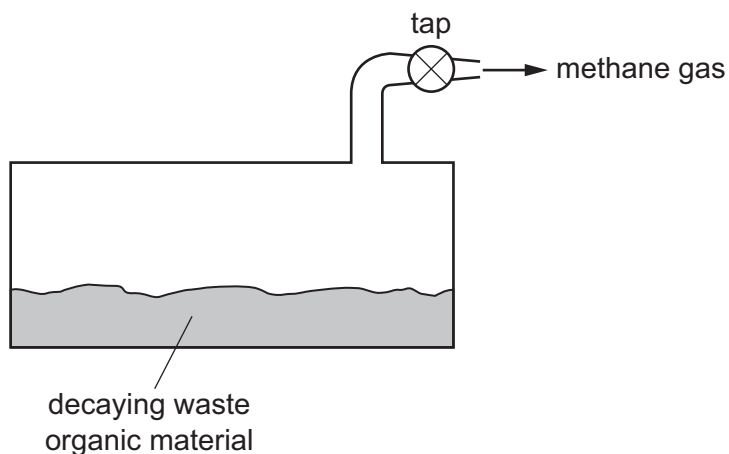
Which change takes place?

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

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



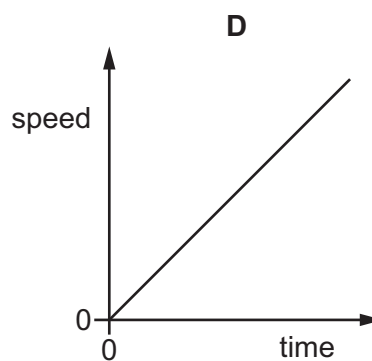
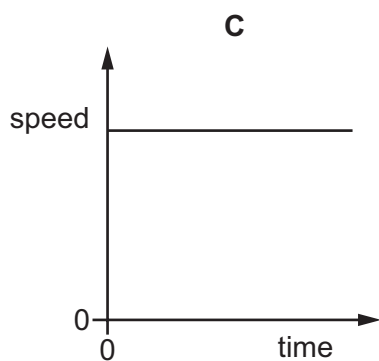
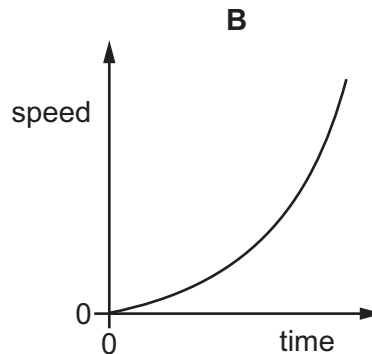
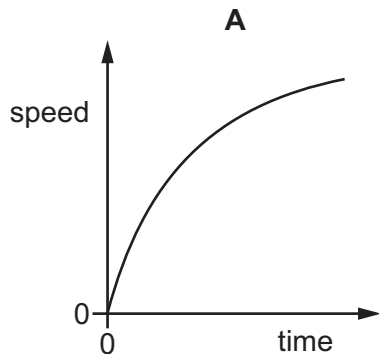
27 The diagram shows waste organic material decaying.



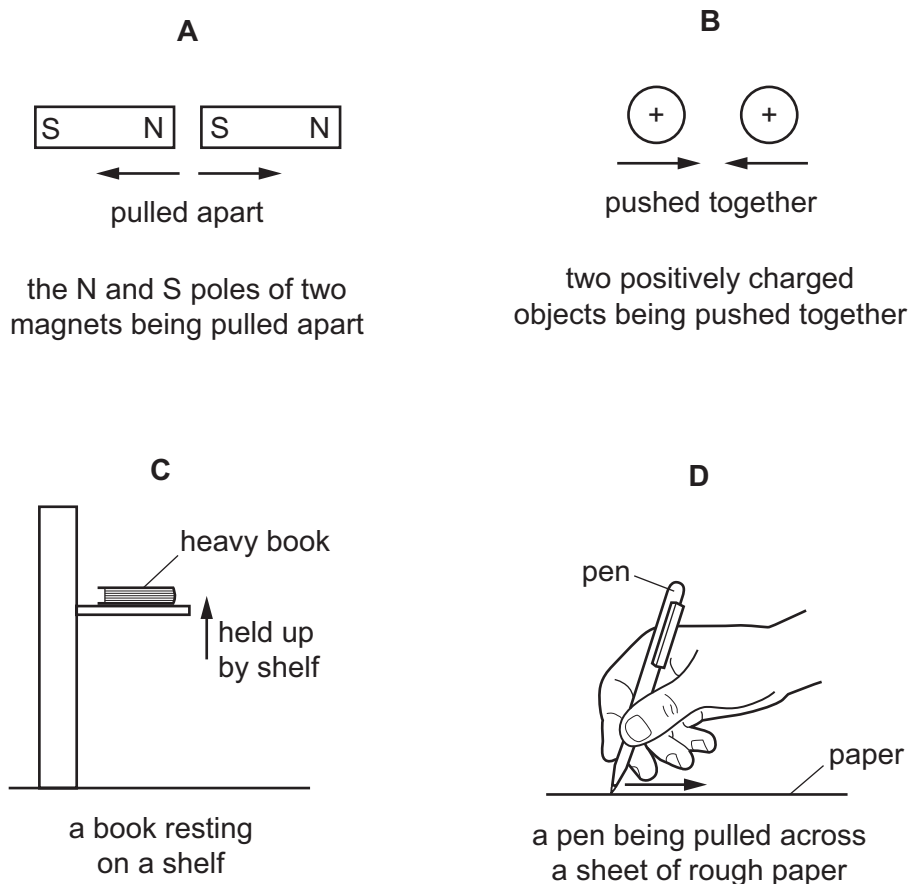
What is formed when the gas, methane, is burned?

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

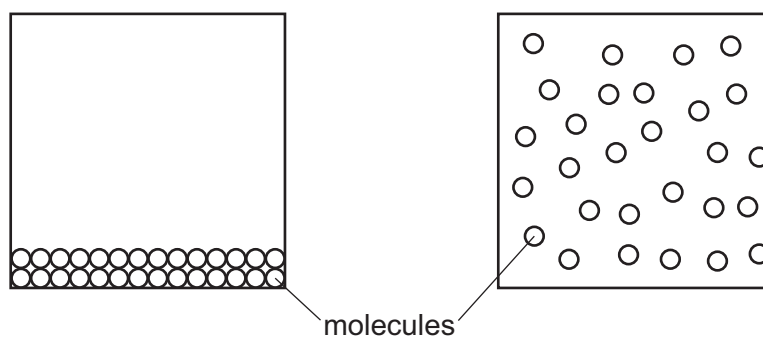
28 Which speed/time graph represents an object moving with constant positive acceleration?



29 Which situation does **not** involve any work being done?



30 The diagram represents two states of a substance.



Which states are represented?

- A** liquid and gas
- B** liquid and solid
- C** solid and gas
- D** solid and liquid

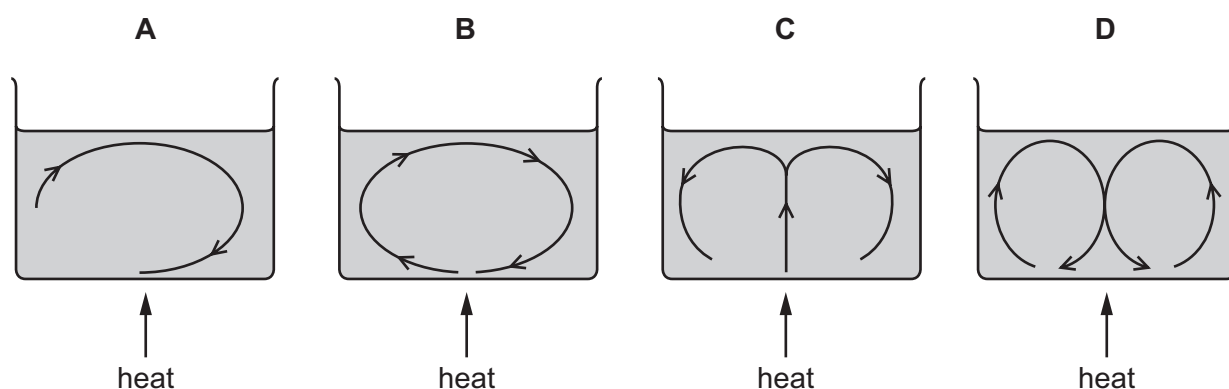
31 Four students write statements about melting and boiling.

Which statement is **not** correct?

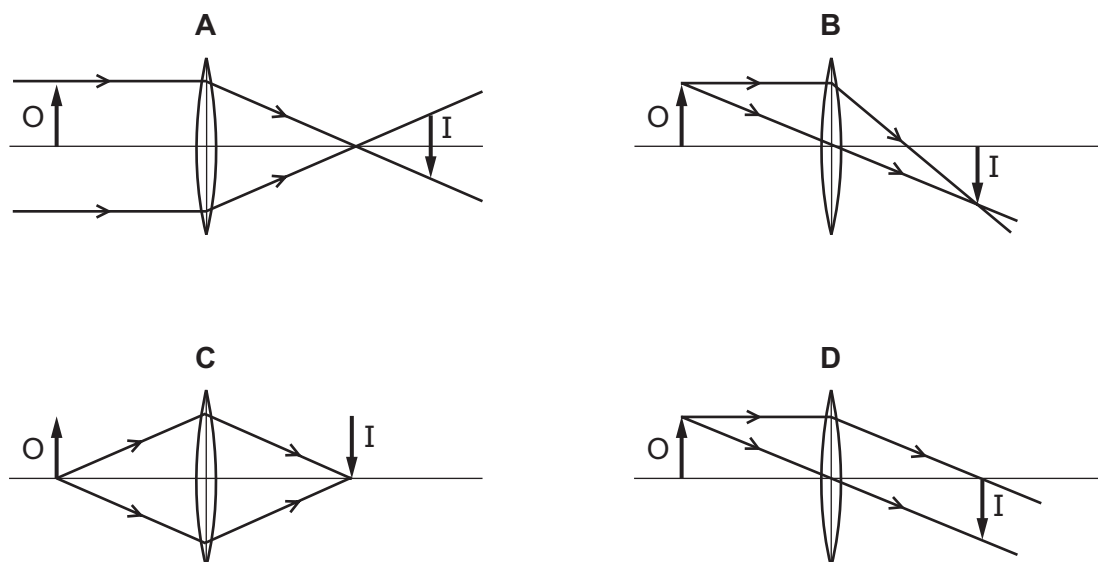
- A A liquid only evaporates when it has reached its boiling point.
- B Heat energy is needed to melt a solid.
- C When a solid is melting, its temperature does not change.
- D When a substance is a liquid, its temperature will not rise above its boiling point.

32 A wide container of water is heated from below.

Which diagram shows the convection current(s) in the water?



33 Which diagram shows how a converging lens forms a real image I of an object O?



34 Which row shows electromagnetic waves in order of increasing wavelength?

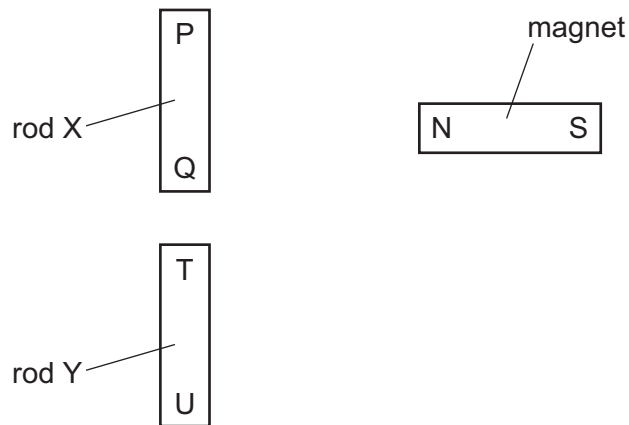
	shortest wavelength	—————▶	longest wavelength
<b>A</b>	$\gamma$ -rays	radio waves	visible light
<b>B</b>	$\gamma$ -rays	visible light	radio waves
<b>C</b>	visible light	$\gamma$ -rays	radio waves
<b>D</b>	visible light	radio waves	$\gamma$ -rays

35 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

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.

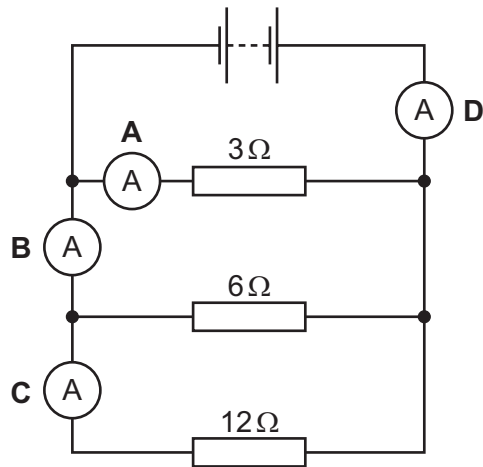
end tested	result
P	attraction
Q	attraction
T	attraction
U	repulsion

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

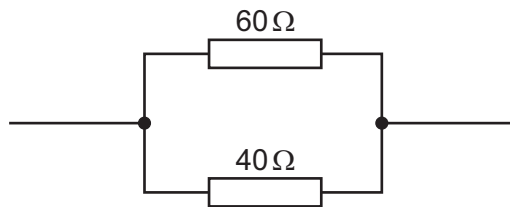
- A both of the rods
- B neither of the rods
- C rod X only
- D rod Y only

37 The diagram shows three resistors, a battery and four ammeters connected in a circuit.

Which ammeter shows the highest reading?



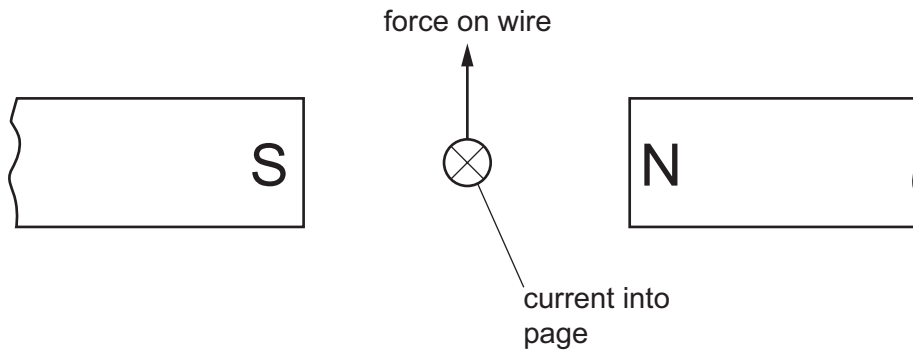
38 A  $60\ \Omega$  resistor and a  $40\ \Omega$  resistor are connected in parallel.



What is their combined resistance?

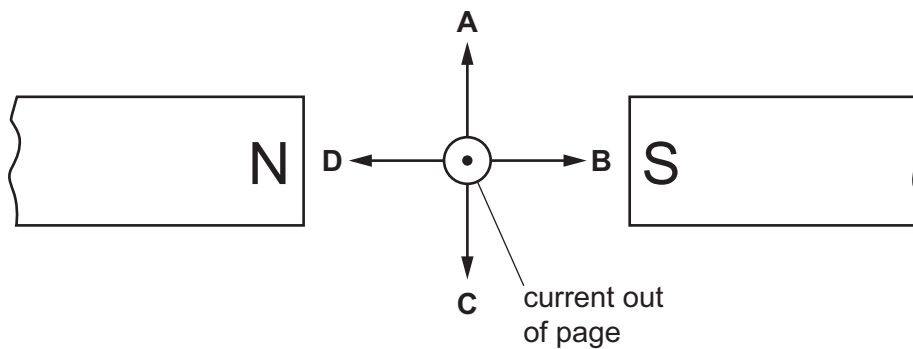
- A less than  $40\ \Omega$
- B  $50\ \Omega$
- C between  $60\ \Omega$  and  $100\ \Omega$
- D  $100\ \Omega$

- 39 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.

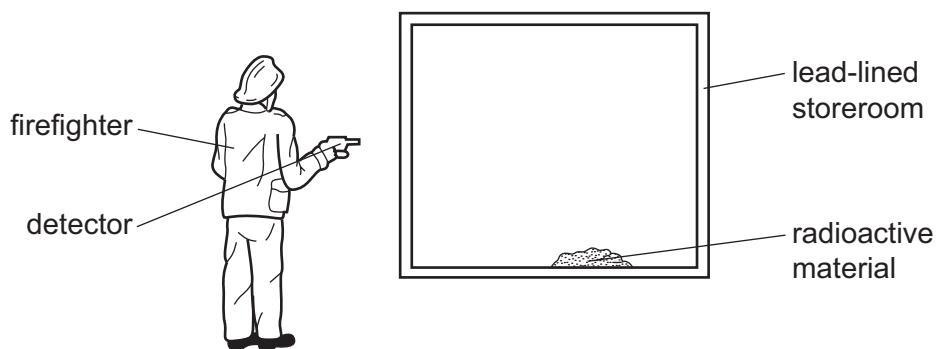


The poles of the magnet and the direction of the current are both reversed.

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



- 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  $\alpha$ -particles
- B  $\beta$ -particles
- C  $\gamma$ -rays
- D X-rays









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

		Group													
		I	II	III	IV	V	VI	VII	VIII	IX	X	0			
		1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2			
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											19 <b>F</b> Fluorine 9			
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	5 <b>B</b> Boron 5	6 <b>C</b> Carbon 6	7 <b>N</b> Nitrogen 7	8 <b>O</b> Oxygen 8	9 <b>Ne</b> Neon 10	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18	
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	27 <b>Fe</b> Iron 26	28 <b>Ni</b> Nickel 28	29 <b>Cu</b> Copper 29	30 <b>Zn</b> Zinc 30	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36	51 <b>In</b> Indium 49	52 <b>Tl</b> Thallium 81	53 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	91 <b>Ti</b> Titanium 22	92 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	94 <b>Hf</b> Hafnium 72	101 <b>Ru</b> Ruthenium 44	102 <b>Rh</b> Rhodium 45	103 <b>Pd</b> Palladium 46	104 <b>Ag</b> Silver 47	105 <b>Cd</b> Cadmium 48	106 <b>Pt</b> Platinum 78	107 <b>Au</b> Gold 79	108 <b>Hg</b> Mercury 80	127 <b>Te</b> Tellurium 52	128 <b>Pb</b> Lead 82
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71
87 <b>Fr</b> Francium		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71
		232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92

\*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<sup>3</sup> at room temperature and pressure (r.t.p.).

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