

CO-ORDINATED SCIENCES (DOUBLE) (US)

0442/13

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)

* 6 9 0 3 3 8 5 9 5 7 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

Write your name, Center 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.

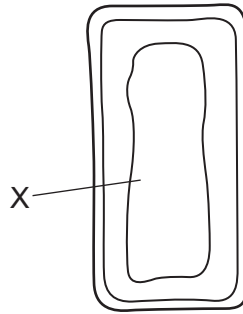
Any rough working should be done in this booklet.

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.



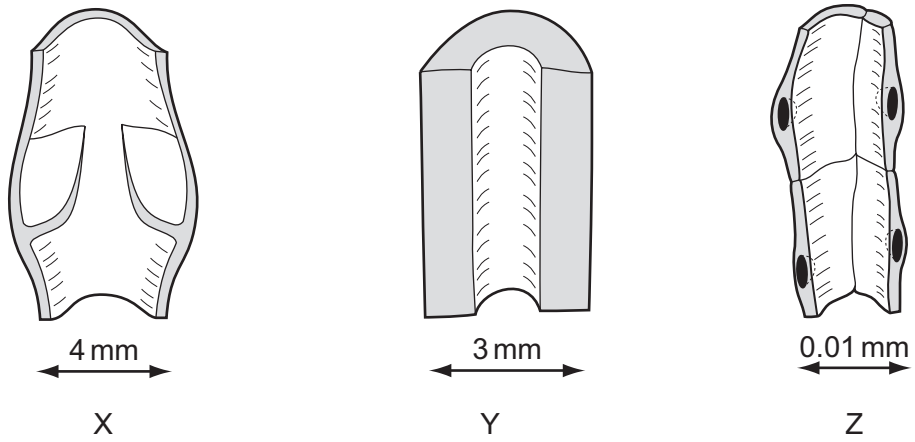
What will be found in the part labeled X?

- 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 catalyze 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.

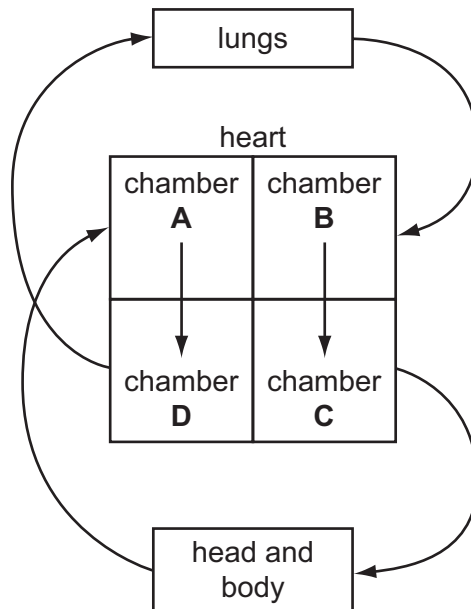


What are X, Y and Z?

	X	Y	Z
A	artery	capillary	vein
B	artery	vein	capillary
C	vein	artery	capillary
D	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 neuron
 B relay neuron
 C sensory neuron
 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

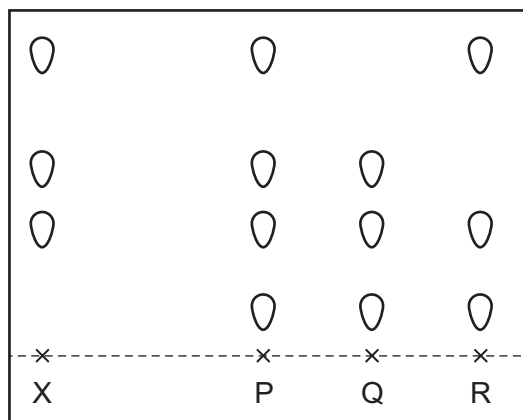
Which statement describes a member of this food chain?

- 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 colored substances.

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

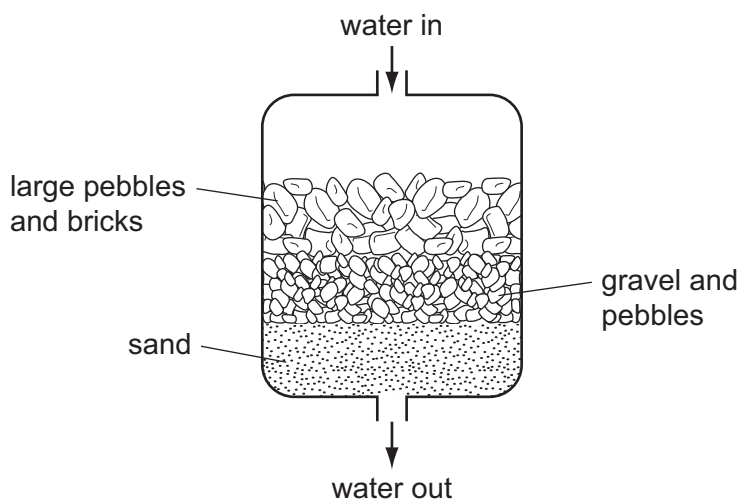
The results are shown in the diagram.



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 crystallization
C distillation
D filtration
- 17 Diagrams 1, 2, 3 and 4 represent atoms and molecules.

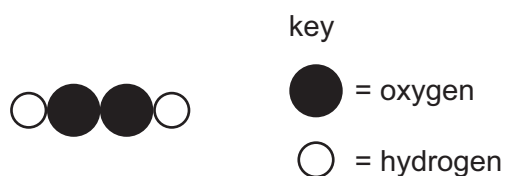


Which statement is correct?

- 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** H₂O₂ **C** (OH)₂ **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
A	W	Y	X
B	X	W	Y
C	Y	W	X
D	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
A	endothermic	decreases
B	endothermic	increases
C	exothermic	decreases
D	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)

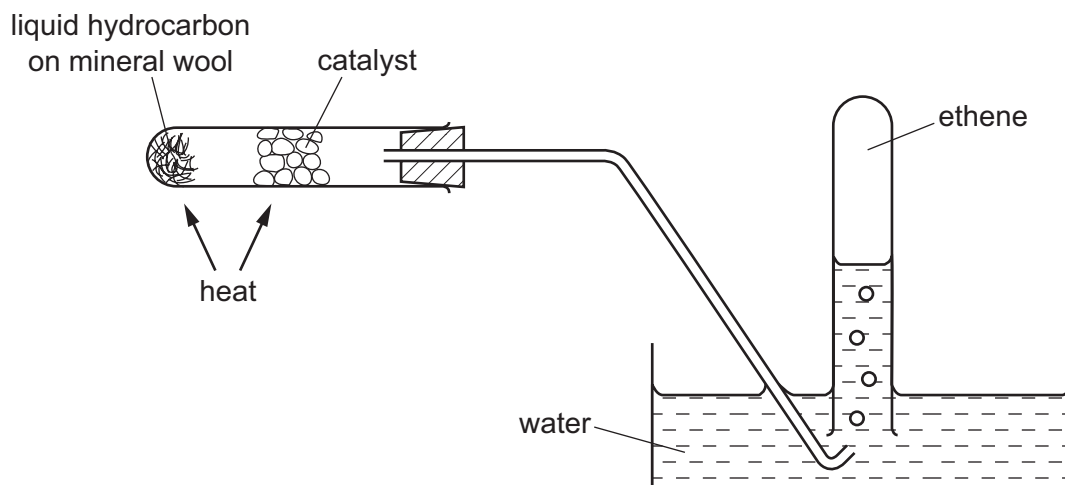
23 Why is aluminum used to make food containers?

- 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.

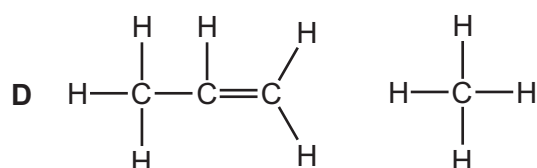
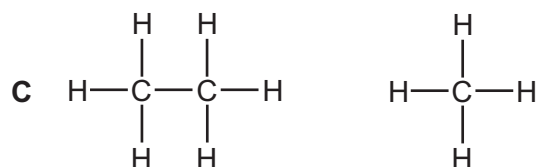
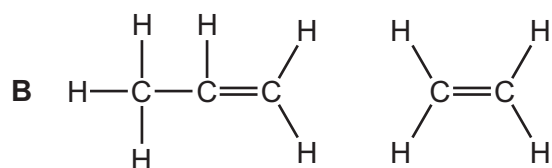
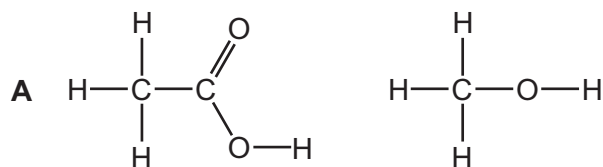
25 The diagram shows an experiment on a liquid hydrocarbon.



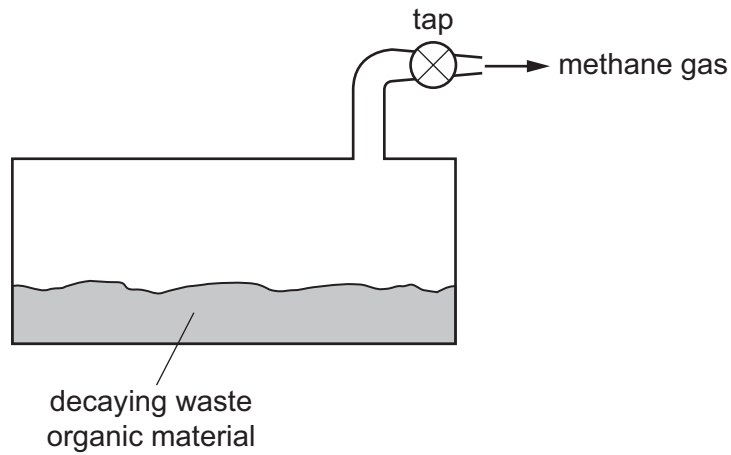
Which change takes place?

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

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



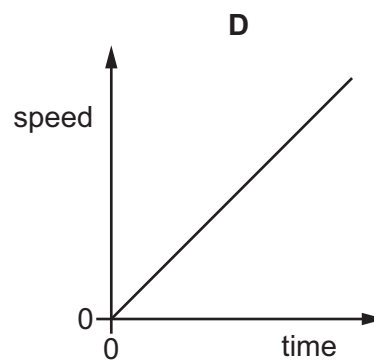
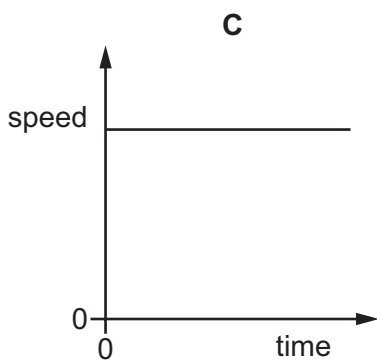
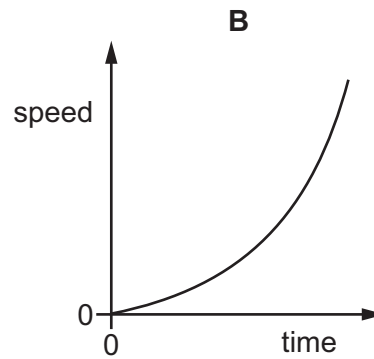
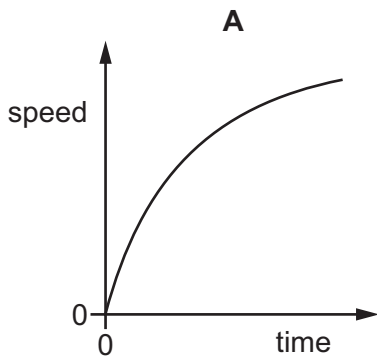
27 The diagram shows waste organic material decaying.



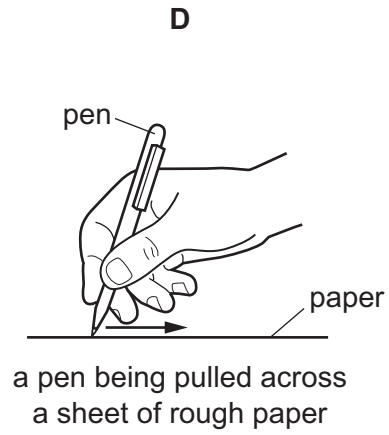
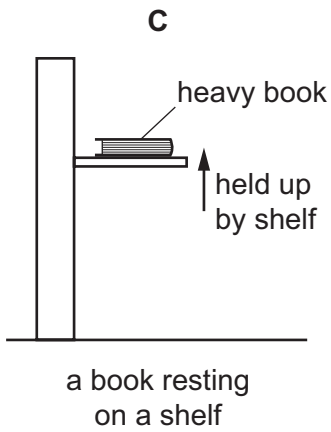
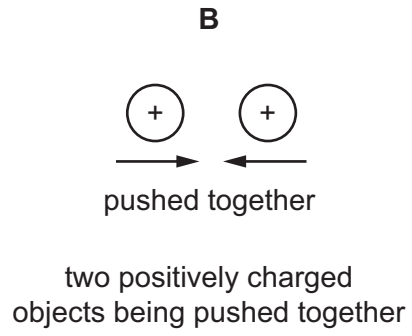
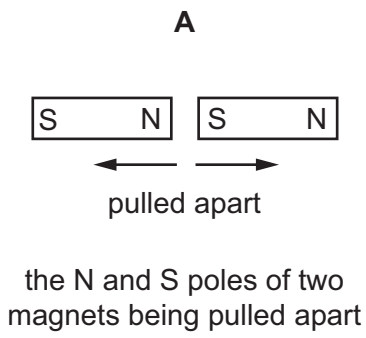
What is formed when the gas, methane, is burned?

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

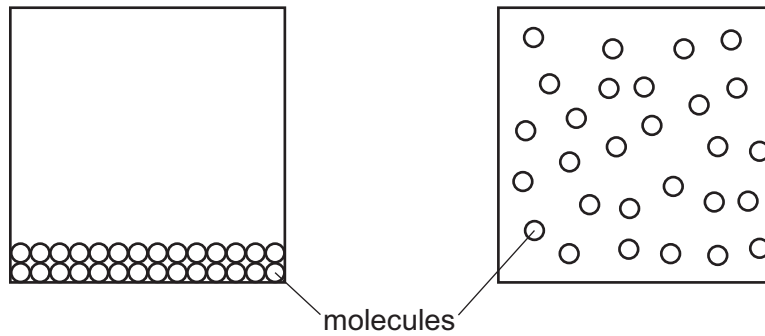
28 Which speed/time graph represents an object moving with constant positive acceleration?



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

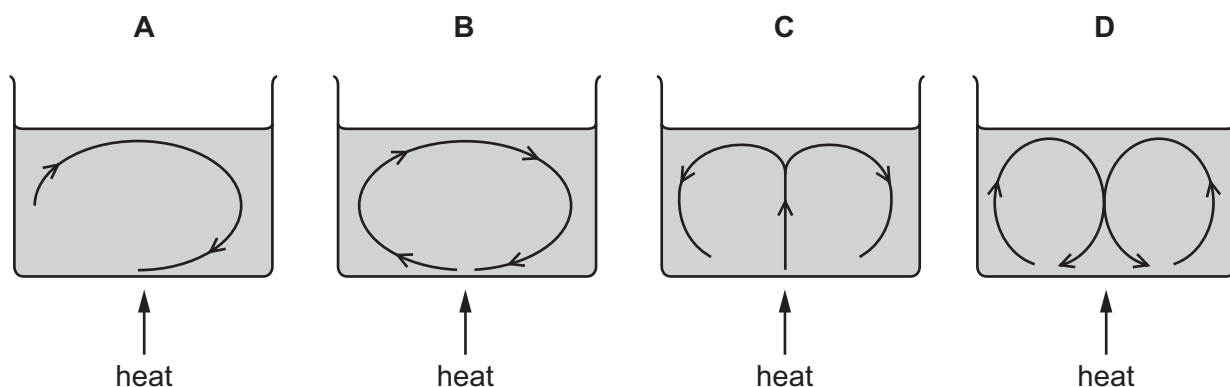
31 Four students write statements about melting and boiling.

Which statement is **not** correct?

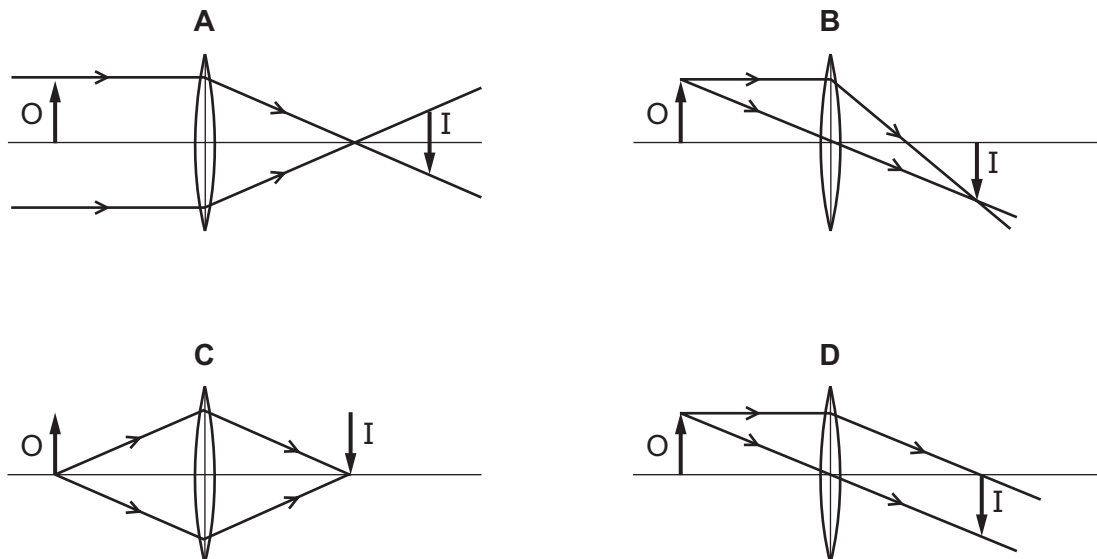
- A A liquid only evaporates when it has reached its boiling point.
- B Heat energy is needed to melt a solid.
- C When a solid is melting, its temperature does not change.
- D When a substance is a liquid, its temperature will not rise above its boiling point.

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?

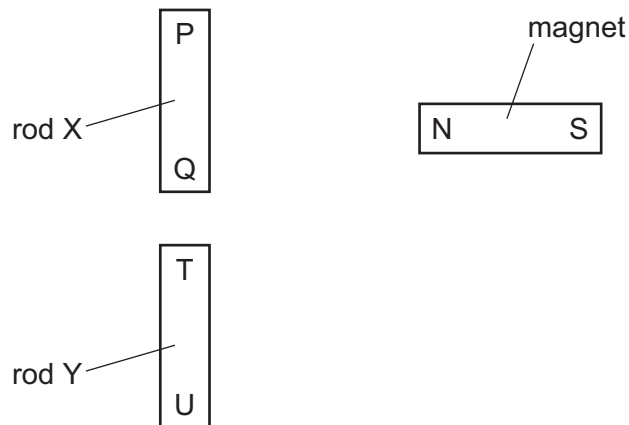
	shortest wavelength	—————▶	longest wavelength
A	γ -rays	radio waves	visible light
B	γ -rays	visible light	radio waves
C	visible light	γ -rays	radio waves
D	visible light	radio waves	γ -rays

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.



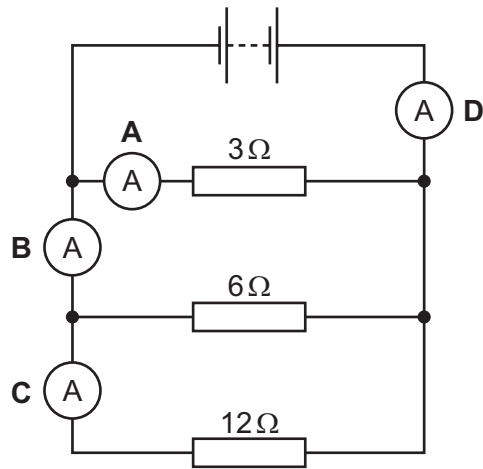
The N pole of a magnet is brought close, in turn, to P, Q, T and U. The results of these four actions are shown in the table.

end tested	result
P	attraction
Q	attraction
T	attraction
U	repulsion

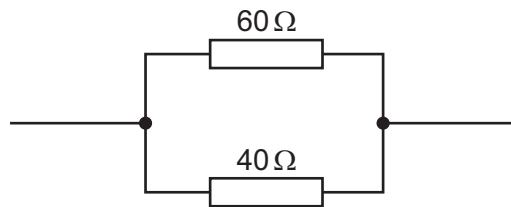
Which of the rods is a permanent magnet, with a pole at each end?

- 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?



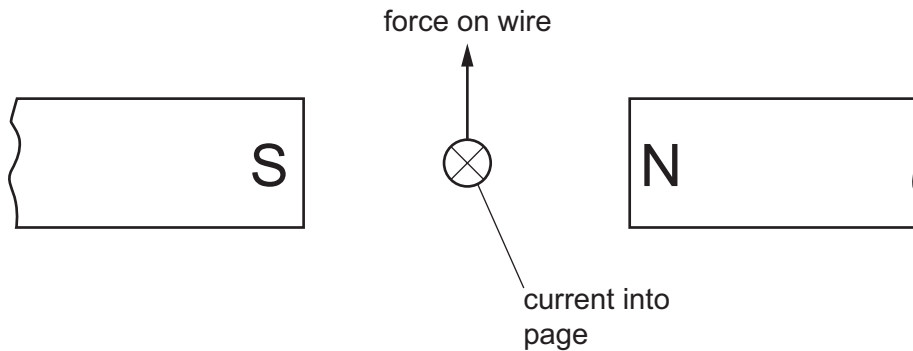
- 38 A $60\ \Omega$ resistor and a $40\ \Omega$ resistor are connected in parallel.



What is their combined resistance?

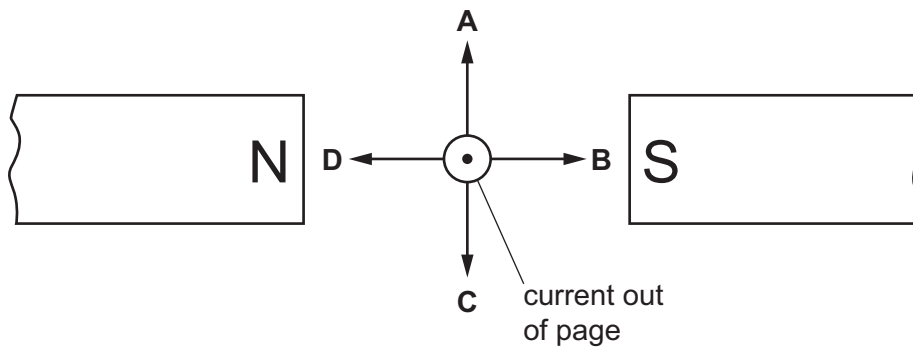
- A less than $40\ \Omega$
- B $50\ \Omega$
- C between $60\ \Omega$ and $100\ \Omega$
- D $100\ \Omega$

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

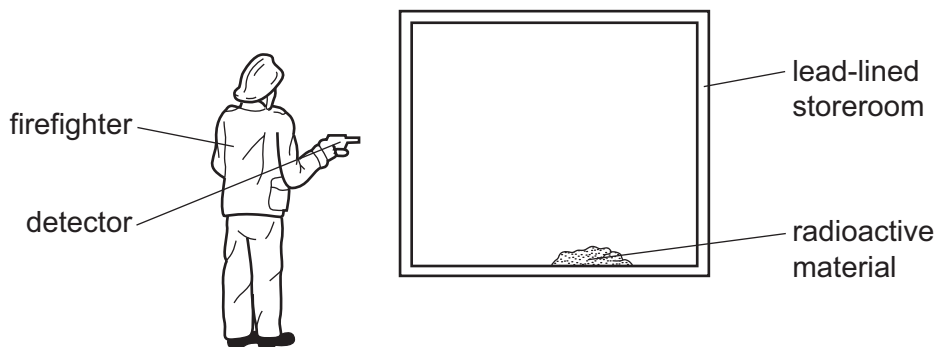


The poles of the magnet and the direction of the current are both reversed.

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



- 40 During a fire in a laboratory storeroom, some radioactive material is spilled. 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

DATA SHEET
The Periodic Table of the Elements

		Group																											
		I	II	III	IV	V	VI	VII	VIII	IX	X																		
		1 H Hydrogen 1																											
7	9	Li Lithium 3	Be Beryllium 4																										
23	24	Na Sodium 11	Mg Magnesium 12																										
39	40	K Potassium 19	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	88	Rb Rubidium 37	Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	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	137	Cs Caesium 55	Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	190 Os Osmium 76	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86												
87	226	Fr Francium 87	Ra Radium 88	227 Ac Actinium 89									†																
													*58-71 Lanthanoid series			†90-103 Actinoid series													
													140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	146 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	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	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	244 Pu Plutonium 94	244 Am Americium 95	244 Cm Curium 96	244 Bk Berkelium 97	244 Cf Californium 98	244 Es Einsteinium 99	244 Fm Fermium 100	244 Md Mendelevium 101	244 No Nobelium 102	244 Lr Lawrencium 103			

Key

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).