UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice **May/June 2013**

45 minutes

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

* 5 7 8 9 0 6 9 8 2 9 *

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.
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 **19** printed pages and **1** blank page.

1 Which characteristic of living organisms is represented in plants by photosynthesis?

A excretion

B nutrition

C respiration

D sensitivity

2 Which structural feature is found in the centre of a typical plant cell?

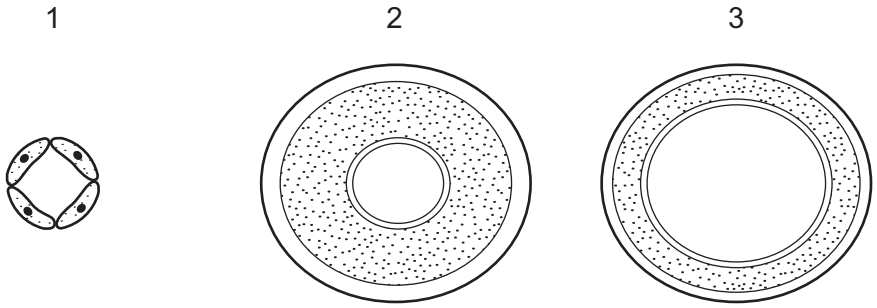
A cell membrane

B cytoplasm

C nucleus

D vacuole

3 The diagrams show three blood vessels in cross-section, not drawn to the same scale.

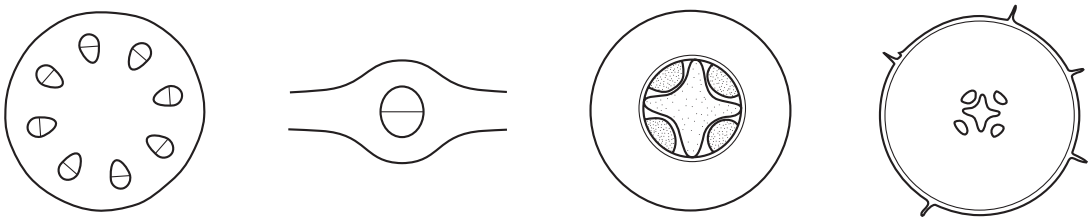


What are these vessels?

	1	2	3
A	artery	capillary	vein
B	artery	vein	capillary
C	capillary	artery	vein
D	capillary	vein	artery

4 The diagrams represent sections through a root, a stem and a leaf mid-rib, not drawn to the same scale.

P Q R S



In which row are the sections correctly identified?

	root	stem	leaf
A	P	Q	R
B	Q	R	P
C	R	P	Q
D	S	R	Q

5 The table shows the results of food tests on a breakfast cereal.

test	result
Benedict's	bright orange
iodine	dark blue
biuret	pale blue
ethanol	slightly milky solution

What do these results show?

A The cereal helps to reduce body weight.

B The cereal is a source of energy.

C The cereal is a source of vitamin C.

D The cereal promotes muscle growth.

6 Which statement about sexual reproduction is correct?

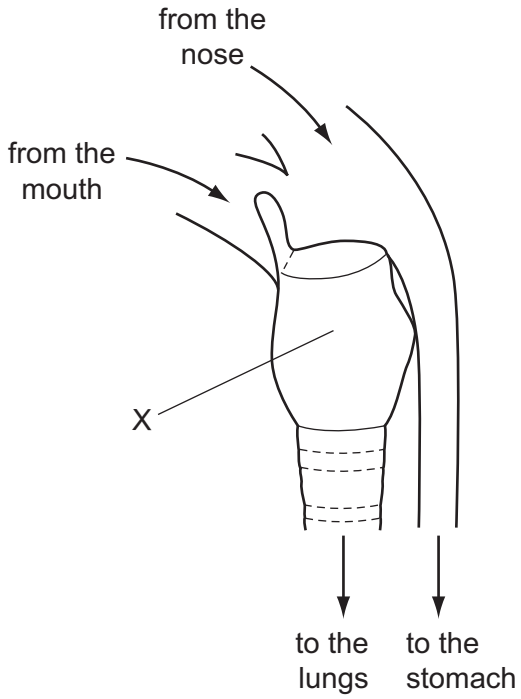
A It involves the formation of a haploid zygote.

B It involves the fusion of diploid nuclei.

C It produces offspring that are genetically dissimilar to their parents.

D It produces offspring that are genetically identical to one another.

7 The diagram shows structures in the throat.



What is X?

A bronchus

B larynx

C oesophagus

D trachea

8 Which conditions would cause the fastest rate of transpiration in a plant?

	humidity	temperature
A	high	high
B	high	low
C	low	high
D	low	low

9 What is homeostasis?

A the maintenance of the body's external environment

B the maintenance of the body's internal environment

C the processes that produce heat in the body

D the removal of wastes from the body

10 When does fertilisation occur in humans?

A when an egg nucleus begins to divide

B when a sperm enters an egg cell membrane

C when a sperm nucleus joins with an egg nucleus

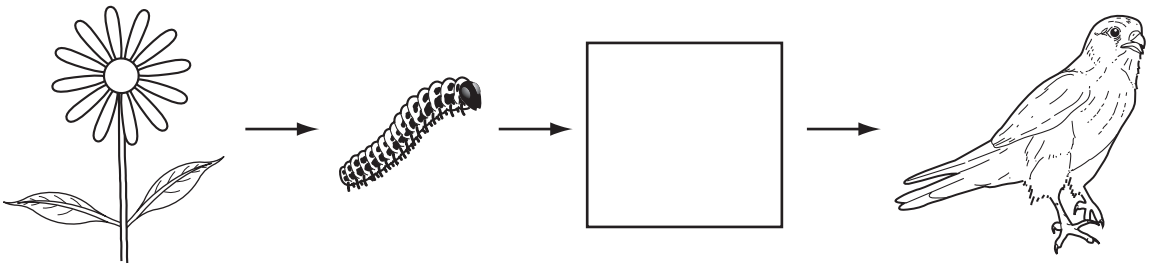
D when sperms are released inside the female

11 An organism has 28 chromosomes in each body cell.

How many chromosomes would there be in a gamete of the same organism?

A 7 **B** 14 **C** 28 **D** 56

12 The diagram shows a food chain.



What does the empty box represent?

A consumer

B herbivore

C photosynthesis

D producer

13 Which chemical contains carbon atoms that are involved in the carbon cycle?

A ammonia

B protein

C sulfuric acid

D water

14 Pure copper chloride can be obtained from a mixture of powdered copper and copper chloride.

Three stages in the method are listed.

P add water and stir

Q crystallise

R filter

In which order should these stages be carried out to obtain pure copper chloride from the mixture?

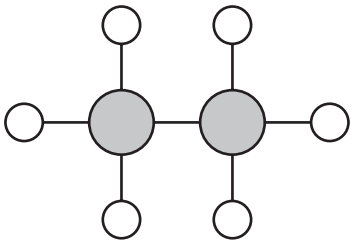
A P → Q → R

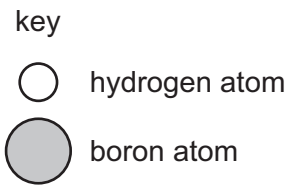
B P → R → Q

C Q → R → P

D R → P → Q

15 A model of a molecule is shown.





Which row shows the formula and describes the bonding in this molecule?

	formula	bonding
A	$2BH_3$	covalent
B	$2BH_3$	ionic
C	B_2H_6	covalent
D	B_2H_6	ionic

16 Which react(s) with ammonia?

	hydrochloric acid	sodium hydroxide
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

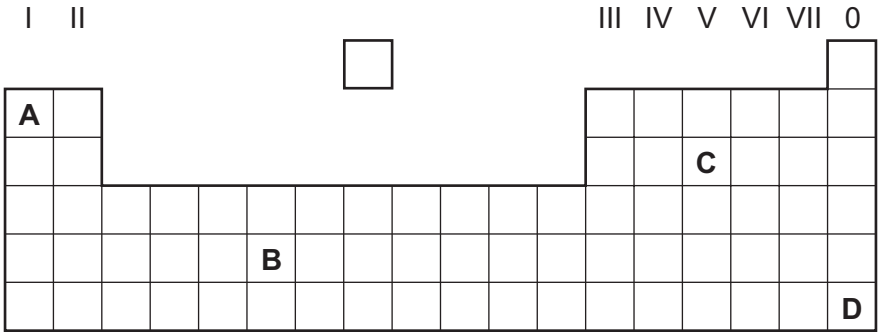
key

✓ = react

✗ = does not react

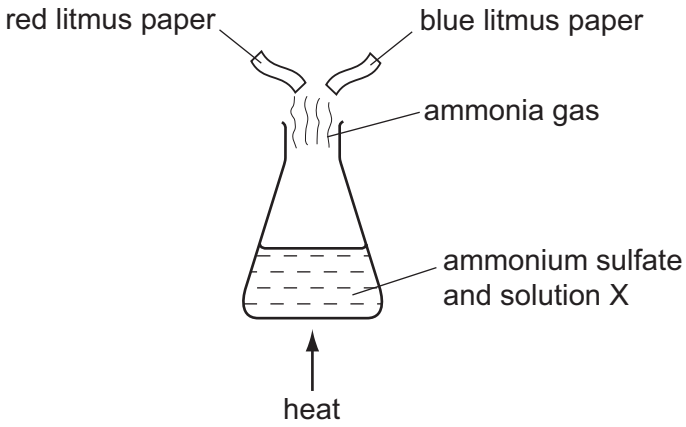
17 Element X is a very dense solid with a high melting point.

Which letter shows the position of X in the Periodic Table?



18 When ammonium sulfate is heated with solution X, ammonia gas is given off.

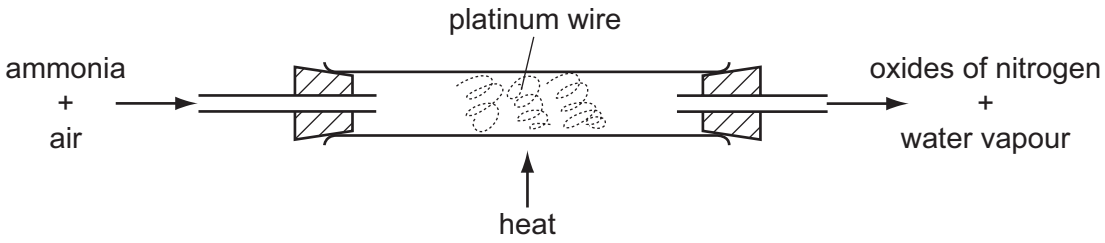
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas.



What is solution X and how does the colour of the litmus paper change?

	solution X	colour change of litmus paper
A	hydrochloric acid	blue to red
B	hydrochloric acid	red to blue
C	sodium hydroxide	blue to red
D	sodium hydroxide	red to blue

19 Ammonia is oxidised as shown.



The platinum is chemically unchanged at the end of the reaction.

What is the reason for using platinum?

A to absorb the heat from the reaction

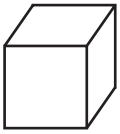
B to filter out oxygen from the air

C to increase the rate of the reaction

D to neutralise the ammonia

20 Three equal masses of potato are divided into differently-sized pieces.

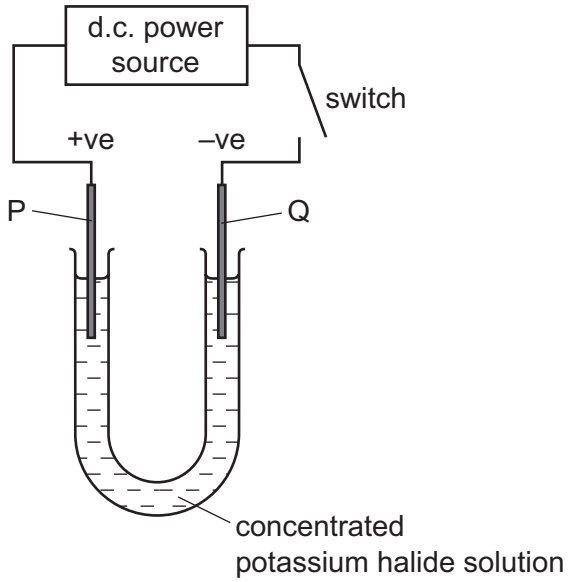
The three equal masses of pieces of potato are then cooked in equal volumes of oil.

test	temperature of oil / °C	size of potato pieces	cooking time / min
1	80		30
2	120		10
3	120		?

How long do the potato pieces take to cook in test 3?

A 10 min **B** 20 min **C** 30 min **D** 40 min

21 The diagram shows the electrolysis of a compound.



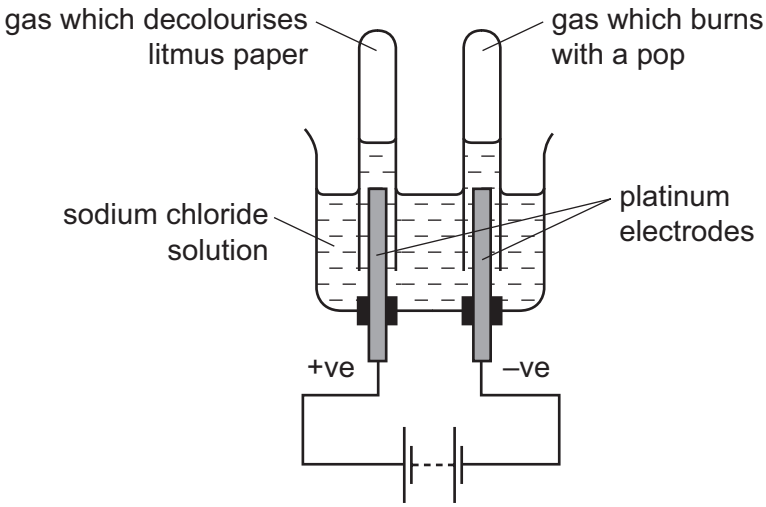
When the switch is closed, the solution near electrode P turns brown because a halogen is formed.

The positive electrode P is called the ……1……, and the halogen is ……2…… .

	1	2
A	anode	bromine
B	anode	chlorine
C	cathode	bromine
D	cathode	chlorine

22 Sodium chloride solution is electrolysed and a gas is collected at each electrode.

One gas decolourises moist litmus paper, the other gas burns with a pop.



Which statement is correct?

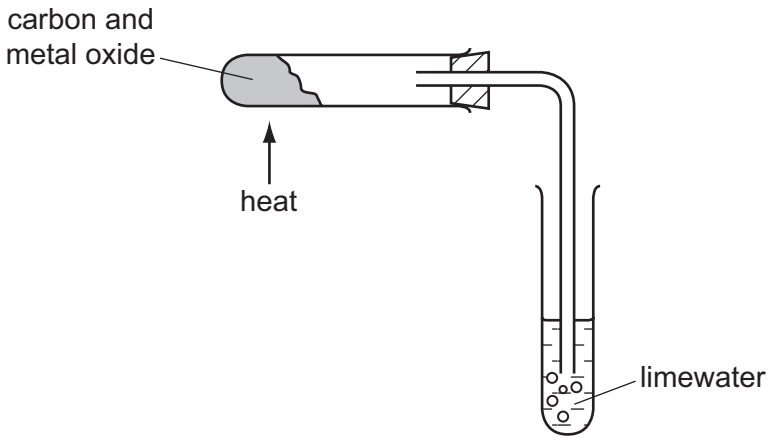
A Chlorine gas is collected at the anode.

B Hydrogen gas is collected at the anode.

C Oxygen gas is collected at the cathode.

D Sodium is formed at the cathode.

23 A metal oxide is mixed with carbon and heated as shown.



The limewater turns cloudy.

Which term describes what happens to the metal oxide?

A combustion

B neutralisation

C oxidation

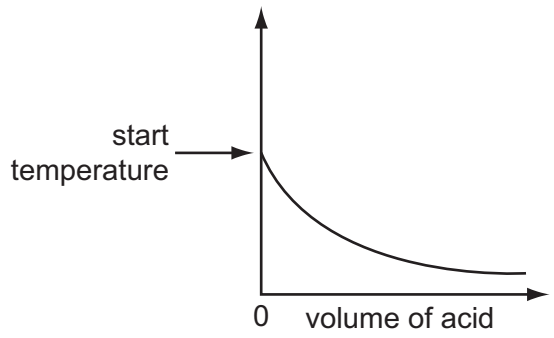
D reduction

24 An acid is added to an alkali until the final solution is **just** neutral.

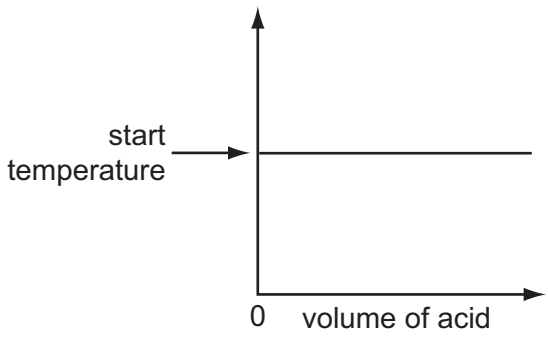
The reaction is exothermic.

Which graph shows how the temperature changes as the acid is added to the alkali?

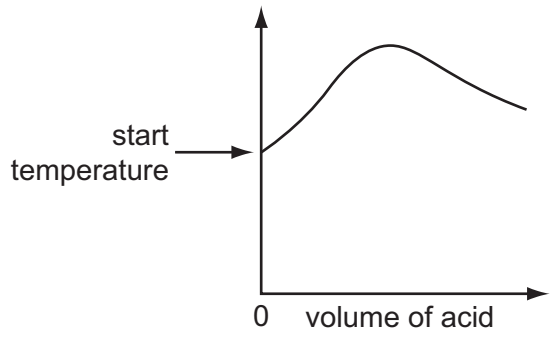
A



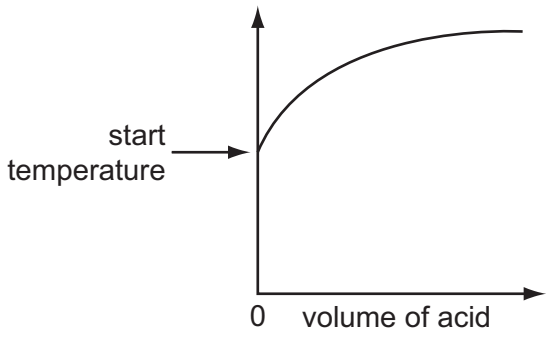
B



C



D



25 Which equation represents the decomposition of limestone into lime?

A $CaCO_3 \rightarrow CaO + CO_2$

B $CaCO_3 + H_2O \rightarrow Ca(OH)_2 + CO_2$

C $CaCO_3 + O_2 \rightarrow CaO_3 + CO_2$

D $Ca(OH)_2 \rightarrow CaO + H_2O$

26 Duralumin and magnalium are alloys used in the manufacture of aircraft.

They both contain aluminium and another metallic element.

The alloys are made up of ……1…… of each element.

They are used because they are ……2…… than the pure metals.

Which words complete gaps 1 and 2?

	1	2
A	atoms	harder
B	atoms	softer
C	molecules	harder
D	molecules	softer

27 Which gas emitted from a car exhaust contributes to acid rain?

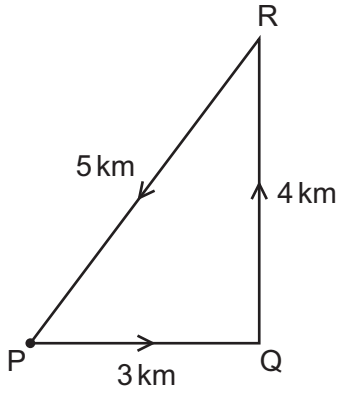
A carbon monoxide, CO

B nitrogen, N_2

C nitrogen oxide, NO_x

D water vapour, H_2O

28 A cyclist takes 15 minutes to travel along the path PQRP.

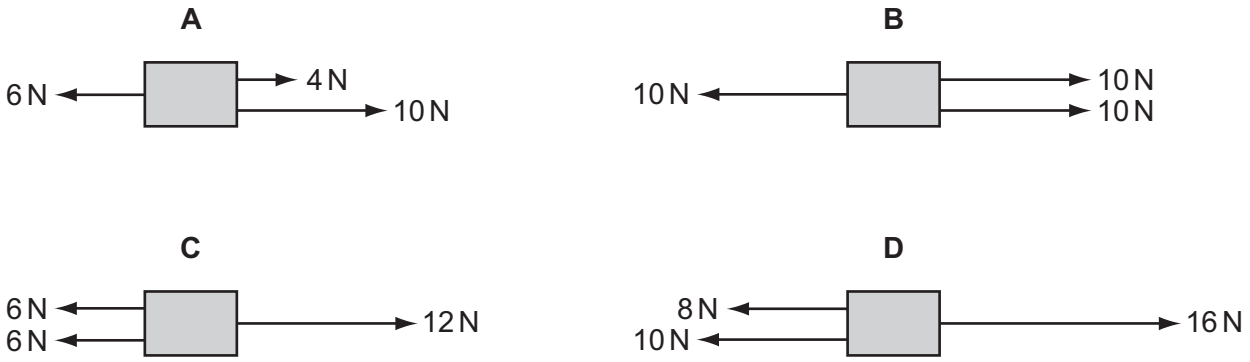


What is the average speed of the cyclist?

A 0 km / hour **B** 12 km / hour **C** 20 km / hour **D** 48 km / hour

29 Three forces act in the directions shown on each of the four blocks.

Which block is in equilibrium?



30 Electricity is generated in power stations. Many power stations use high pressure steam to drive the turbines.

Some power stations do not use high pressure steam.

Which type of power station does **not** use high pressure steam?

A chemical energy (fuel) power stations

B geothermal energy power stations

C hydroelectric energy power stations

D nuclear energy power stations

31 Gas is contained in a cylinder and exerts a pressure on the cylinder.

The speed of the gas molecules is reduced.

Which row shows what happens to the temperature of the gas and to the pressure exerted by the gas on the cylinder?

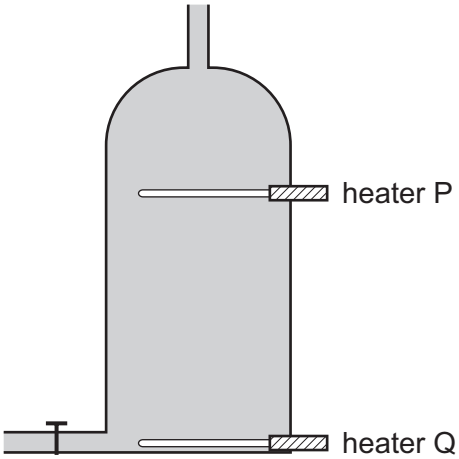
	temperature	pressure
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

32 A substance is a gas when its temperature is 65 °C.

How do the boiling point and the melting point of this substance compare with 65 °C?

	boiling point	melting point
A	above 65 °C	above 65 °C
B	above 65 °C	below 65 °C
C	below 65 °C	above 65 °C
D	below 65 °C	below 65 °C

33 A hot water tank is fitted with two identical heaters P and Q. Heater P is two thirds of the way up the tank and heater Q is at the very bottom. The tank is full of cold water.



When only heater Q is switched on, it takes a long time to heat the tank of water to the required temperature of 60 °C.

What happens to the tank of cold water if only heater P is switched on?

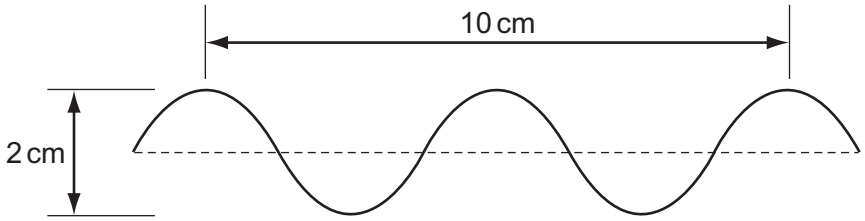
A All the water reaches 60 °C in less time than before.

B All the water reaches 60 °C in the same time as before.

C The bottom two thirds of the water reaches 60 °C in two thirds of the original time.

D The top one third of the water reaches 60 °C in one third of the original time.

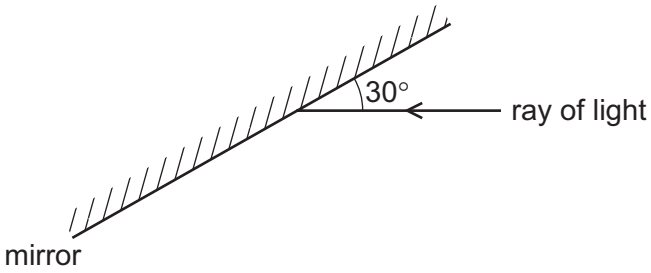
34 The diagram shows a wave.



What is the amplitude of the wave?

A 1 cm **B** 2 cm **C** 5 cm **D** 10 cm

35 A ray of light strikes a plane mirror.



What is the angle of reflection of the ray?

A 150° **B** 90° **C** 60° **D** 30°

36 Which row shows the type of electromagnetic wave used in each application?

	television remote controllers	satellite television (link to satellite)
A	infrared	microwaves
B	infrared	radio waves
C	microwaves	microwaves
D	microwaves	radio waves

37 Which change to a sound wave would make it louder?

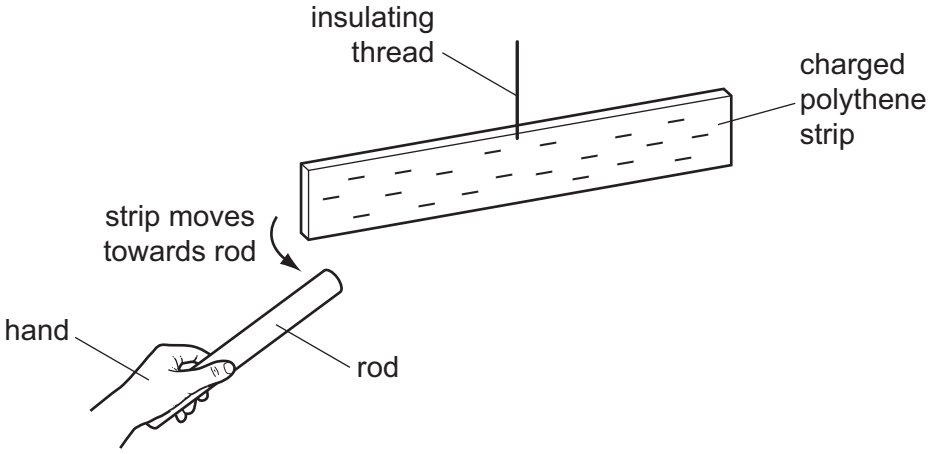
A decreasing the amplitude

B increasing the amplitude

C decreasing the wavelength

D increasing the wavelength

38 A rod is rubbed with a dry piece of cloth. A scientist holds the rod in her hand and brings it close to a negatively charged polythene strip. The strip is suspended by an insulating thread.



As the rod approaches the polythene strip, the strip moves towards the rod.

Which statement is correct?

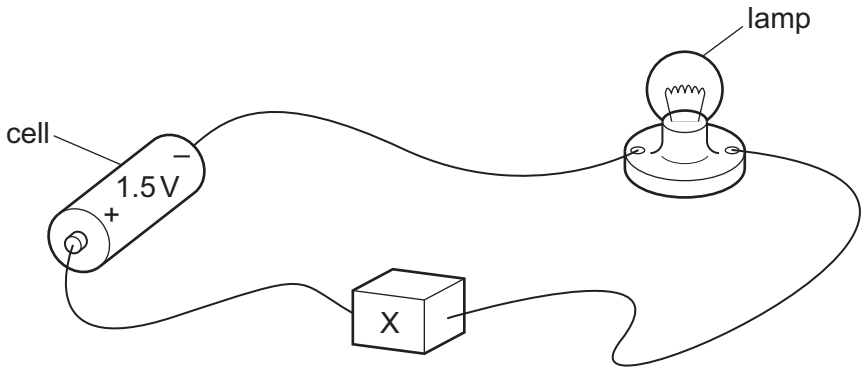
A The rod is a negatively charged electrical conductor.

B The rod is a negatively charged electrical insulator.

C The rod is a positively charged electrical conductor.

D The rod is a positively charged electrical insulator.

39 In the circuit, component X is used to control the brightness of the lamp.



What is component X?

A an ammeter

B a fixed resistor

C a fuse

D a variable resistor

40 Which row correctly compares the number of neutrons in atoms of two different isotopes of an element and states whether the isotopes must be radioactive?

	number of neutrons	must be radioactive?
A	must be different	no
B	must be different	yes
C	must be the same	no
D	must be the same	yes

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
							1 H Hydrogen 1									4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 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 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	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 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	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	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*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^3 at room temperature and pressure (r.t.p.).