



**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.



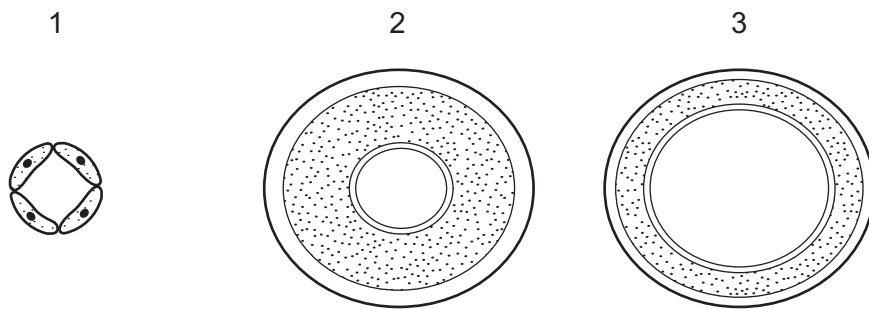
1 Which characteristic of living organisms is represented in plants by photosynthesis?

- 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

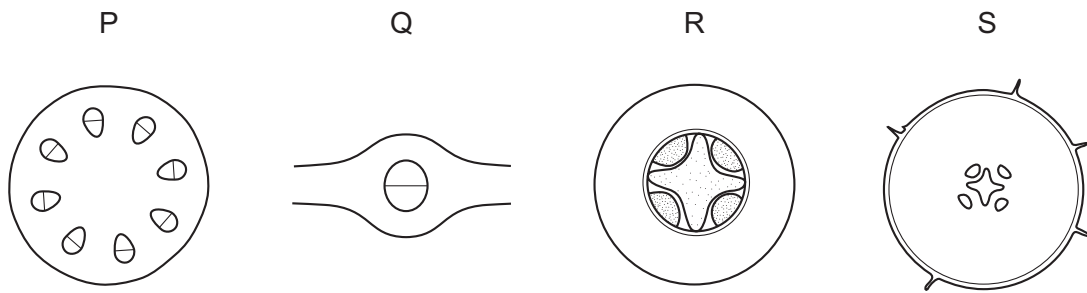
3 The diagrams show three blood vessels in cross-section, not drawn to the same scale.



What are these vessels?

	1	2	3
<b>A</b>	artery	capillary	vein
<b>B</b>	artery	vein	capillary
<b>C</b>	capillary	artery	vein
<b>D</b>	capillary	vein	artery

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



In which row are the sections correctly identified?

	root	stem	leaf
<b>A</b>	P	Q	R
<b>B</b>	Q	R	P
<b>C</b>	R	P	Q
<b>D</b>	S	R	Q

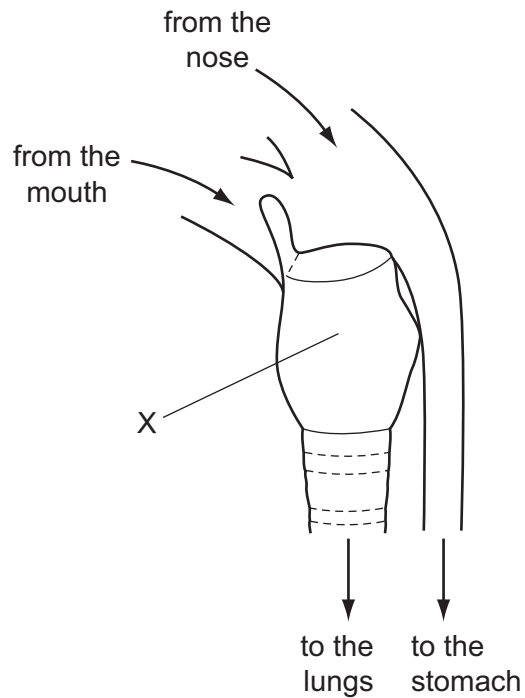
- 5 The table shows the results of food tests on a breakfast cereal.

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?

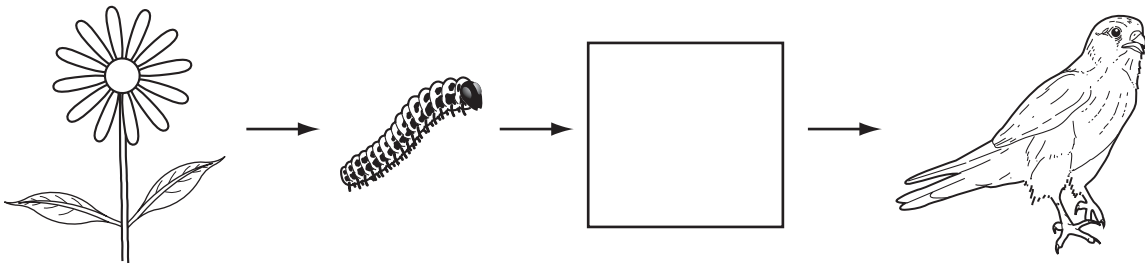
- A when an egg nucleus begins to divide
- B when a sperm enters an egg cell membrane
- C when a sperm nucleus joins with an egg nucleus
- D when sperms are released inside the female

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(II) 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?

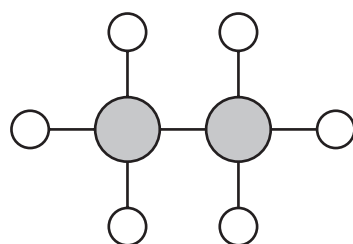
A P → Q → R

B P → R → Q

C Q → R → P

D R → P → Q

15 A model of a molecule is shown.



key

○ hydrogen atom

● boron atom

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

	formula	bonding
<b>A</b>	2BH <sub>3</sub>	covalent
<b>B</b>	2BH <sub>3</sub>	ionic
<b>C</b>	B <sub>2</sub> H <sub>6</sub>	covalent
<b>D</b>	B <sub>2</sub> H <sub>6</sub>	ionic

16 Which react(s) with ammonia?

	hydrochloric acid	sodium hydroxide
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

key

✓ = react

x = does not react

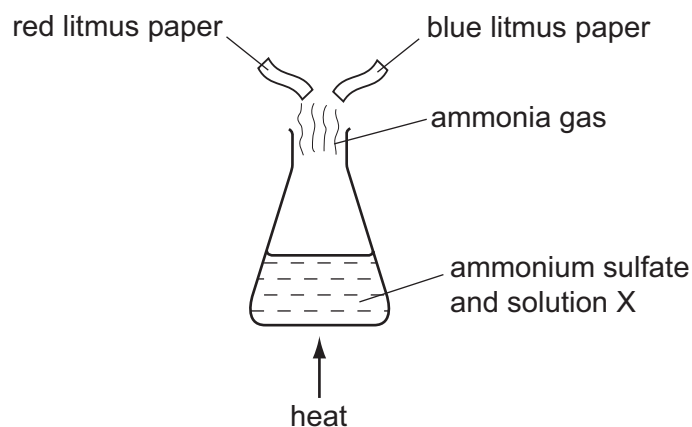
17 Element X is a very dense solid with a high melting point.

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

	I	II																III	IV	V	VI	VII	0	
	A																							
																								D

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

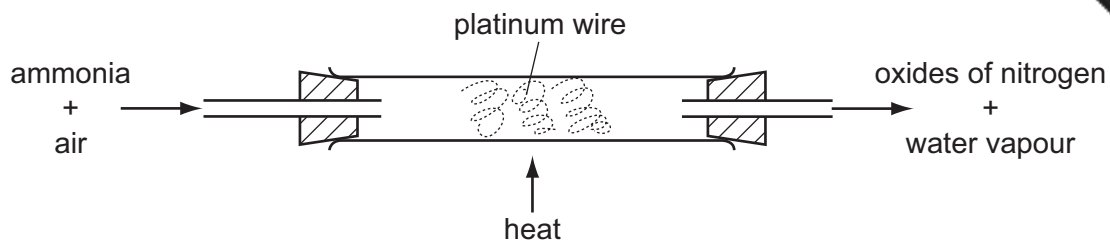
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas.



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

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

19 Ammonia is oxidised as shown.



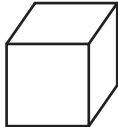


The platinum is chemically unchanged at the end of the reaction.

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.

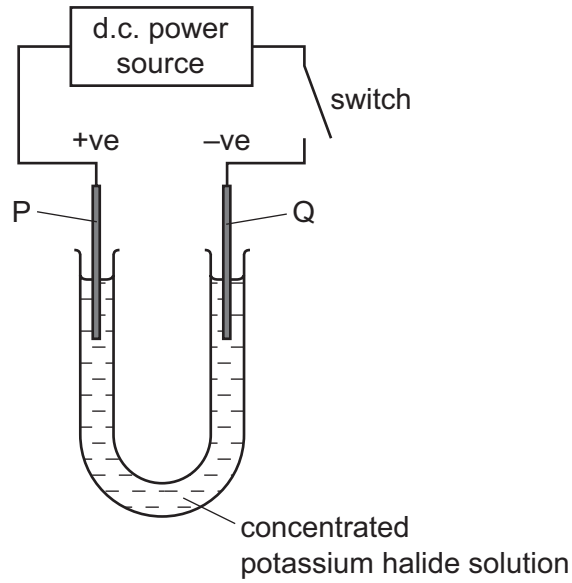
test	temperature of oil / °C	size of potato pieces	cooking time / min
1	80		30
2	120		10
3	120		?

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.



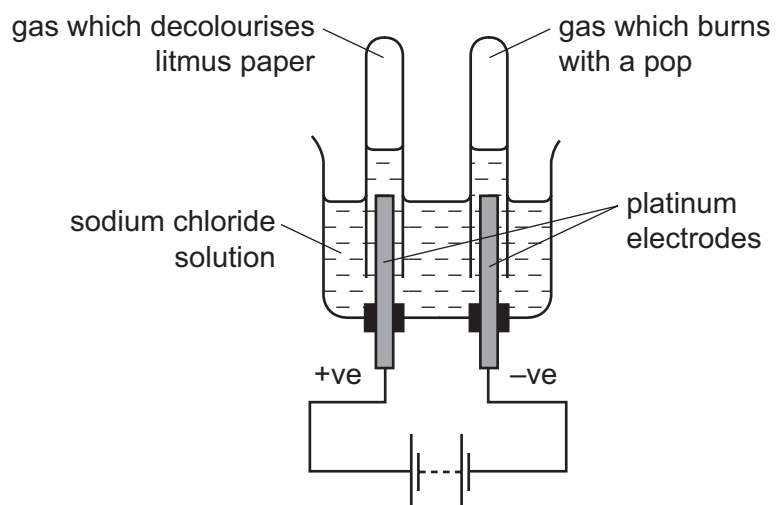
When the switch is closed, the solution near electrode P turns brown because a halogen is formed.

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

	1	2
<b>A</b>	anode	bromine
<b>B</b>	anode	chlorine
<b>C</b>	cathode	bromine
<b>D</b>	cathode	chlorine

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

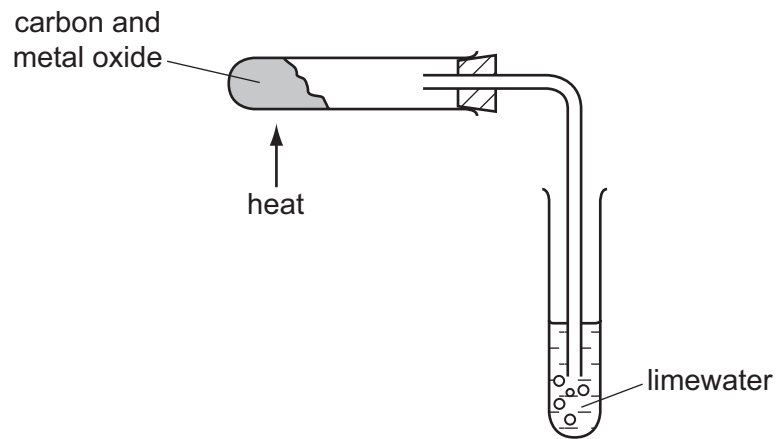
One gas decolourises moist litmus paper, the other gas burns with a pop.



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.

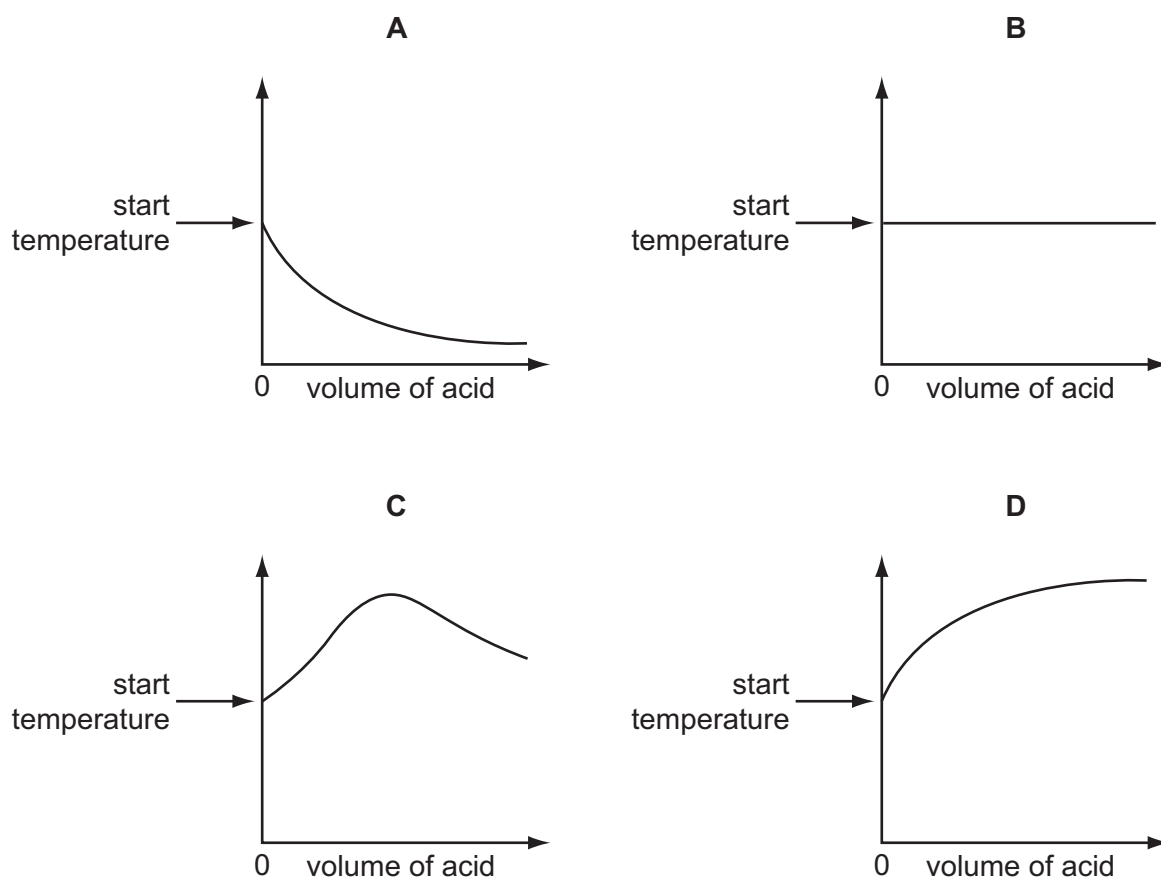
Which term describes what happens to the metal oxide?

- 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?



25 Which equation represents the decomposition of limestone into lime?

- A**  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
- B**  $\text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2 + \text{CO}_2$
- C**  $\text{CaCO}_3 + \text{O}_2 \rightarrow \text{CaO}_3 + \text{CO}_2$
- D**  $\text{Ca}(\text{OH})_2 \rightarrow \text{CaO} + \text{H}_2\text{O}$

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
<b>A</b>	atoms	harder
<b>B</b>	atoms	softer
<b>C</b>	molecules	harder
<b>D</b>	molecules	softer

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

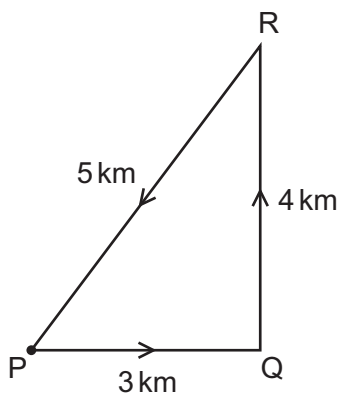
**A** carbon monoxide, CO

**B** nitrogen, N<sub>2</sub>

**C** nitrogen oxide, NO<sub>x</sub>

**D** water vapour, H<sub>2</sub>O

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



What is the average speed of the cyclist?

**A** 0 km/hour

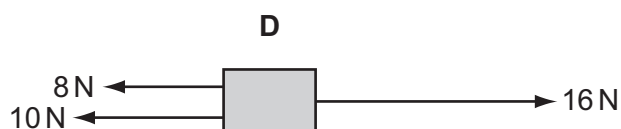
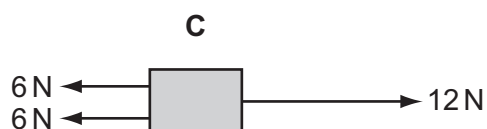
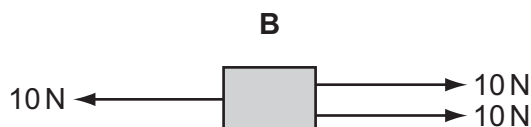
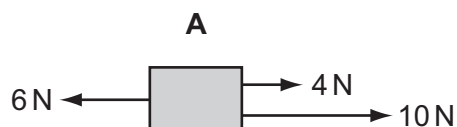
**B** 12 km/hour

**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?

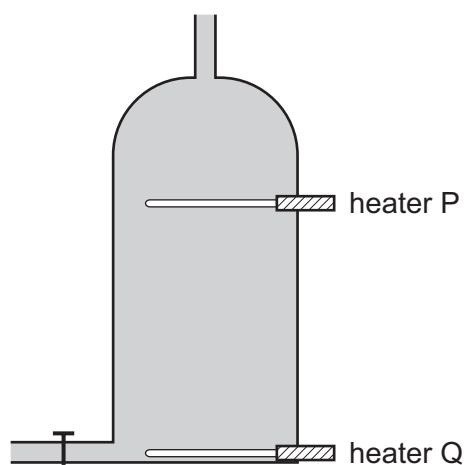
	temperature	pressure
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

32 A substance is a gas when its temperature is  $65^{\circ}\text{C}$ .

How do the boiling point and the melting point of this substance compare with  $65^{\circ}\text{C}$ ?

	boiling point	melting point
<b>A</b>	above $65^{\circ}\text{C}$	above $65^{\circ}\text{C}$
<b>B</b>	above $65^{\circ}\text{C}$	below $65^{\circ}\text{C}$
<b>C</b>	below $65^{\circ}\text{C}$	above $65^{\circ}\text{C}$
<b>D</b>	below $65^{\circ}\text{C}$	below $65^{\circ}\text{C}$

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.

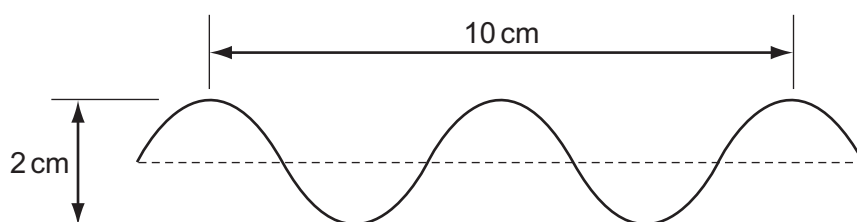


When only heater Q is switched on, it takes a long time to heat the tank of water to the required temperature of  $60^{\circ}\text{C}$ .

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

- A** All the water reaches  $60^{\circ}\text{C}$  in less time than before.
- B** All the water reaches  $60^{\circ}\text{C}$  in the same time as before.
- C** The bottom two thirds of the water reaches  $60^{\circ}\text{C}$  in two thirds of the original time.
- D** The top one third of the water reaches  $60^{\circ}\text{C}$  in one third of the original time.

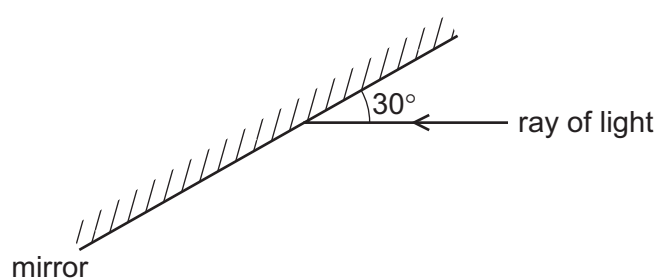
34 The diagram shows a wave.



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?

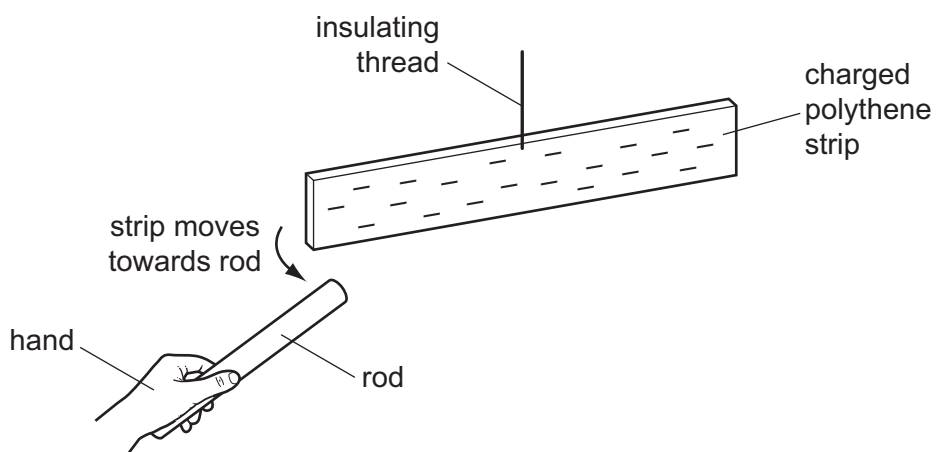
	television remote controllers	satellite television (link to satellite)
<b>A</b>	infrared	microwaves
<b>B</b>	infrared	radio waves
<b>C</b>	microwaves	microwaves
<b>D</b>	microwaves	radio waves

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



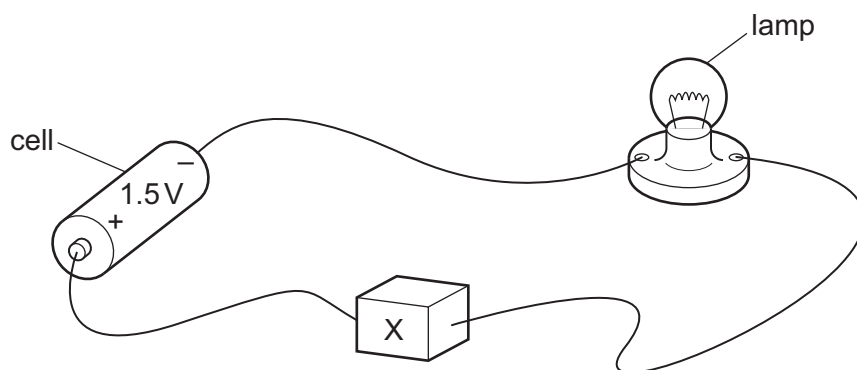
- 38 A rod is rubbed with a dry piece of cloth. A scientist holds the rod in her hand and brings it close to a negatively charged polythene strip. The strip is suspended by an insulating thread.



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 the same element and states whether the isotopes must be radioactive?

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



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

		Group												
I	II	III	IV	V	VI	VII	0							
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10						
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12		27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18						
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20		56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38		101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	103 <b>Rh</b> Rhodium 45	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53	128 <b>Te</b> Tellurium 52	131 <b>Xe</b> Xenon 54	
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56		186 <b>Os</b> Osmium 76	188 <b>Re</b> Rhenium 75	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86	
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
			232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103

\*58-71 Lanthanoid series  
†90-103 Actinoid series

Key

a    **X**    a = relative atomic mass

b    **X**    X = atomic symbol

**X**    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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