



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/01**

Paper 1 Multiple Choice

**May/June 2009**

**45 minutes**

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

\* 2 0 7 9 1 3 7 5 4 3 \*

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**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.

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.**

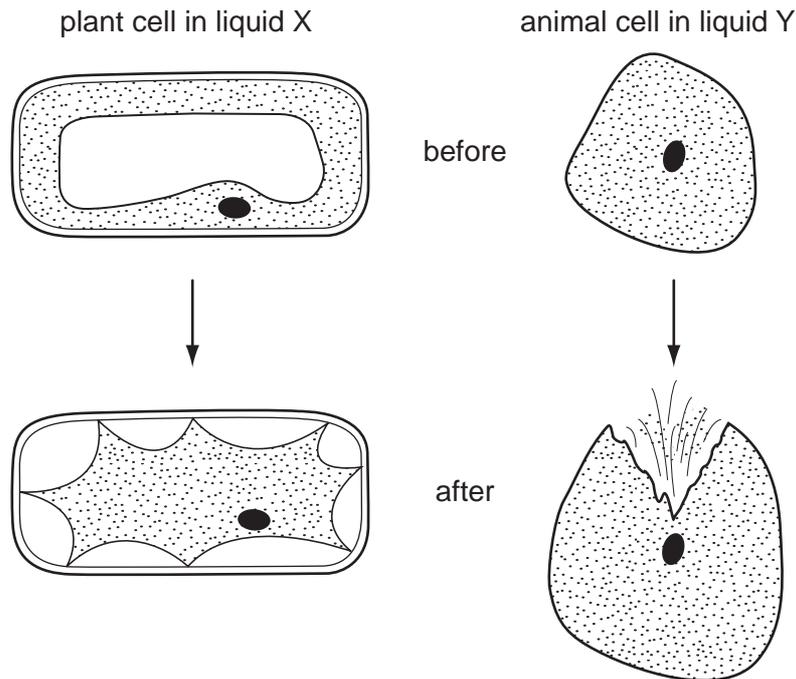
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.  
Any rough working should be done in this booklet.  
A copy of the Periodic Table is printed on page 20.

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



- 1 Which characteristic is shown by members of the same species?
- A They all live in the same place.
- B They are all identical in appearance.
- C They breed with each other to produce fertile offspring.
- D They cannot form clones.
- 2 The diagram shows a plant cell before and after being placed in liquid X for 30 minutes, and an animal cell before and after being placed in liquid Y for 30 minutes.

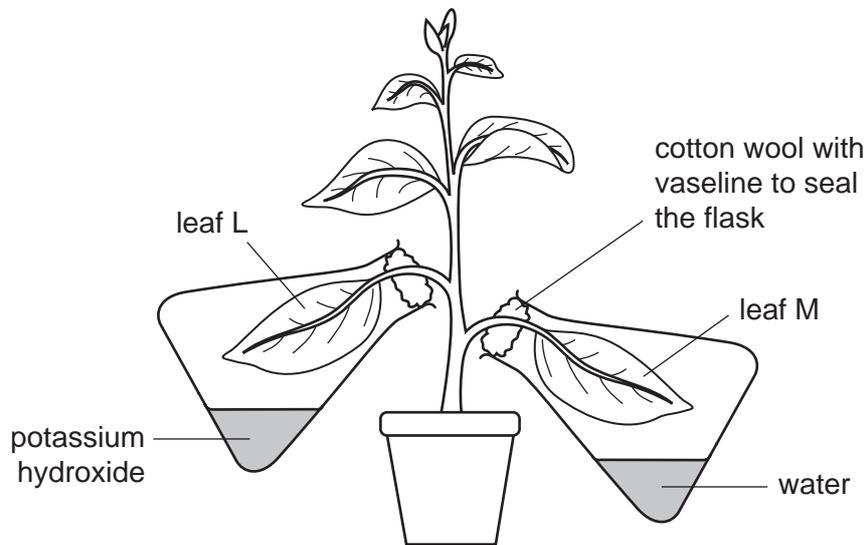


What describes liquids X and Y?

	X	Y
<b>A</b>	concentrated solution	concentrated solution
<b>B</b>	concentrated solution	pure water
<b>C</b>	pure water	concentrated solution
<b>D</b>	pure water	pure water

- 3 The diagram shows an experiment to investigate photosynthesis.

Potassium hydroxide absorbs carbon dioxide.

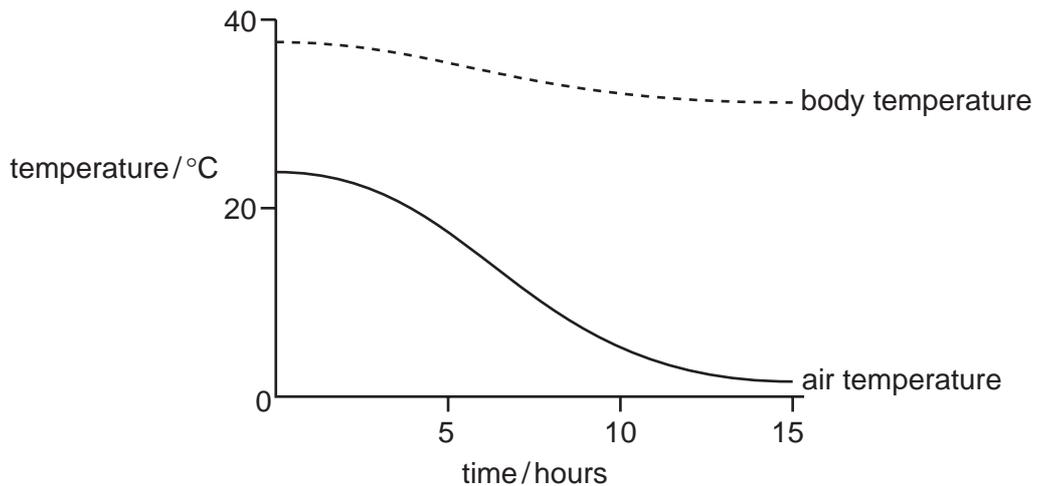


After standing in sunlight for 10 hours, leaf L contained no starch but leaf M contained a lot of starch.

What does this show?

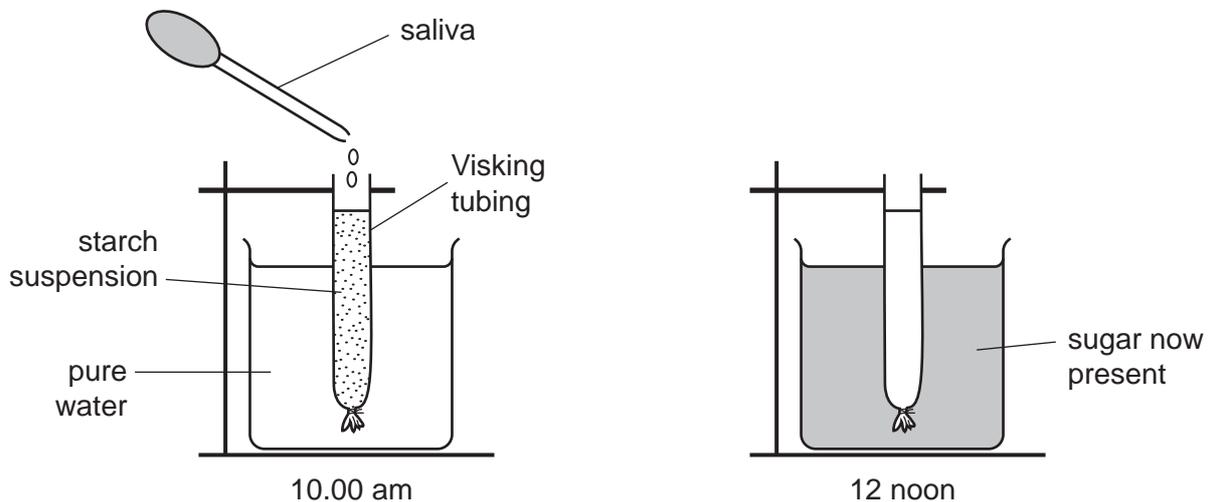
- A A leaf cannot make starch in a sealed flask.
  - B A leaf cannot make starch without carbon dioxide.
  - C A leaf cannot make starch without light.
  - D A leaf cannot make starch without oxygen.
- 4 Between which structures are the pleural membranes found?
- A bronchi and bronchioles
  - B diaphragm and ribs
  - C larynx and trachea
  - D lungs and intercostal muscles

- 5 The graph shows how a person's body temperature changes with changing air temperature.



Which process provides the energy for maintaining the body temperature as shown in the graph?

- A** breathing  
**B** digestion  
**C** excretion  
**D** respiration
- 6 The diagram shows a piece of Visking tubing (partially permeable) containing starch suspension, held in a beaker of pure water. Saliva, containing the enzyme amylase, is added to the starch and left for two hours.



What does the experiment show?

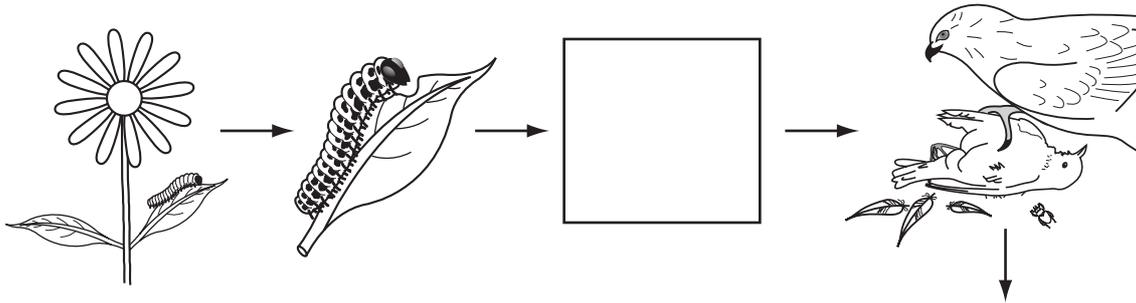
- A** Amylase is a solvent for starch.  
**B** Saliva passes through the Visking tubing.  
**C** Starch can be changed to sugar.  
**D** Starch is soluble in pure water.



- 11 Black coat colour in mice is dominant to white coat colour. A pure-bred black mouse is crossed with a white mouse.

What colour are the offspring?

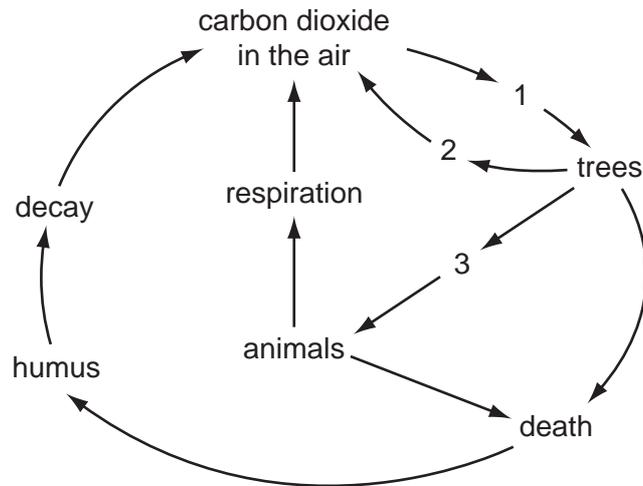
- A black only
  - B black and white
  - C grey
  - D white only
- 12 The diagram shows a food chain.



What does the empty box represent?

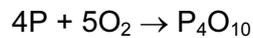
- A consumer
- B decomposer
- C photosynthesis
- D producer

- 13 The diagram shows part of the carbon cycle in a forest. The numbers represent processes.



Which of these processes is reduced in rate as a result of deforestation?

- A 1 only  
 B 1 and 2 only  
 C 2 and 3 only  
 D 1, 2 and 3
- 14 The element phosphorus burns in air, as shown.



What does the formula  $\text{P}_4\text{O}_{10}$  show?

- A a mixture of atoms of two elements  
 B a mixture of molecules of two elements  
 C a molecule of a compound  
 D an atom of a compound
- 15 Which types of oxide are formed by magnesium and sulfur?

	magnesium	sulfur
A	acidic	acidic
B	acidic	basic
C	basic	acidic
D	basic	basic

16 Which process produces molecules with longer chains?

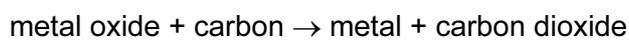
- A combustion of hydrocarbon
- B cracking
- C fractional distillation of crude oil
- D polymerisation

17 Proteins consist of long chains of .....1..... molecules and always contain the elements carbon, hydrogen, nitrogen and .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	amino acid	oxygen
<b>B</b>	amino acid	sulfur
<b>C</b>	glucose	oxygen
<b>D</b>	glucose	sulfur

18 The equation for the extraction of a metal from its oxide can be written as shown.



Which statements about this reaction are correct?

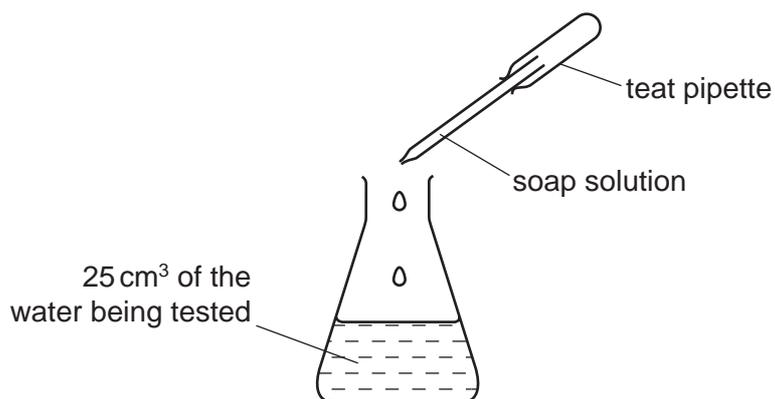
	the metal oxide is reduced	the carbon is oxidised
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

19 Aqueous sodium chloride is electrolysed on a large scale.

Which three substances are manufactured in this way?

- A acid, chlorine and hydrogen
- B acid, chlorine and oxygen
- C alkali, chlorine and hydrogen
- D alkali, chlorine and oxygen

- 20 The diagram shows an experiment to test the hardness of separate samples of distilled water and boiled tap water.



Soap solution is added, shaking after each drop, until a lather is formed.

Which results could be correct?

	number of drops of soap solution used		
	distilled water	tap water	boiled tap water
<b>A</b>	2	5	10
<b>B</b>	2	10	5
<b>C</b>	5	10	2
<b>D</b>	10	5	2

- 21 The waste from a factory is acidic. The factory treats the waste with lime.

Which pH change takes place?

	pH of waste	pH of treated waste
<b>A</b>	6	5
<b>B</b>	6	7
<b>C</b>	8	7
<b>D</b>	8	9

- 22 From which carbonate is lime manufactured?

- A** calcium carbonate
- B** lead(II) carbonate
- C** magnesium carbonate
- D** zinc carbonate

23 Which metal is used with aqueous sodium hydroxide to test for nitrate ions in solution?

- A aluminium
- B copper
- C magnesium
- D tin

24 What is an analgesic?

- A an alloy
- B an antacid
- C a monomer
- D a painkiller

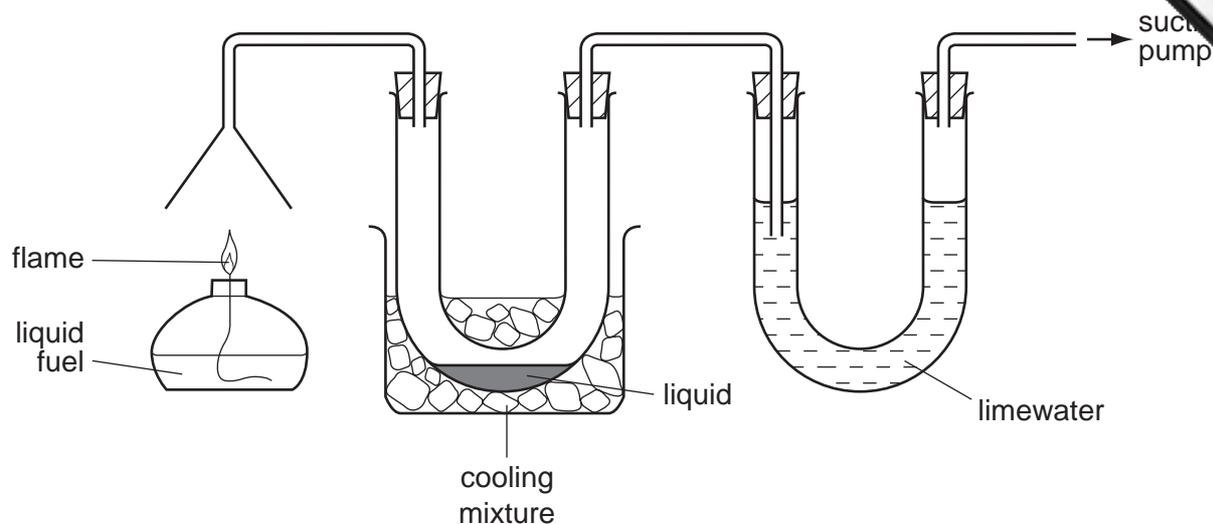
25 A sample of clay is stirred in a beaker of water.

When light is shone through the beaker, the light is scattered.

What does the experiment show?

- A An emulsion has been formed.
- B Clay in water forms a colloid.
- C Clay in water forms a gel.
- D Water dissolves clay particles.

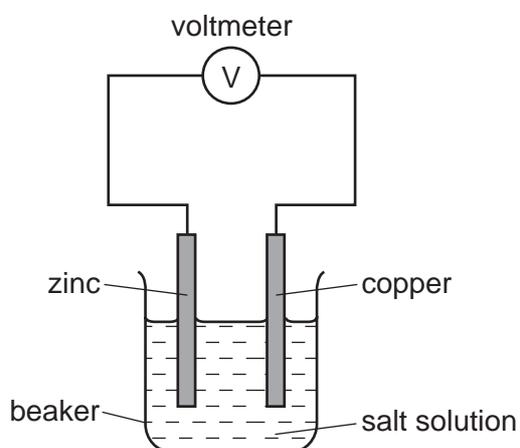
26 A liquid fuel is burned using the following apparatus.



What is being tested for in the gases produced by the burning fuel?

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

27 The diagram shows a simple cell.



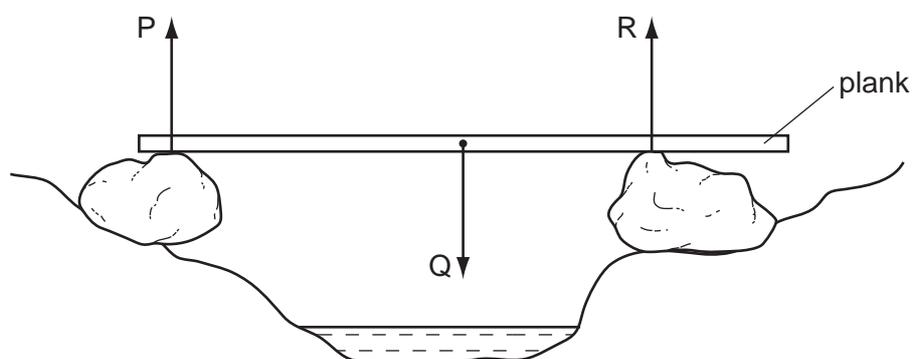
Which change would increase the reading on the voltmeter?

- A adding more solution
- B replacing the zinc with magnesium
- C using a larger beaker
- D using a larger piece of zinc

- 28 A car travels 100 km. The highest speed of the car is 90 km/h, and the lowest speed is 30 km/h. The journey takes two hours.

What is the average speed for the journey?

- A 30 km/h      B 50 km/h      C 60 km/h      D 90 km/h
- 29 Which items of apparatus are required to determine the density of a liquid?
- A balance and measuring cylinder  
B balance and thermometer  
C metre rule and measuring cylinder  
D metre rule and thermometer
- 30 A wooden plank rests in equilibrium on two boulders on opposite sides of a narrow stream. Three forces of size P, Q and R act on the plank.

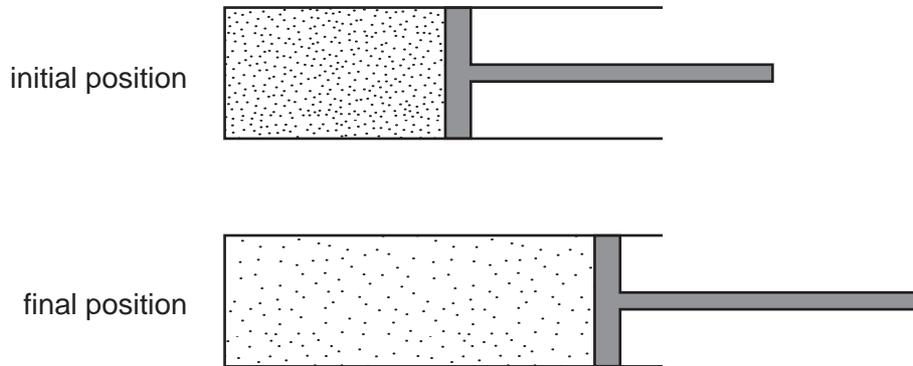


How are the sizes of the forces related?

- A  $P + Q = R$   
B  $P + R = Q$   
C  $P = Q = R$   
D  $P = Q + R$
- 31 Electricity can be obtained from different energy resources.
- Which energy resource is used to obtain electricity without producing heat to boil water?
- A coal  
B gas  
C hydroelectric  
D nuclear

- 32 A piston traps a certain mass of gas inside a cylinder. Initially the piston is halfway along the length of the cylinder.

The piston is now moved towards the open end of the cylinder. The temperature of the gas remains constant.

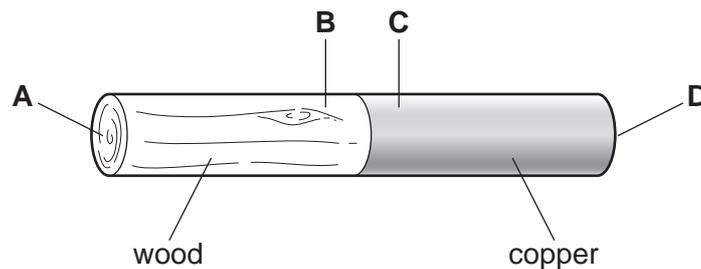


How are the density and the pressure of the gas affected by moving the piston?

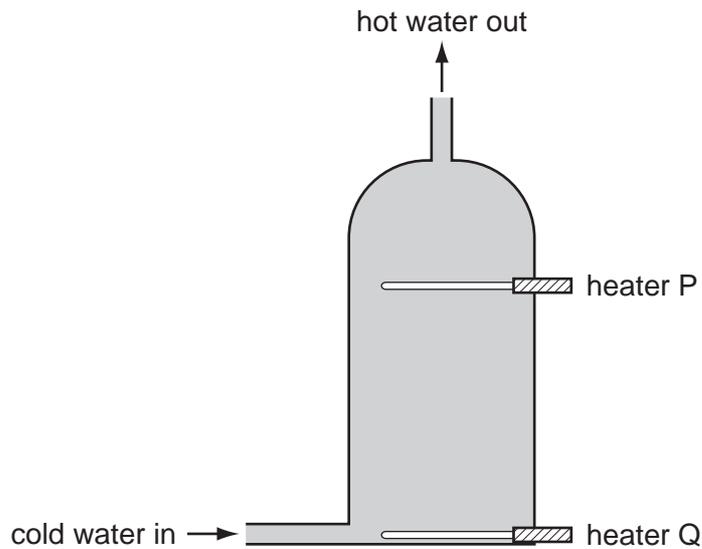
	density	pressure
<b>A</b>	decreases	decreases
<b>B</b>	decreases	unchanged
<b>C</b>	increases	decreases
<b>D</b>	increases	unchanged

- 33 A rod is made up of copper and wood joined together.

After the rod is heated at the join in the centre for about a minute, where would the lowest temperature be?



- 34 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.

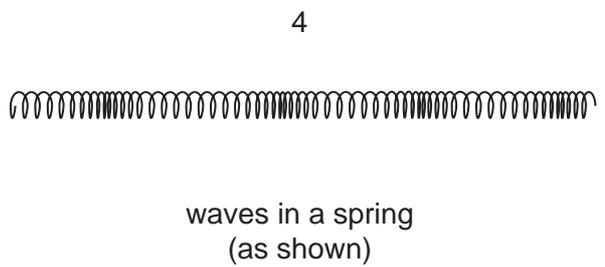
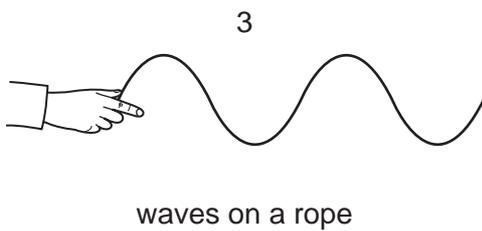
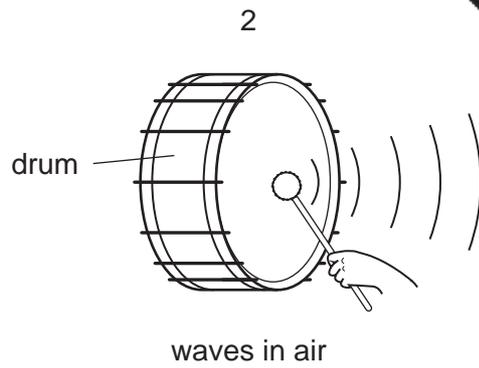
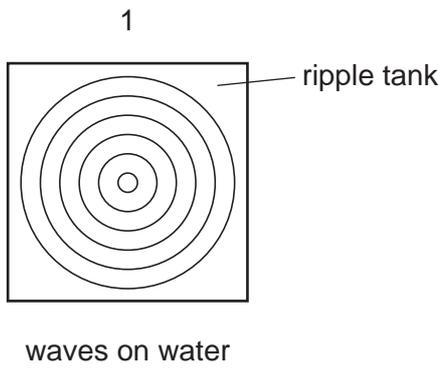


When only heater Q is switched on, it takes a very long time to heat the tank of water to the required temperature of  $60^{\circ}\text{C}$ .

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.

35 The diagrams show examples of wave motion.

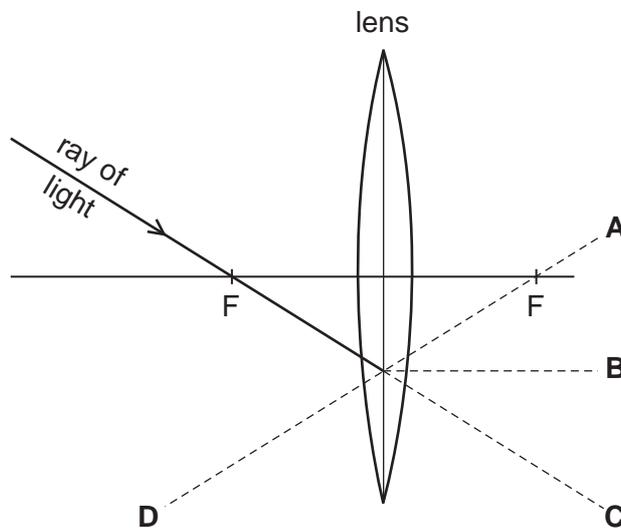


Which are longitudinal waves?

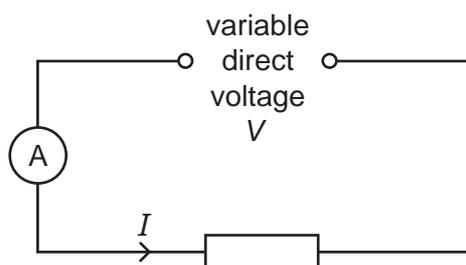
- A 1 only
- B 1, 2 and 4
- C 2 and 3 only
- D 2 and 4 only

36 The diagram shows the path of a ray of light passing through the principal focus F of a lens.

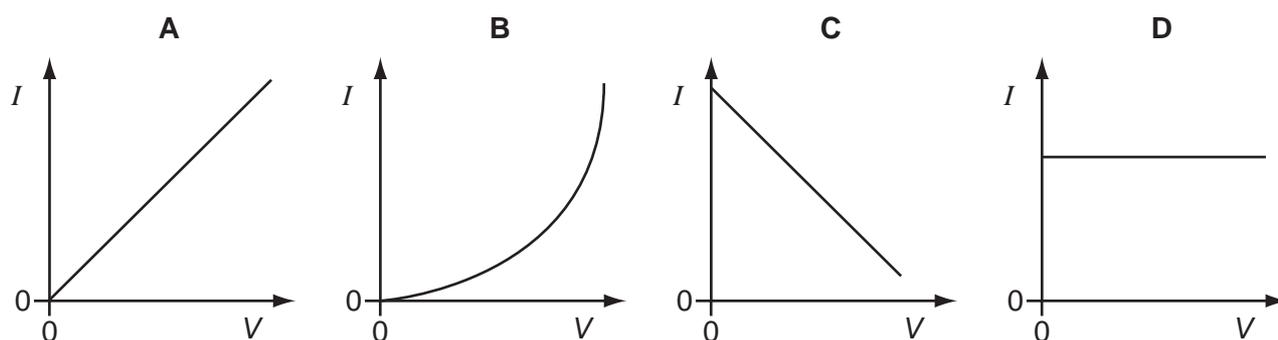
Which broken line shows the direction of the ray after it leaves the lens?



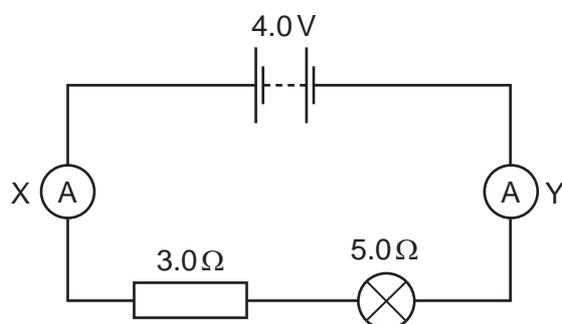
- 37 Using the circuit shown, the current  $I$  is found for various voltages  $V$ . The temperature of the resistor does not change.



Which graph shows the results obtained?



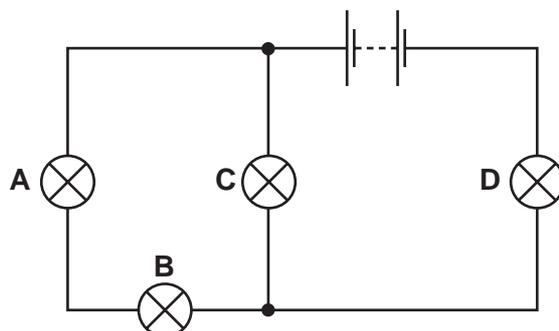
- 38 In the circuit shown, ammeter X reads 0.5 A.



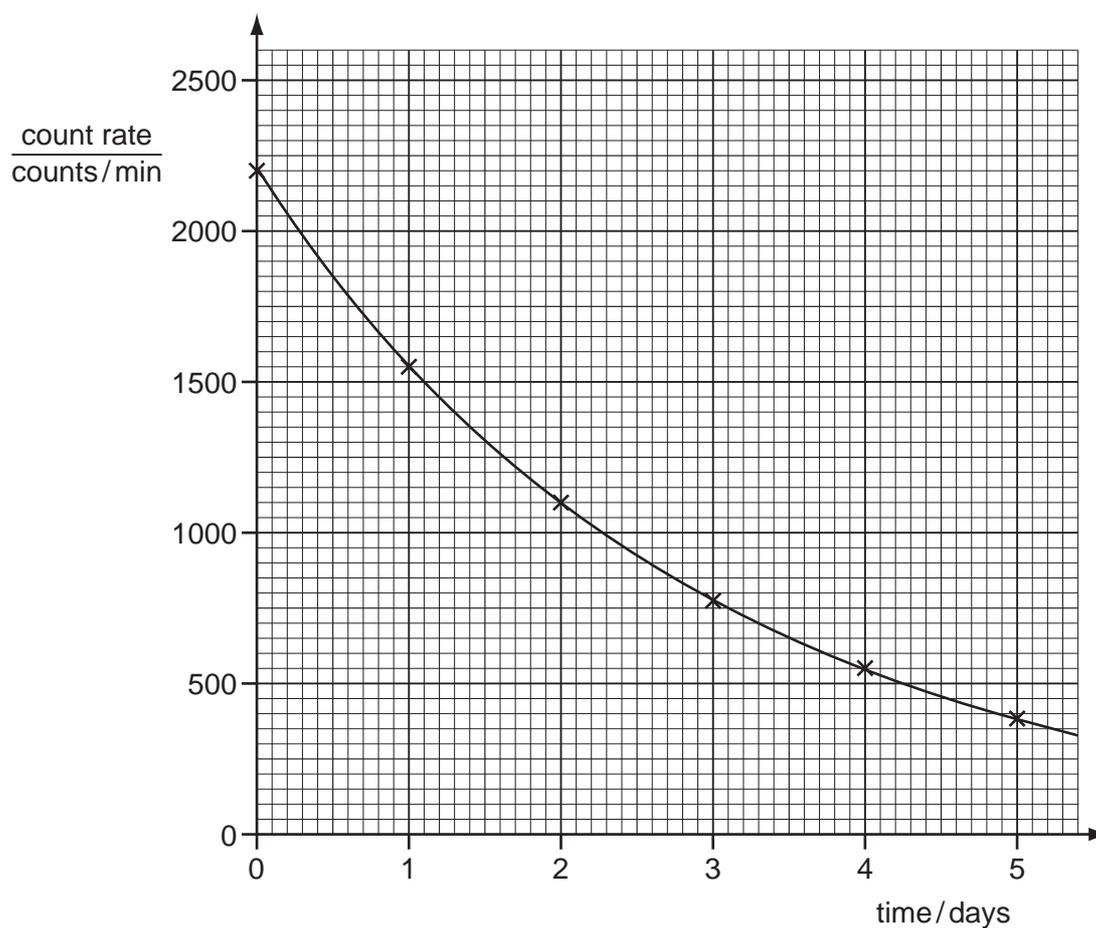
What does ammeter Y read?

- A** 0                      **B** 0.5 A                      **C** 3.5 A                      **D** 4.0 A

- 39 In the circuit below, one of the lamps breaks, causing all the other lamps to go out.  
Which lamp breaks?



- 40 The graph shows the decay curve for one particular type of radioactive nuclide.



What is the half-life of this nuclide?

- A 1.0 day      B 1.5 days      C 2.0 days      D 2.5 days





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

		Group												
I	II	III	IV	V	VI	VII	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	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18					20 <b>Ne</b> Neon 10		
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	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				
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	115 <b>In</b> Indium 49	112 <b>Cd</b> Cadmium 48	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54			
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	65 <b>Zn</b> Zinc 30	64 <b>Cu</b> Copper 29	59 <b>Ni</b> Nickel 28	56 <b>Fe</b> Iron 26	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89											169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
												162 <b>Dy</b> Dysprosium 66	167 <b>Er</b> Erbium 68	168 <b>Fm</b> Fermium 100
												159 <b>Tb</b> Terbium 65	165 <b>Ho</b> Holmium 67	101 <b>Md</b> Mendelevium 101
												157 <b>Gd</b> Gadolinium 64	162 <b>Cf</b> Californium 98	102 <b>No</b> Nobelium 102
												152 <b>Eu</b> Europium 63	162 <b>Cf</b> Californium 98	103 <b>Lr</b> Lawrencium 103
												150 <b>Sm</b> Samarium 62	162 <b>Cf</b> Californium 98	
												144 <b>Nd</b> Neodymium 60	162 <b>Cf</b> Californium 98	
												141 <b>Pr</b> Praseodymium 59	162 <b>Cf</b> Californium 98	
												140 <b>Ce</b> Cerium 58	162 <b>Cf</b> Californium 98	
												232 <b>Th</b> Thorium 90	162 <b>Cf</b> Californium 98	
												238 <b>U</b> Uranium 92	162 <b>Cf</b> Californium 98	
												91 <b>Pa</b> Protactinium 91	162 <b>Cf</b> Californium 98	
												93 <b>Np</b> Neptunium 93	162 <b>Cf</b> Californium 98	
												94 <b>Pu</b> Plutonium 94	162 <b>Cf</b> Californium 98	
												96 <b>Cm</b> Curium 96	162 <b>Cf</b> Californium 98	
												95 <b>Am</b> Americium 95	162 <b>Cf</b> Californium 98	
												97 <b>Bk</b> Berkelium 97	162 <b>Cf</b> Californium 98	
												99 <b>Es</b> Einsteinium 99	162 <b>Cf</b> Californium 98	

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

	a	X	a = relative atomic mass X = atomic symbol
Key	b	b	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.).