UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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)

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.

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

1 Which characteristic is shown by members of the same species?

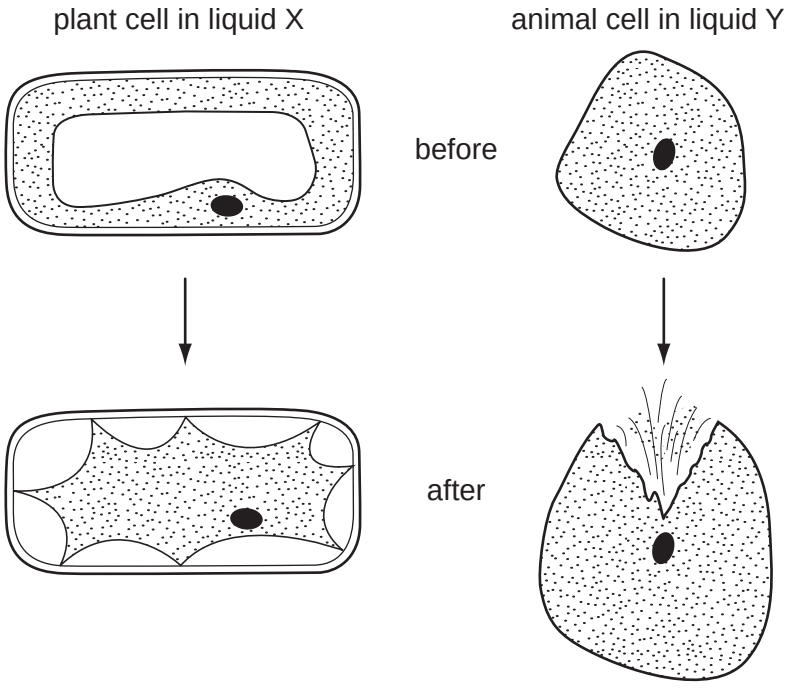
A They all live in the same place.

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.

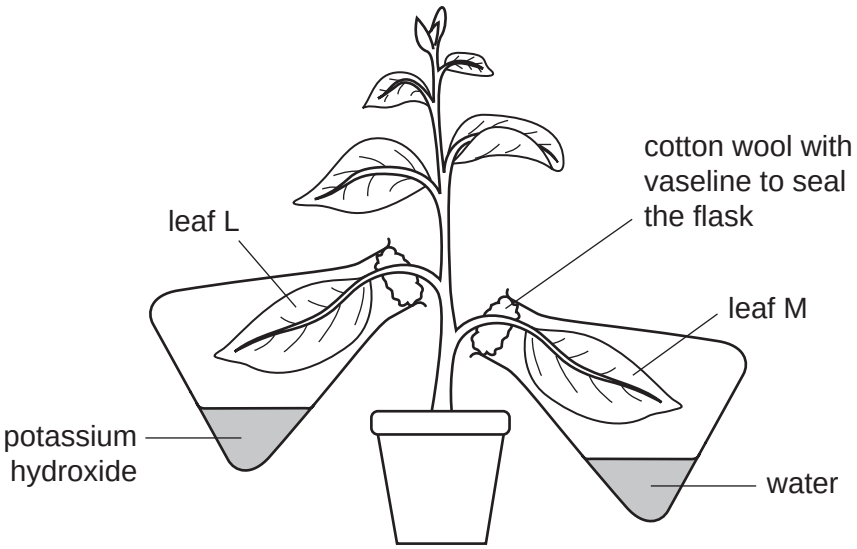


What describes liquids X and Y?

	X	Y
A	concentrated solution	concentrated solution
B	concentrated solution	pure water
C	pure water	concentrated solution
D	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?

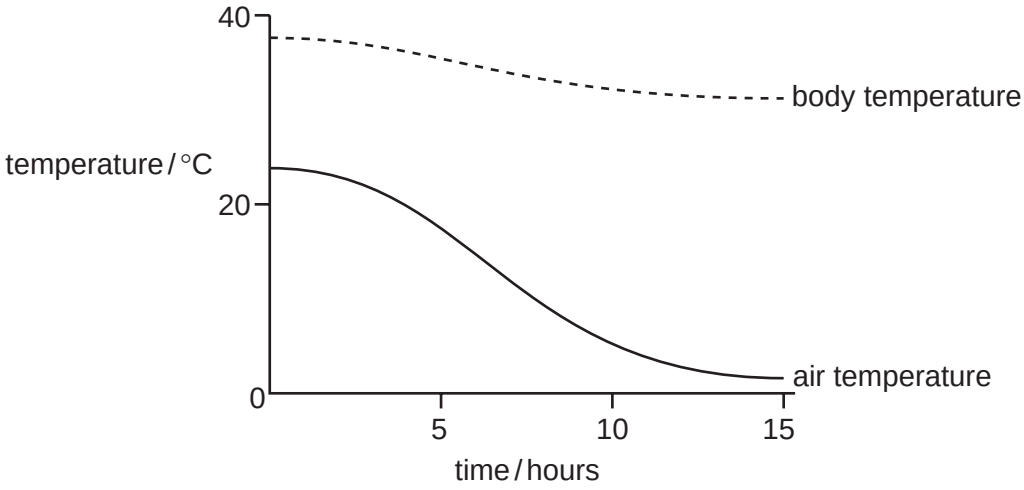
A bronchi and bronchioles

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?

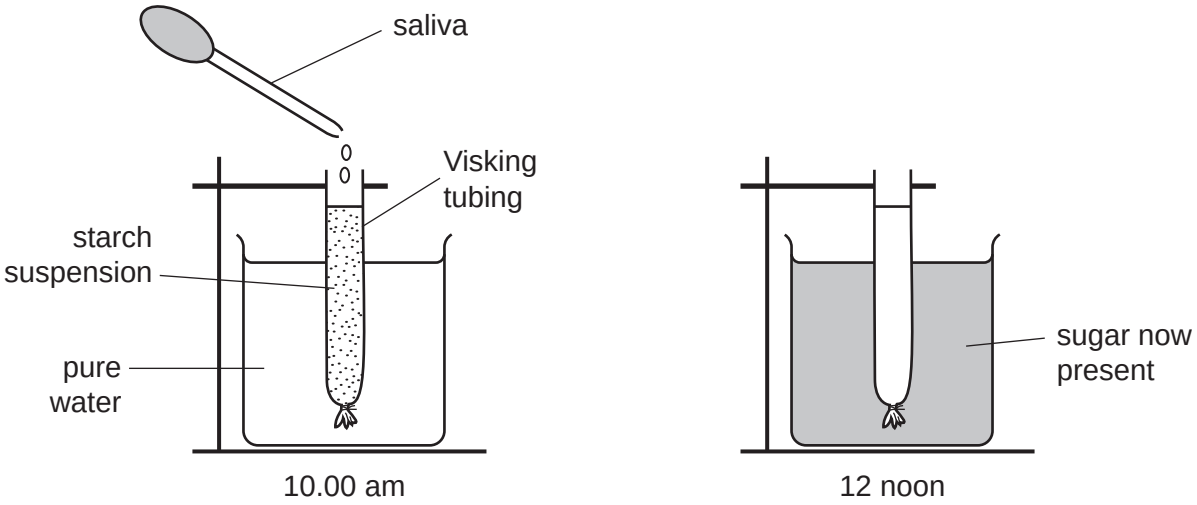
A breathing

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.

7 Which substance is needed in the diet so that red blood cells can carry oxygen?

A calcium

B iron

C vitamin C

D vitamin D

8 What is most likely to happen after a person eats a meal high in protein?

A The amount of water in the blood would decrease.

B The concentration of urea in the urine would increase.

C The level of insulin in the blood would increase.

D The temperature of the body would decrease.

9 In which part of a seed is the micropyle found?

A cotyledon

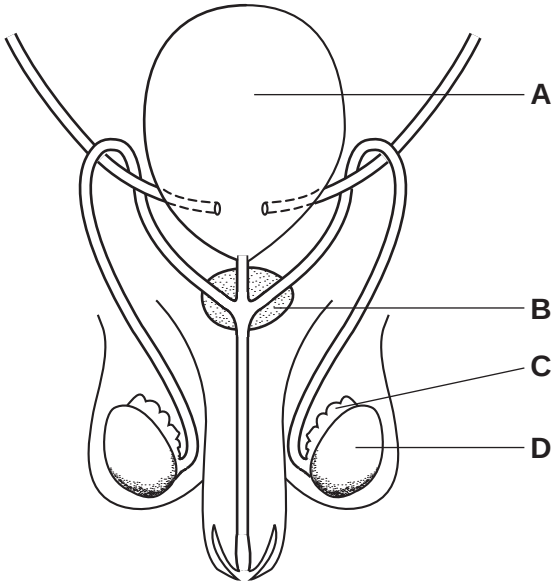
B plumule

C radicle

D testa

10 The diagram shows the male reproductive system.

In which structure are the hormones that control adolescence produced?



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

What colour are the offspring?

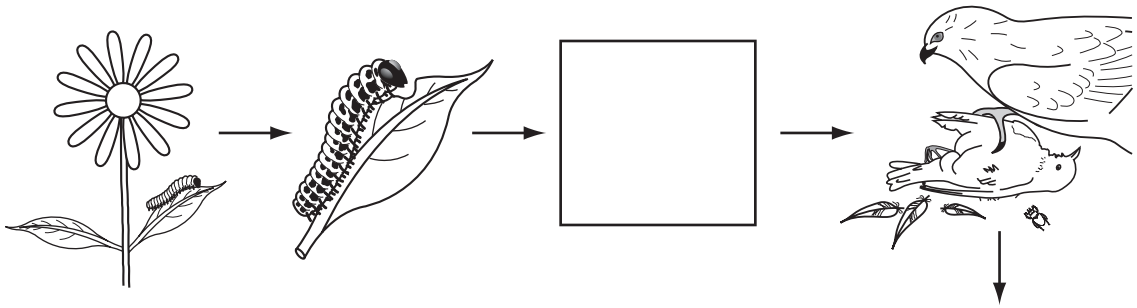
A black only

B black and white

C grey

D white only

12 The diagram shows a food chain.



What does the empty box represent?

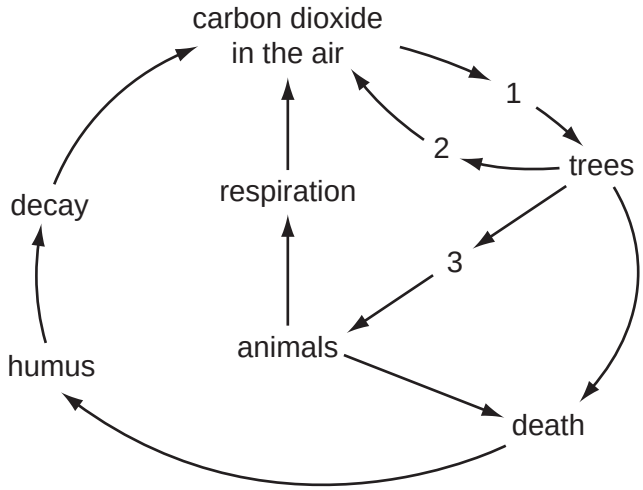
A consumer

B decomposer

C photosynthesis

D producer

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

$$4P + 5O_2 \rightarrow P_4O_{10}$$

What does the formula P_4O_{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
A	amino acid	oxygen
B	amino acid	sulfur
C	glucose	oxygen
D	glucose	sulfur

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

metal oxide + carbon → metal + carbon dioxide

Which statements about this reaction are correct?

	the metal oxide is reduced	the carbon is oxidised
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

19 Aqueous sodium chloride is electrolysed on a large scale.

Which three substances are manufactured in this way?

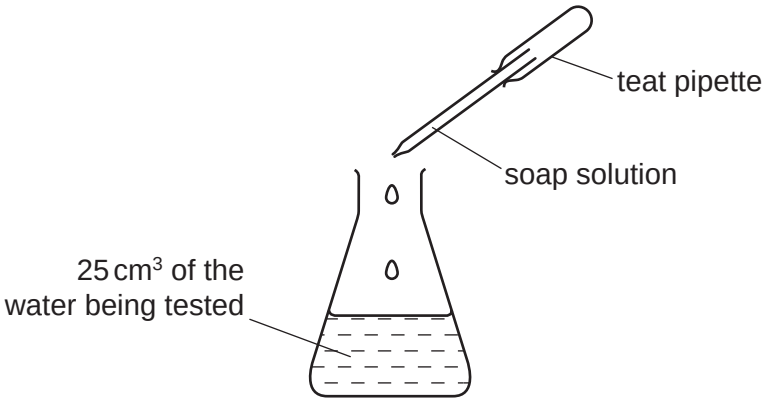
A acid, chlorine and hydrogen

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, tap 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
A	2	5	10
B	2	10	5
C	5	10	2
D	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
A	6	5
B	6	7
C	8	7
D	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?

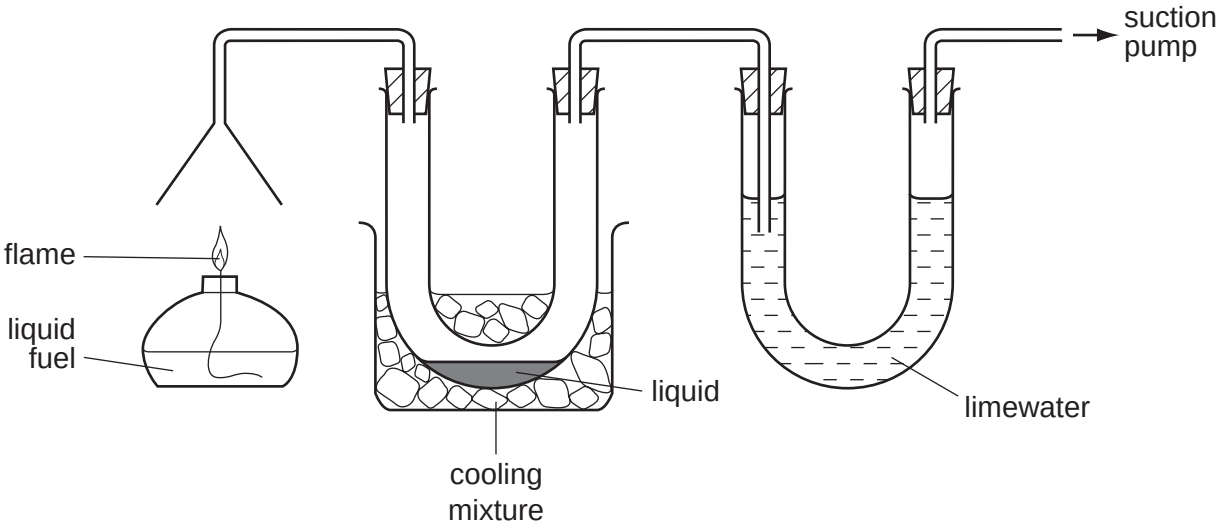
A An emulsion has been formed.

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?

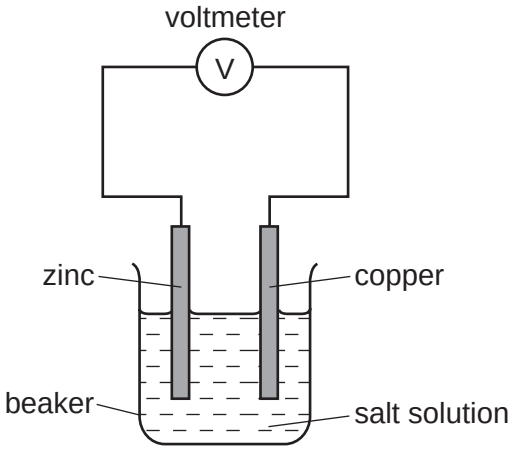
A carbon monoxide and carbon dioxide

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?

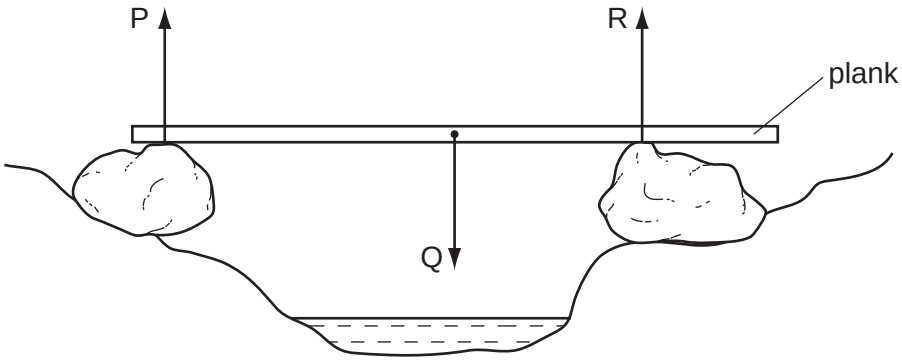
A balance and measuring cylinder

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

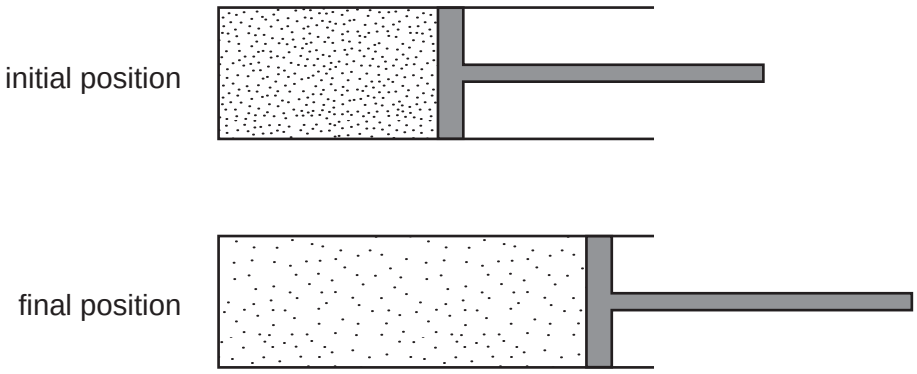
B gas

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.

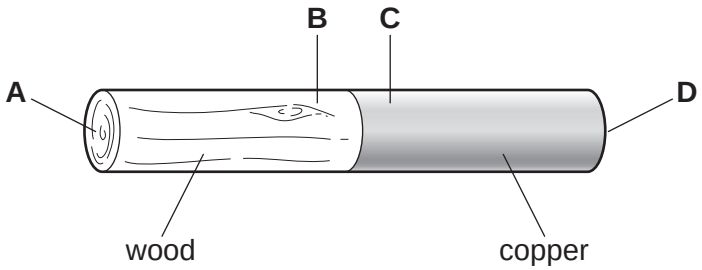


How are the density and the pressure of the gas affected by moving the piston?

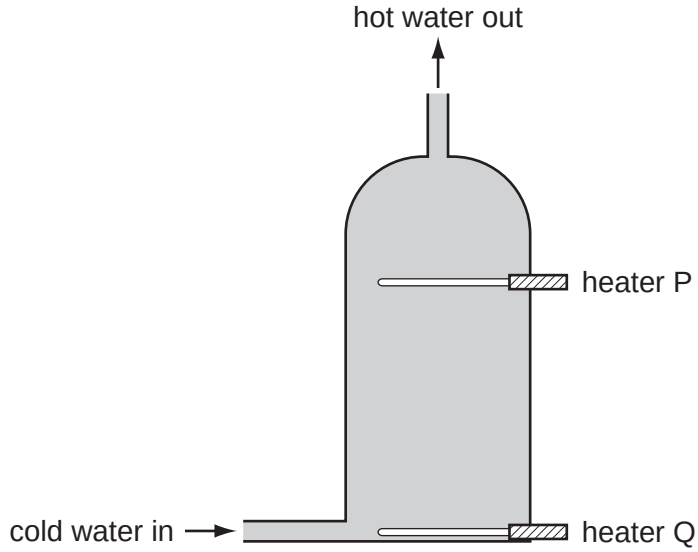
	density	pressure
A	decreases	decreases
B	decreases	unchanged
C	increases	decreases
D	increases	unchanged

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 °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.

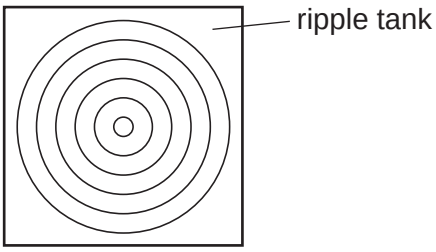
B All the water reaches 60 °C in the same time as before.

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.

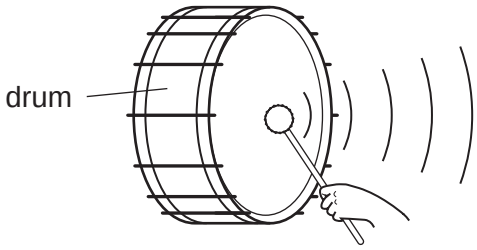
35 The diagrams show examples of wave motion.

1



waves on water

2



waves in air

3

waves on a rope

4

waves in a spring
(as shown)

Which are longitudinal waves?

A 1 only

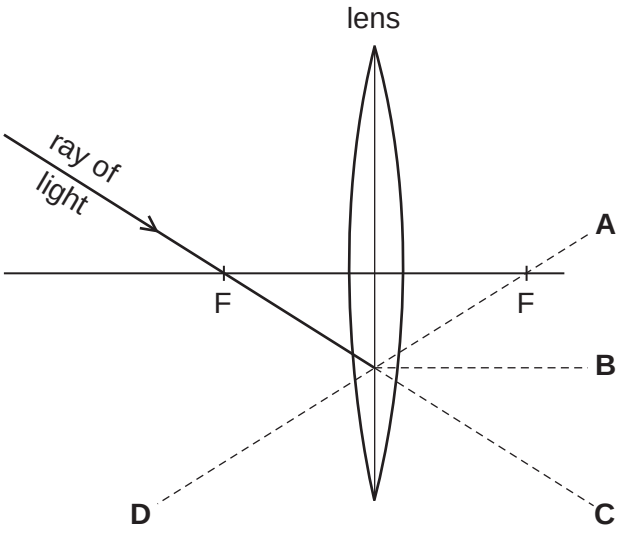
B 1, 2 and 4

C 2 and 3 only

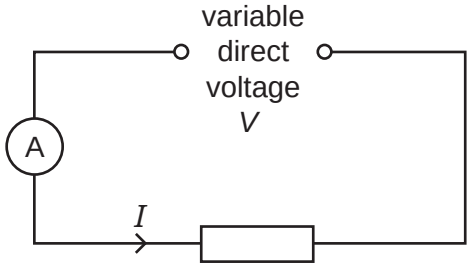
D 2 and 4 only

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?

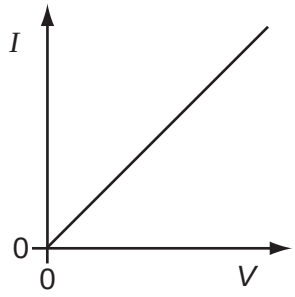


37 Using the circuit shown, the current I is found for various voltages V. The temperature of the resistor does not change.

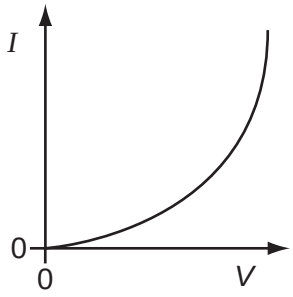


Which graph shows the results obtained?

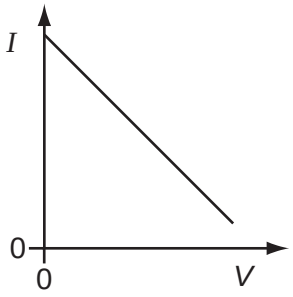
A



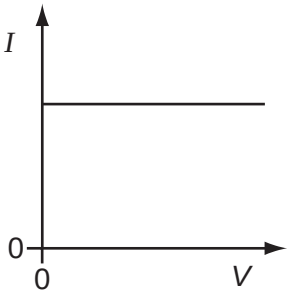
B



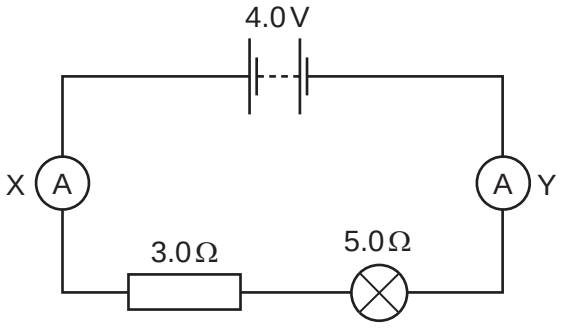
C



D



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

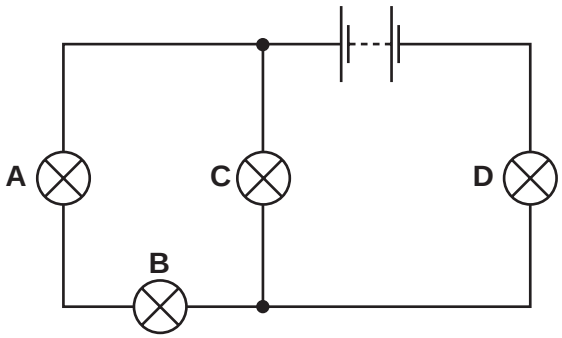


What does ammeter Y read?

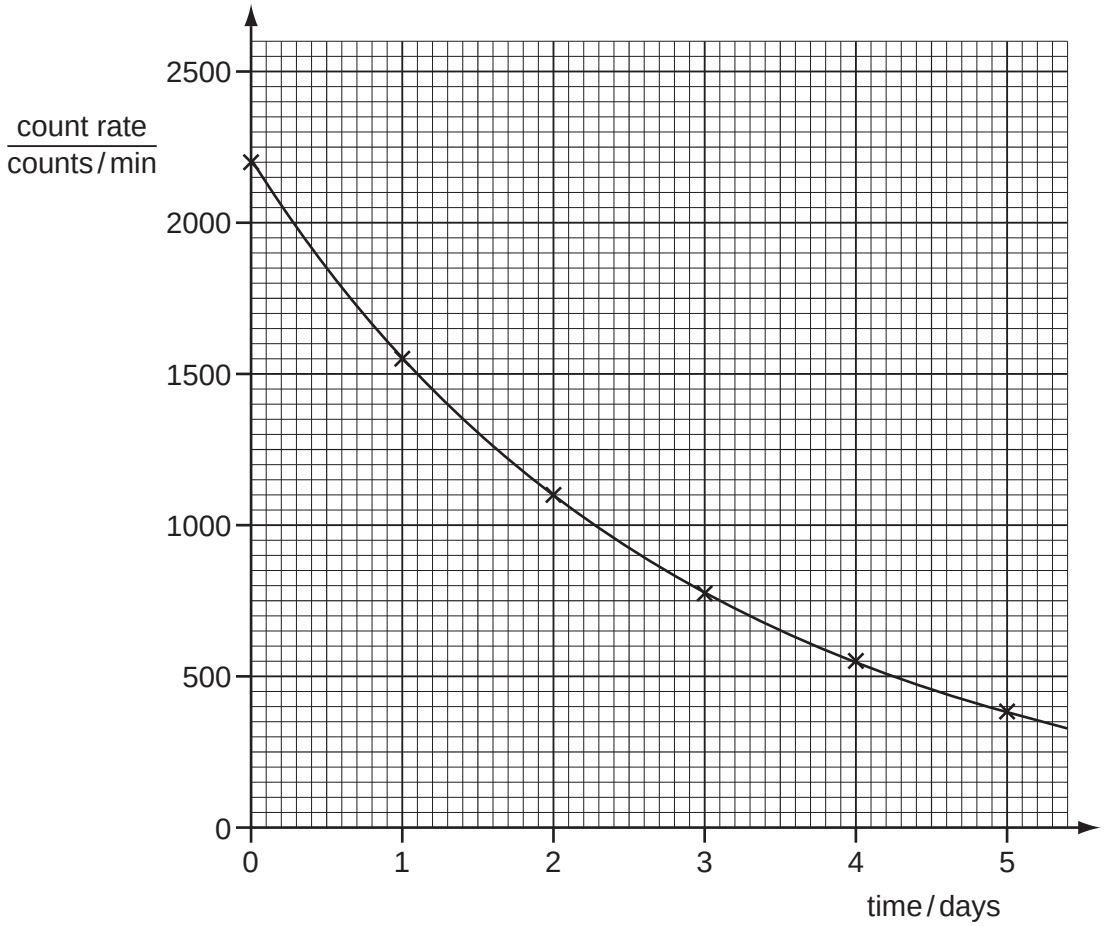
A 0 **B** 0.5 A **C** 3.5 A **D** 4.0 A

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

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DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	0
																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.).