



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice

October/November 2015

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, 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 **18** printed pages and **2** blank pages.

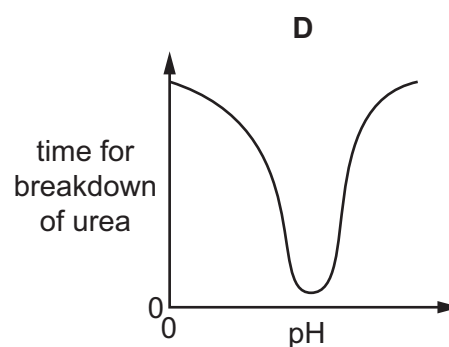
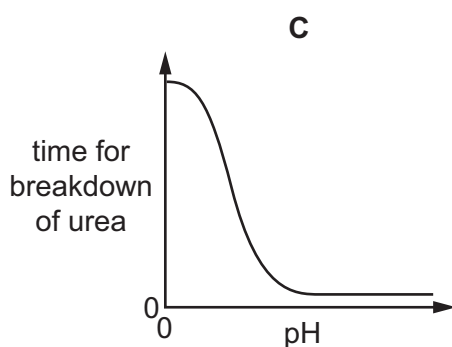
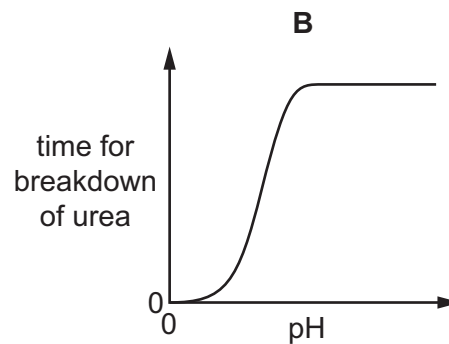
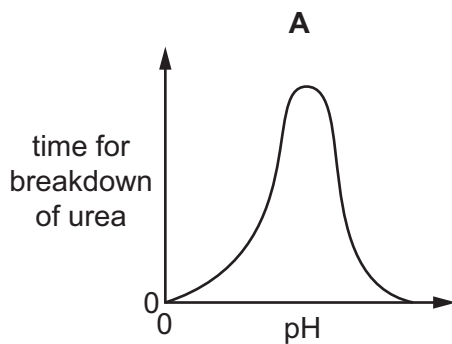
1 Which chemical is found in a plant cell but **not** in an animal cell?

- A glucose
- B glycogen
- C protein
- D starch

2 What must be present for diffusion to occur?

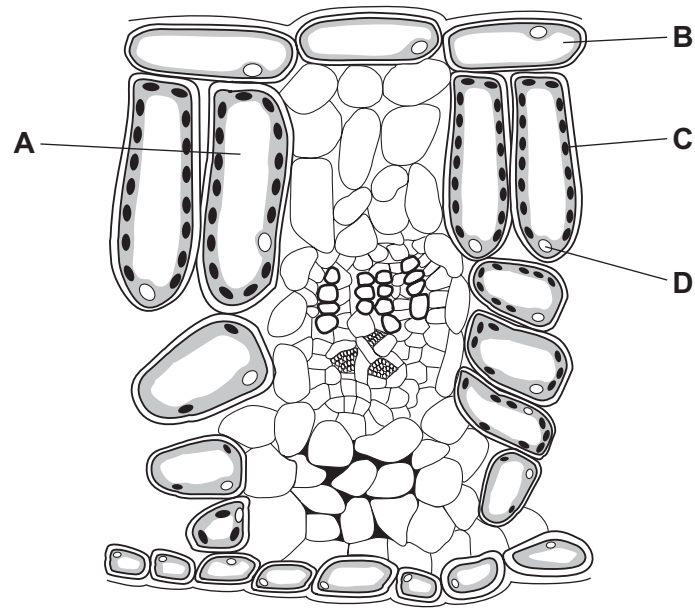
	concentration gradient	random movement of molecules	solvent
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

3 Which graph shows the effect of pH on the time taken for the breakdown of urea by enzymes?

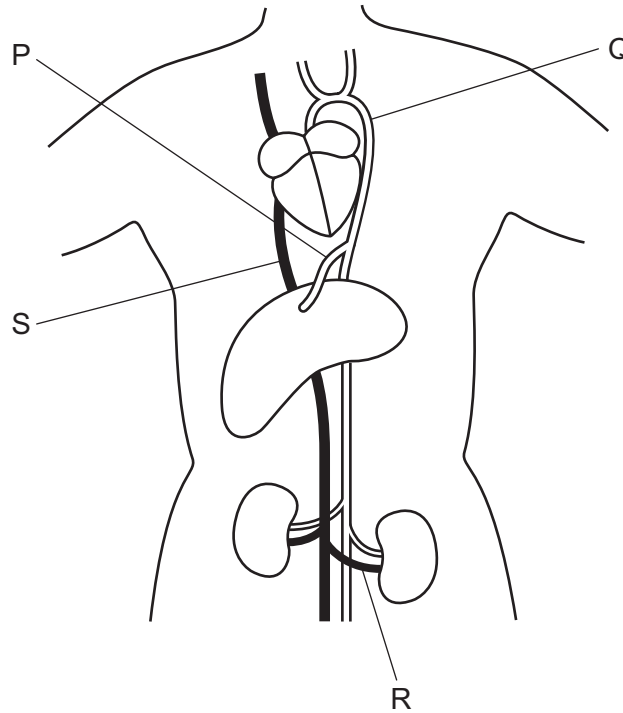


4 The diagram shows a section through a leaf.

Where are carbohydrates made?



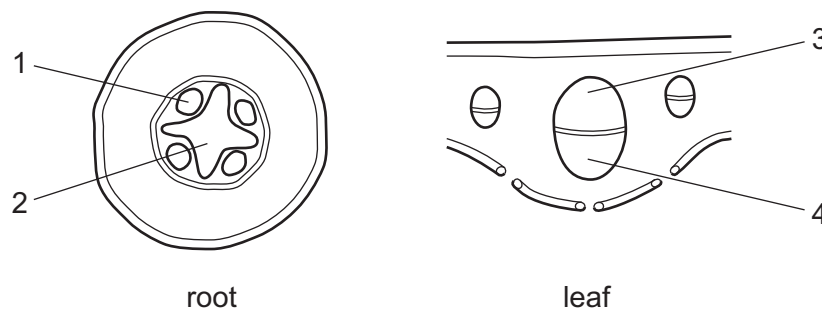
5 The diagram shows the heart, liver and kidneys with connecting blood vessels.



What are the labelled blood vessels?

	aorta	hepatic artery	vena cava	renal vein
A	Q	P	S	R
B	Q	R	S	P
C	S	P	Q	R
D	S	R	Q	P

6 The diagram shows sections through a plant root and a leaf.

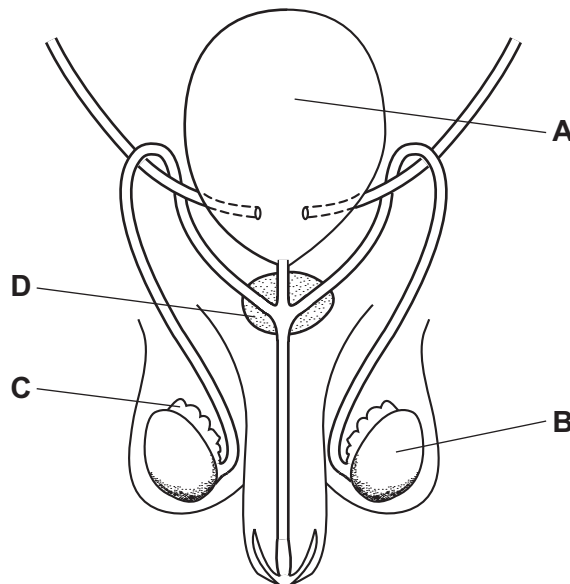


Which tissues are phloem?

- A** 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

- 7 Which part of the alimentary canal is in the form of a coiled tube?
- A oesophagus
 - B pancreas
 - C rectum
 - D small intestine
- 8 What is the definition of homeostasis?
- A controlling body temperature
 - B controlling responses to stimuli
 - C maintaining a constant external environment
 - D maintaining a constant internal environment
- 9 What happens when the body temperature falls below normal?
- A Arterioles (small arteries) supplying the skin constrict (become narrower).
 - B Arterioles (small arteries) supplying the skin dilate (become wider).
 - C Capillaries move towards the skin surface.
 - D Capillaries move away from the skin surface.
- 10 The diagram shows the male reproductive system.

Which structure produces the hormones that control adolescence?



11 Which statement about flowers is correct?

- A The anther and stigma are parts of the carpel.
- B The anther and stigma are parts of the stamen.
- C The ovary and stigma are parts of the carpel.
- D The ovary and stigma are parts of the stamen.

12 The diagram shows a food chain.

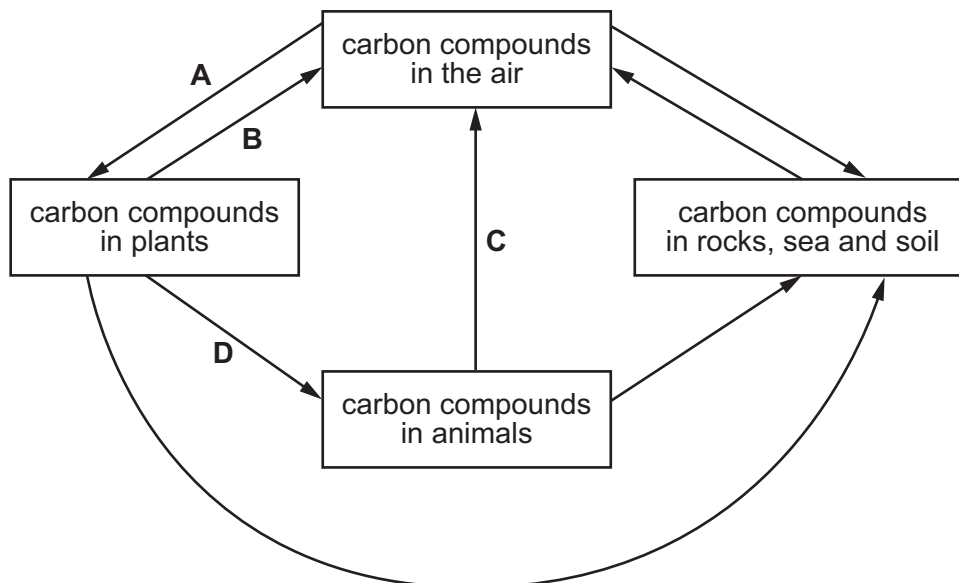
beech tree → insect → shrew → owl

Which statement is correct?

- A The beech tree is a consumer.
- B The insect is a producer.
- C The owl is a carnivore.
- D The shrew is a herbivore.

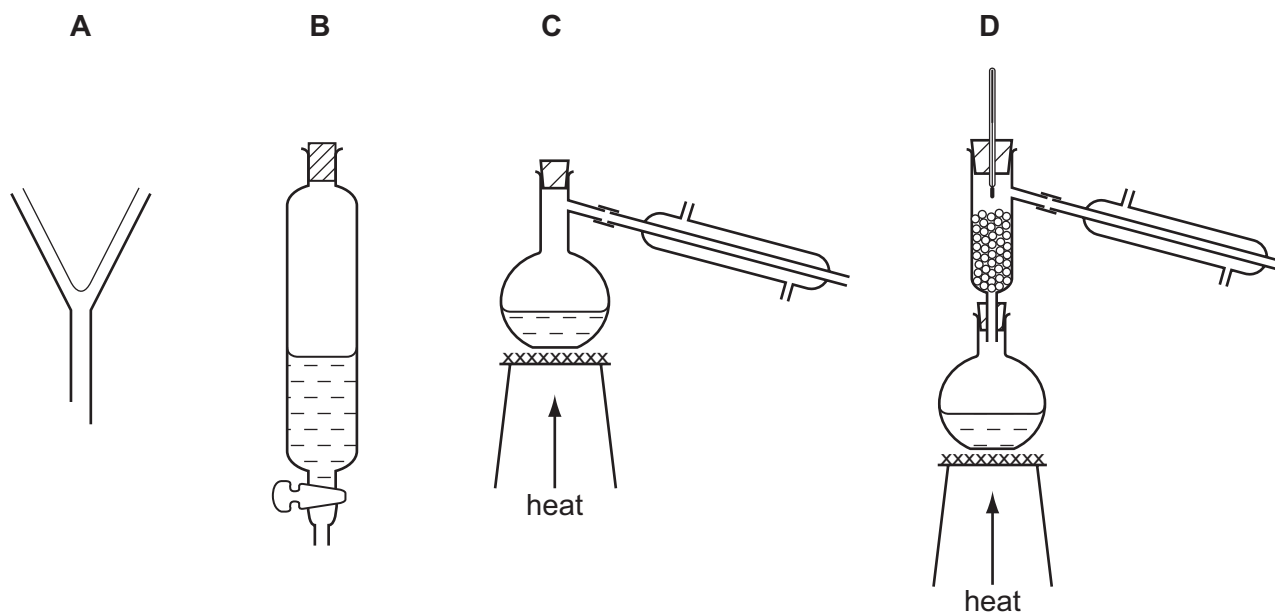
13 The diagram shows part of the carbon cycle.

Which arrow shows respiration by plants?

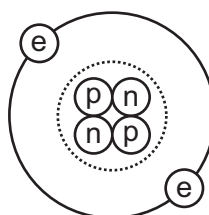


14 Hexane and octane are liquid hydrocarbons that mix together.

Which method is used to separate a mixture of these two liquids?



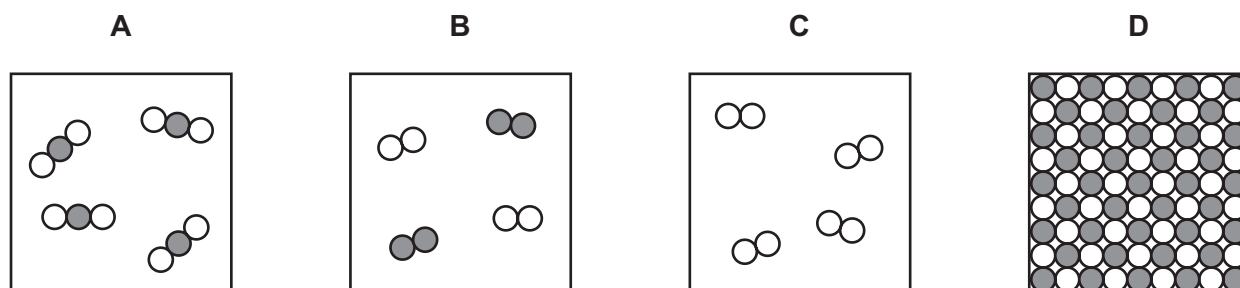
15 The diagram shows a helium atom.



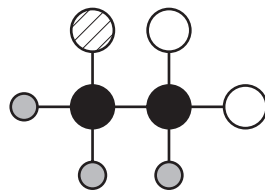
Which particles in the helium atom have approximately the same mass?

- A electron and proton only
- B electron and neutron only
- C proton and neutron only
- D electron, proton and neutron





16 Which diagram represents a single element?



17 The diagram shows an organic molecule.



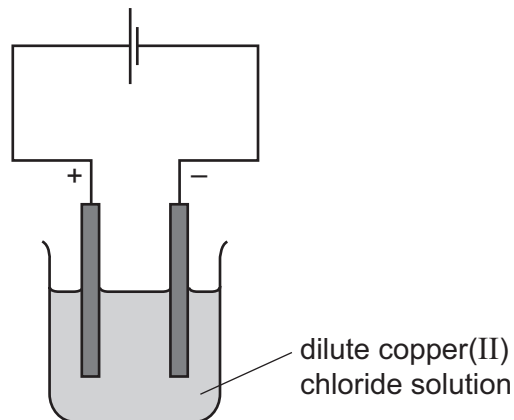
key

-  carbon atom
-  hydrogen atom
-  bromine atom
-  chlorine atom

What is the formula of the molecule?

- A** $C_2H_3BrCl_2$ **B** $C_2H_3Br_2Cl$ **C** $C_3H_2BrCl_2$ **D** $C_3H_2Br_2Cl$

18 The diagram shows the electrolysis of a dilute solution of copper(II) chloride using inert electrodes.



Which row shows the products formed at each electrode and describes the bonding in copper(II) chloride?

	anode	cathode	type of bonding
A	chlorine	copper	ionic
B	chlorine	hydrogen	covalent
C	oxygen	copper	ionic
D	oxygen	hydrogen	covalent

- 19 Lime is manufactured by heating limestone.

Lime is used to control the acidity of soil.

Which types of chemical change occur in these two reactions?

	heating limestone	controlling acidity
A	endothermic	oxidation
B	endothermic	neutralisation
C	exothermic	oxidation
D	exothermic	neutralisation

- 20 Nitrogen from the air is used to manufacture ammonia.



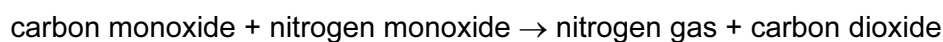
Why is a catalyst used in this reaction?

- A** Nitrogen from the air is not pure.
- B** Nitrogen is a gas at room temperature.
- C** Nitrogen is a non-metallic element.
- D** Nitrogen is not very reactive.
- 21 When petrol burns in a car engine carbon monoxide, CO, and nitrogen monoxide, NO, are produced.

The gases produced are passed through a catalytic converter.

In the catalytic converter, the carbon monoxide reacts with nitrogen monoxide.

The equation for the reaction is



Which statement is **not** correct?

- A** Carbon monoxide is oxidised in the catalytic converter.
- B** Carbon monoxide is produced by the complete combustion of petrol.
- C** Nitrogen from the air is oxidised in the car engine.
- D** Nitrogen monoxide is reduced in the catalytic converter.

22 An unknown aqueous solution is mixed with nitric acid and silver nitrate solution.

A white precipitate is formed.

Which ion is present in the unknown aqueous solution?

- A carbonate
- B chloride
- C nitrate
- D sulfate

23 An element is a solid at room temperature and does **not** conduct electricity.

What is the proton number of this element?

- A 11 B 19 C 35 D 53

24 Which process does **not** produce carbon dioxide?

- A acid reacting with a metal
- B acid reacting with sodium carbonate
- C complete combustion of methane
- D respiration

25 Which anion is present in limestone?

- A carbonate CO_3^{2-}
- B nitrate NO_3^-
- C oxide O^{2-}
- D sulfate SO_4^{2-}

26 Which method is used to separate petroleum?

- A chromatography
- B distillation
- C filtration
- D fractional distillation

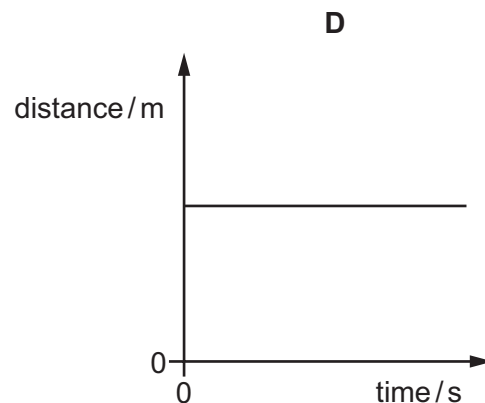
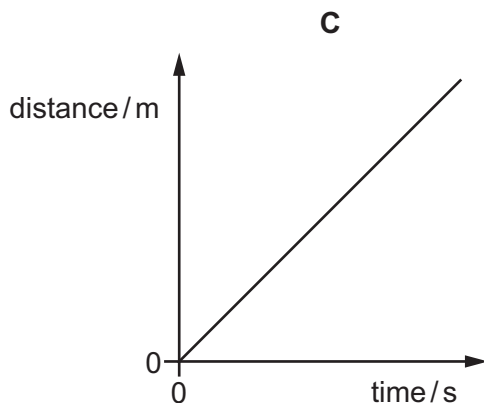
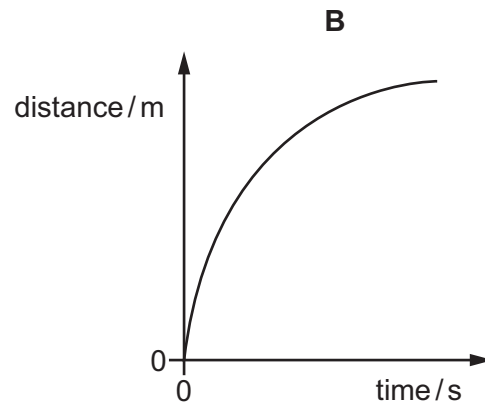
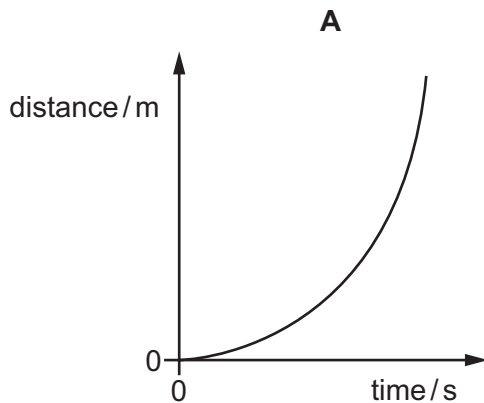
27 Ethanol is formed when steam reacts with compound Y.

What is the name and what is the structure of compound Y?

	name	structure
A	ethane	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C} = \text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
B	ethane	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
C	ethene	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{C} = \text{C} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
D	ethene	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$

28 The following are distance/time graphs.

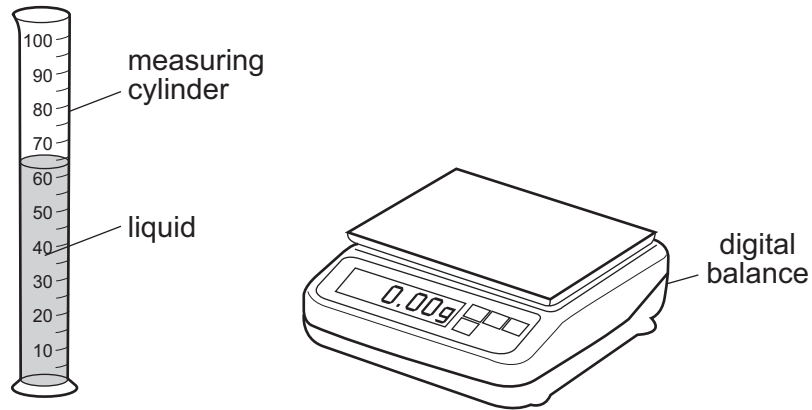
Which graph shows an object moving at constant speed?



29 Which statement about weight is correct?

- A** Weight and mass are both measured in the same unit.
- B** Weight is the amount of matter in a body and is measured in kilograms.
- C** Weight is a force and is measured in kilograms.
- D** Weight is a force and is measured in newtons.

30 A student pours liquid into a measuring cylinder.



The student records the volume of the liquid from the scale on the measuring cylinder. He then puts the measuring cylinder containing the liquid on a balance and records the mass.

What else needs to be measured before the density of the liquid can be calculated?

- A the depth of the liquid in the measuring cylinder
- B the mass of the empty measuring cylinder
- C the temperature of the liquid in the measuring cylinder
- D the volume of the empty measuring cylinder

31 An electric motor is used to lift a container off a ship.

The output power of the motor is changed by changing the time taken to lift the container and by changing the work done in lifting the container.

Which row shows changes that both increase the output power?

	time taken	work done
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

- 32** On a warm day, a swimmer climbs out of a swimming pool into the open air and water evaporates from his skin.

As the water evaporates, which molecules escape into the air first and what happens to the average speed of the remaining water molecules?

	first molecules to escape	average speed of the remaining molecules
A	least energetic	decreases
B	least energetic	increases
C	most energetic	decreases
D	most energetic	increases

- 33** A sample of a solid is heated for 12 minutes and its temperature noted every minute.

The results are shown in the table.

time/min	0	1	2	3	4	5	6	7	8	9	10	11	12
temperature/°C	11.5	16.1	22.1	31.0	31.1	31.1	31.1	31.3	45.0	65.2	66.2	66.3	66.3

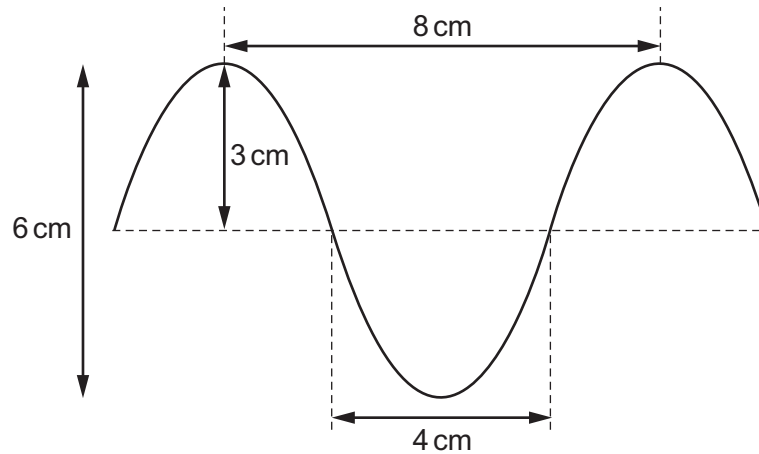
How should the sample be described at the end of the 12 minutes?

- A** all solid
 - B** in the process of melting
 - C** all liquid
 - D** in the process of boiling
- 34** Food is kept in a loosely-packed cool-box which uses two ice packs to keep it cool.

Where should the ice packs be placed to keep all the food as cool as possible?

- A** both at the bottom of the box
- B** both at the top of the box
- C** one at the front and one at the back of the box
- D** one on the left and one on the right of the box

35 The diagram shows a wave.



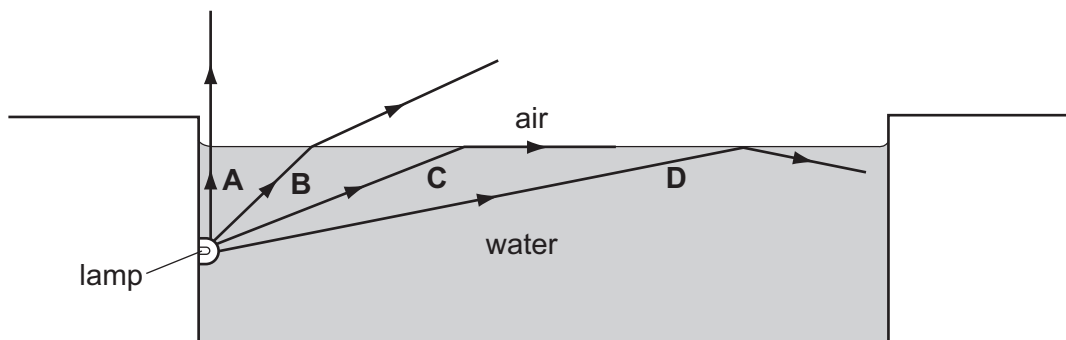
What are the amplitude and the wavelength of this wave?

	amplitude / cm	wavelength / cm
A	3	4
B	3	8
C	6	4
D	6	8

36 An underwater lamp is used to light a swimming pool.

Rays of light from the lamp hit the water surface at different angles, as shown in the diagram.

Which ray hits the surface at the critical angle?



37 In a test, a car horn is found to be too loud and the pitch of the note is too high.

What information does this give about the amplitude and the frequency of the sound wave produced?

	amplitude	frequency
A	too large	too large
B	too large	too small
C	too small	too large
D	too small	too small

38 A certain electrical appliance is powered from a mains supply.

The appliance normally uses a current of 3 A, but the current briefly rises to 4 A at the instant the appliance is switched on. The cable to the appliance is designed for currents up to 6 A.

A fuse is used to protect the circuit.

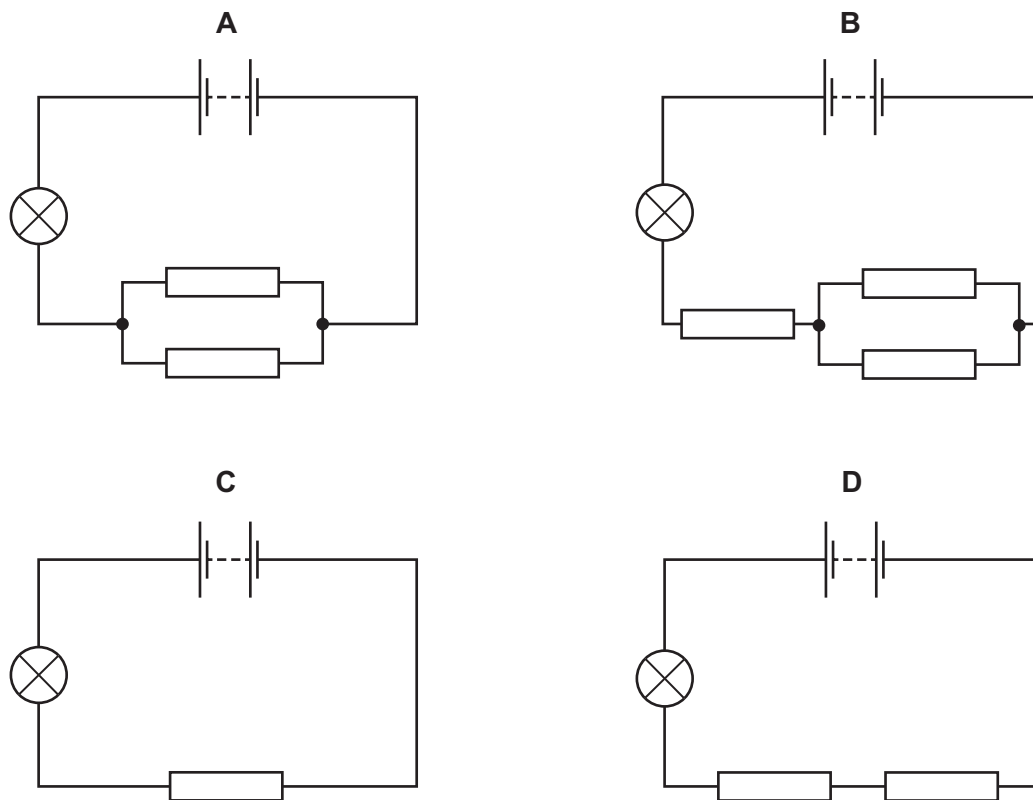
What should be the rating of the fuse?

- A** 1 A **B** 3 A **C** 5 A **D** 13 A

39 A lamp is connected in four circuits in turn.

The batteries are identical and the resistors are identical.

In which circuit is the lamp brightest?



40 The table compares an atom of carbon-13 and an atom of nitrogen-14.

	carbon-13	nitrogen-14
nucleon number A	6	7
proton number Z	13	14

A neutral atom of carbon-13 and a neutral atom of nitrogen-14 have the same number of

- A electrons.
- B ions.
- C neutrons.
- D protons.

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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	48	51	52	55	56	59	59	64	65		
		Sc Scandium 21	Ti Titanium 22	V Vanadium 23	Cr Chromium 24	Mn Manganese 25	Fe Iron 26	Co Cobalt 27	Ni Nickel 28	Cu Copper 29	Zn Zinc 30		
85	88	89	91	93	96	101	101	103	106	108	112		
Rb Rubidium 37	Sr Strontium 38	Y Yttrium 39	Zr Zirconium 40	Nb Niobium 41	Mo Molybdenum 42	Ru Ruthenium 44	Rh Rhodium 45	Pd Palladium 46	Ag Silver 47	Cd Cadmium 48			
133	137	139	178	181	184	190	190	192	195	197	201		
Cs Caesium 55	Ba Barium 56	La Lanthanum 57	Hf Hafnium 72	Ta Tantalum 73	W Tungsten 74	Os Osmium 76	Ir Iridium 77	Pt Platinum 78	Au Gold 79	Hg Mercury 80			
223	226	227											
Fr Francium 87	Ra Radium 88	Ac Actinium 89											
*58-71 Lanthanoid series †90-103 Actinoid series													
		a		X		b							
		Key		X		b							
		a = relative atomic mass		X = atomic symbol		b = proton (atomic) number							
140	141	144	147	150	152	157	159	162	165	167	169	173	175
Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Pm Promethium 61	Sm Samarium 62	Eu Europium 63	Gd Gadolinium 64	Tb Terbium 65	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	Tm Thulium 69	Yb Ytterbium 70	Lu Lutetium 71
232	231	238	237	244	243	247	247	251	252	257	258	259	260
Th Thorium 90	Pa Protactinium 91	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
The volume of one mole of any gas is 24 dm ³ at room temperature and pressure (r.t.p.).													