



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.

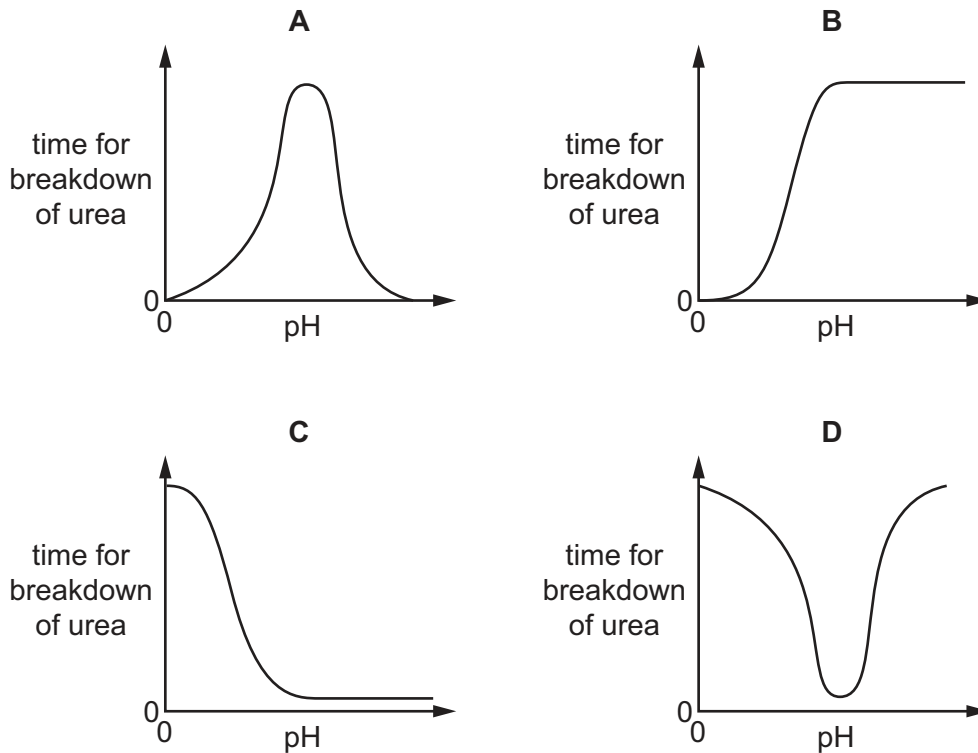
1 Which chemical is found in a plant cell but **not** in an animal cell?

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

2 What must be present for diffusion to occur?

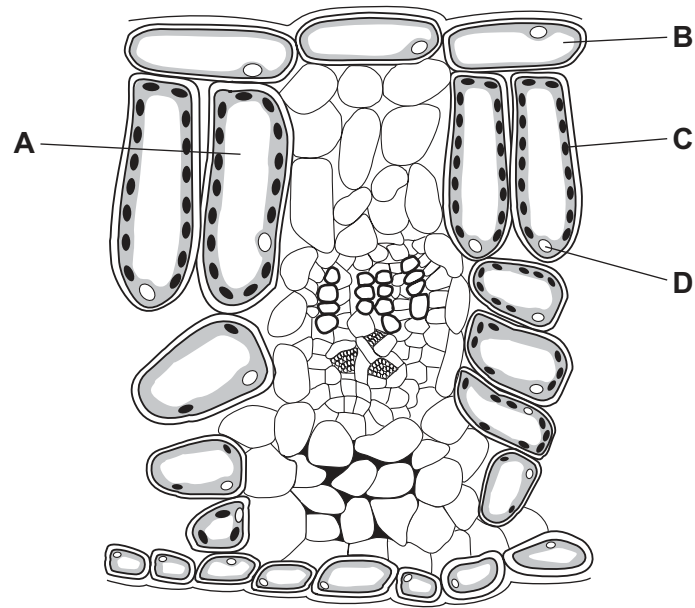
	concentration gradient	random movement of molecules	solvent
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

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

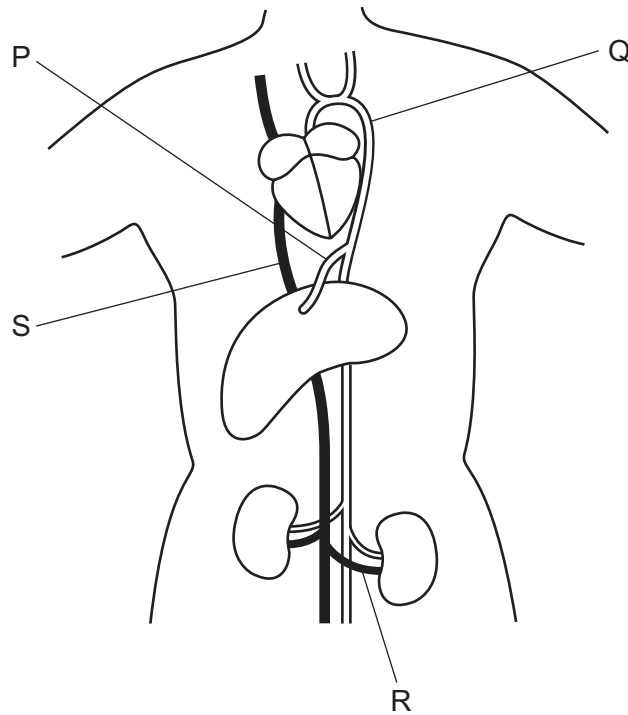


4 The diagram shows a section through a leaf.

Where are carbohydrates made?



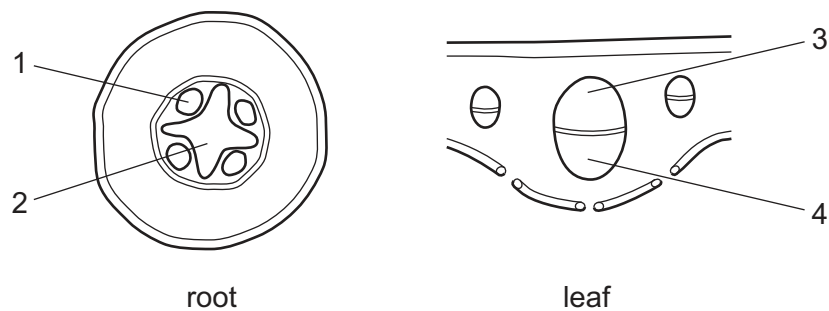
5 The diagram shows the heart, liver and kidneys with connecting blood vessels.



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

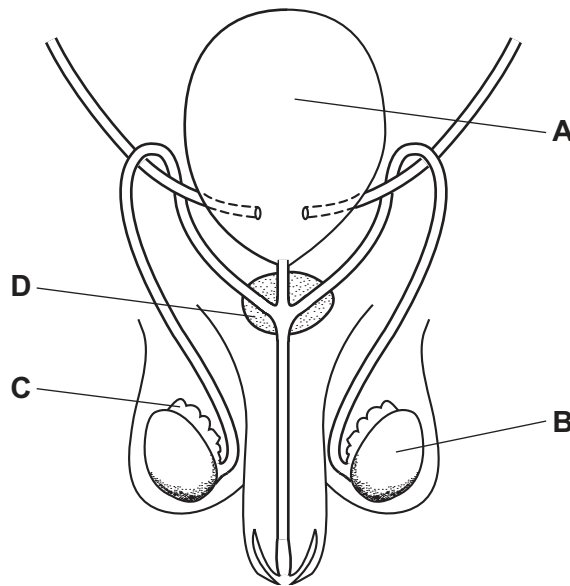
6 The diagram shows sections through a plant root and a leaf.



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.

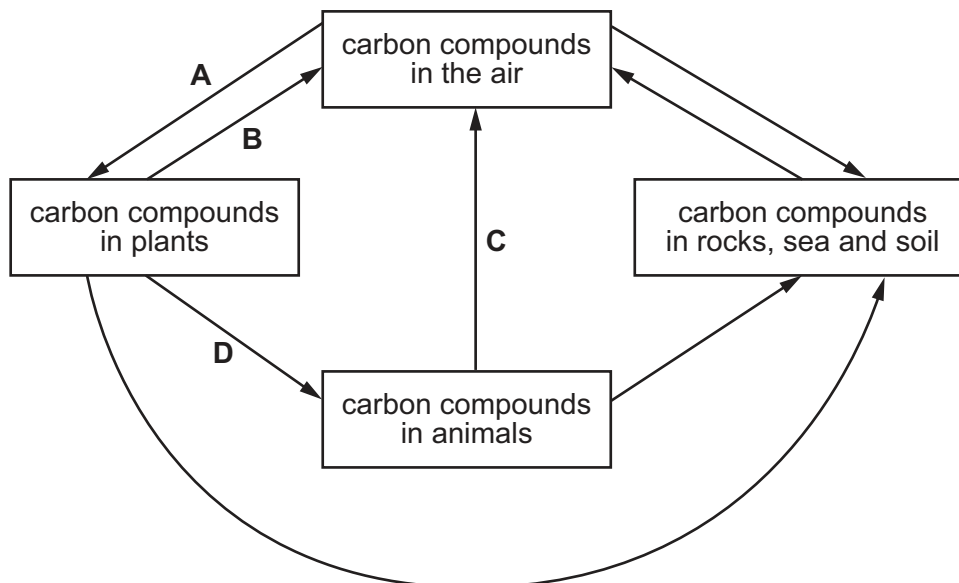
beech tree → insect → shrew → owl

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.

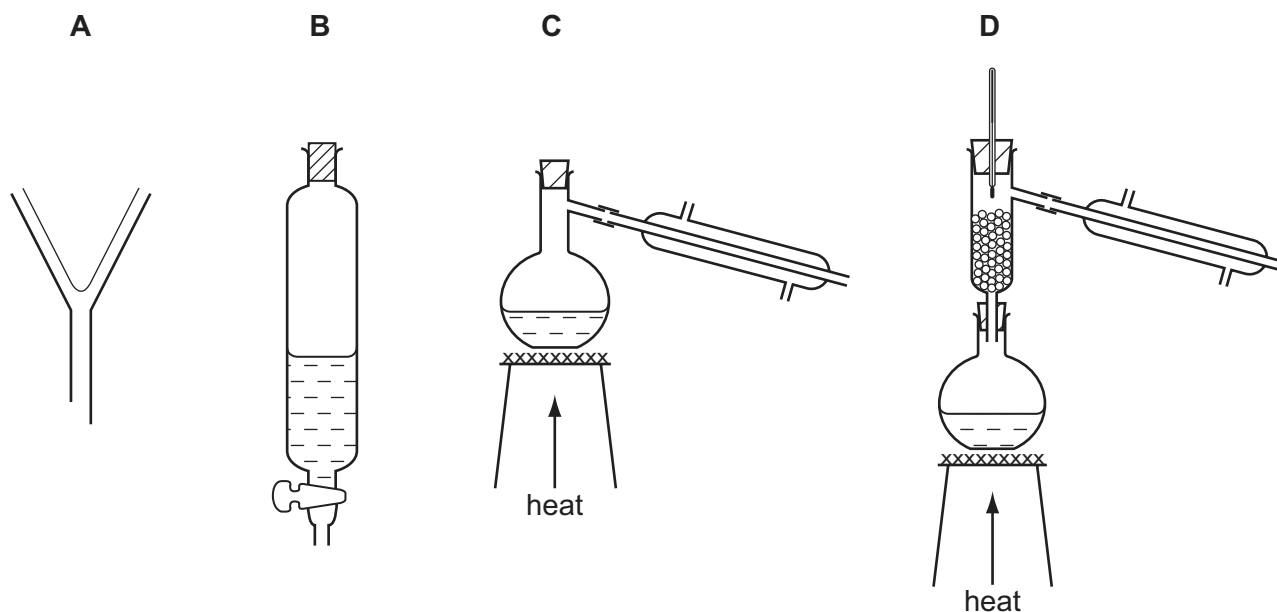
13 The diagram shows part of the carbon cycle.

Which arrow shows respiration by plants?

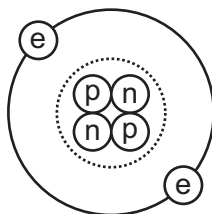


14 Hexane and octane are liquid hydrocarbons that mix together.

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



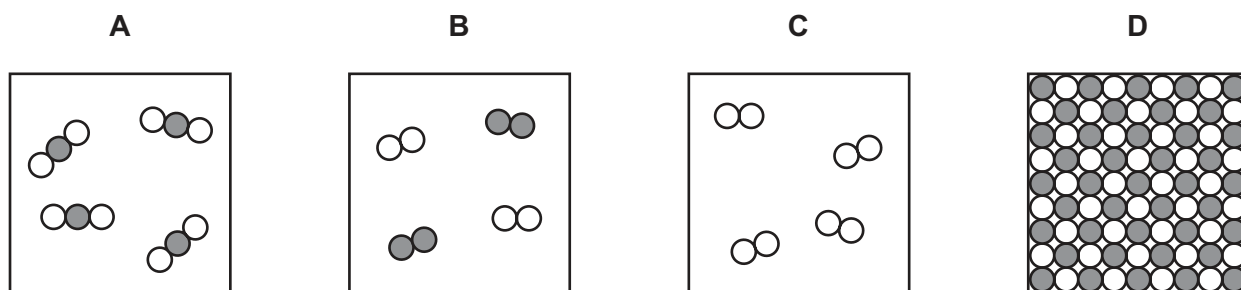
15 The diagram shows a helium atom.



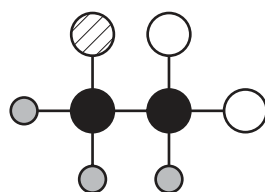
Which particles in the helium atom have approximately the same mass?

- 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.



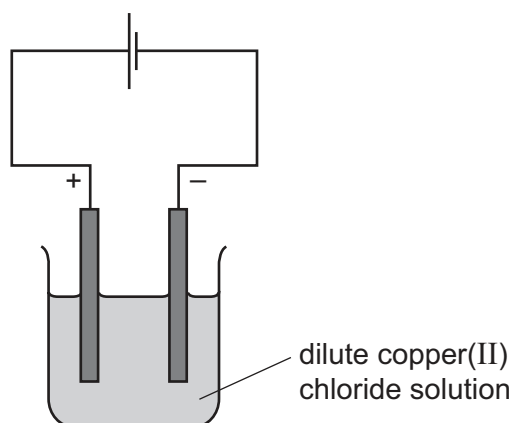
key

-  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.



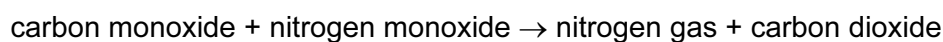
Why is a catalyst used in this reaction?

- 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

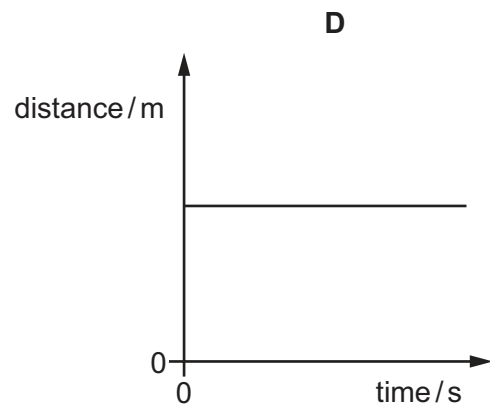
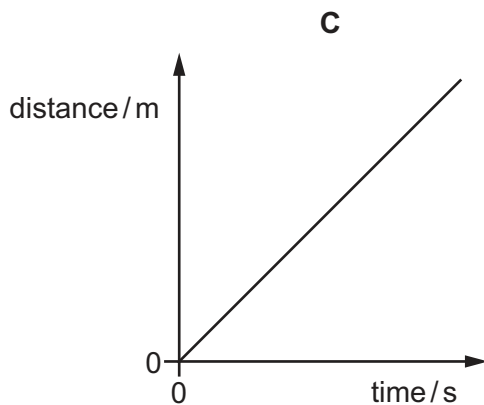
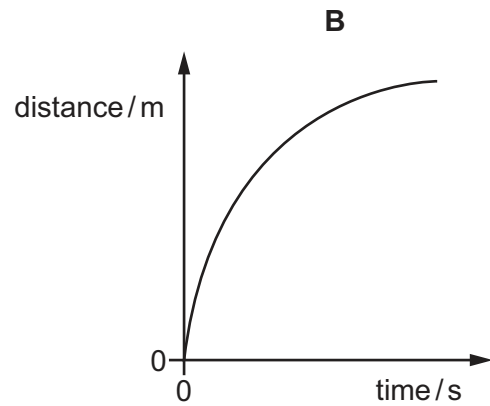
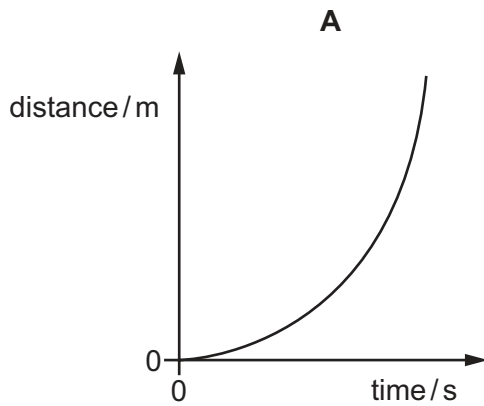
27 Ethanol is formed when steam reacts with compound Y.

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.

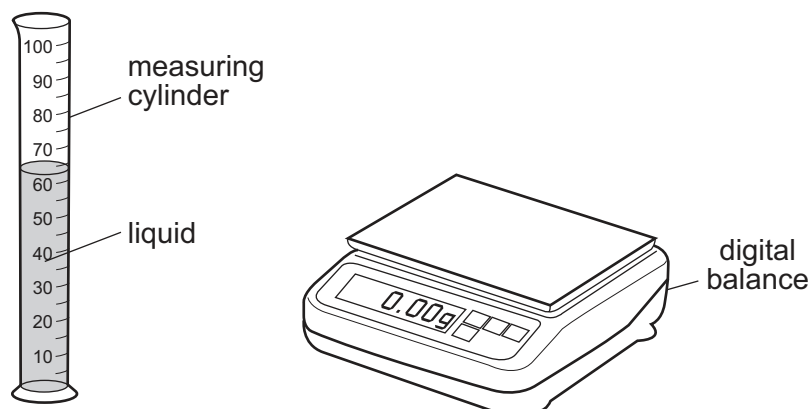
Which graph shows an object moving at constant speed?



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

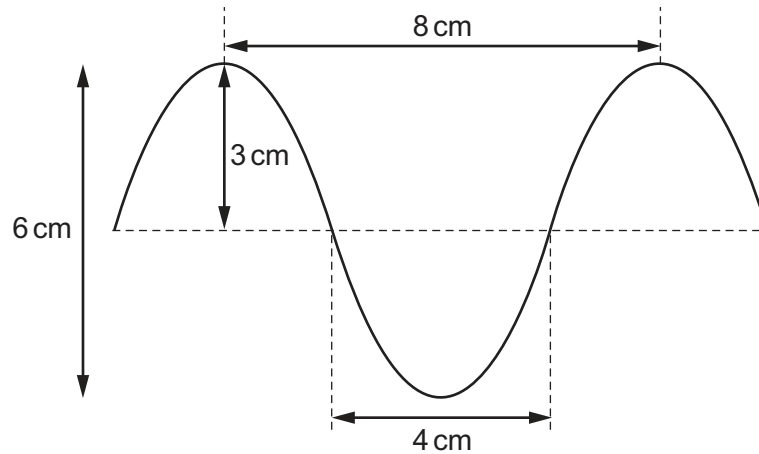
How should the sample be described at the end of the 12 minutes?

- 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.



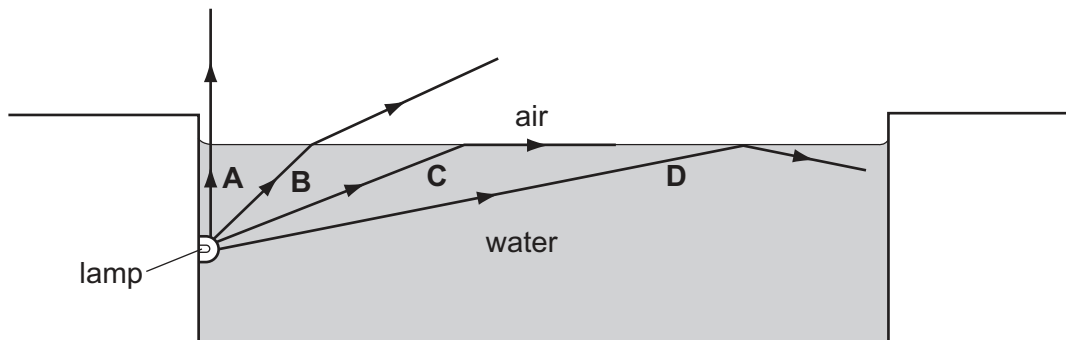
What are the amplitude and the wavelength of this wave?

	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.

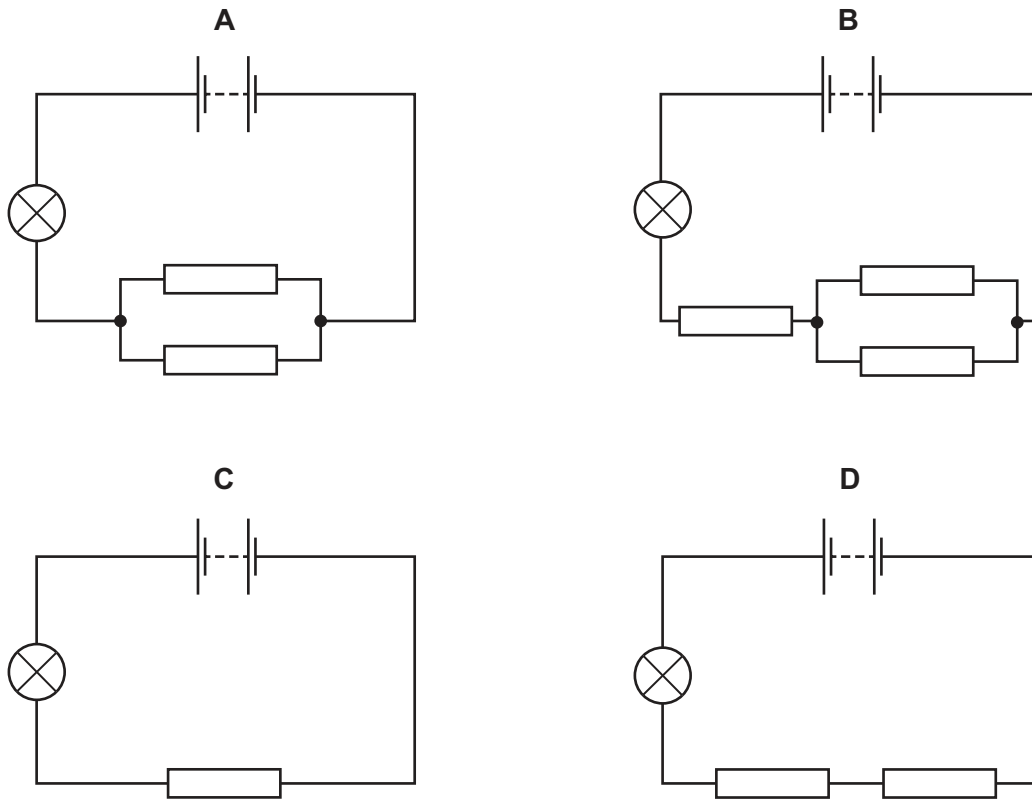
What should be the rating of the fuse?

- 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.

DATA SHEET
The Periodic Table of the Elements

		Group												
		I	II	III	IV	V	VI	VII	VIII	IX	X	0		
		1 H Hydrogen 1										4 He Helium 2		
7	9	3	4											20
Li Lithium	Be Beryllium											Ne Neon		
23	24											10		
Na Sodium	Mg Magnesium											Ar Argon		
11	12											18		
39	40											84		
K Potassium	Ca Calcium											Kr Krypton		
19	20											36		
85	88											131		
Rb Rubidium	Sr Strontium											Xe Xenon		
37	38											54		
133	137											222		
Cs Caesium	Ba Barium											Rn Radon		
55	56											86		
223	226											86		
Fr Francium	Ra Radium											Lu Lutetium		
87	88											71		
												260		
												Lr Lawrencium		
												103		

11	12	14	16	19	20
B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	Ne Neon
5	6	7	8	9	10
27	28	31	32	35.5	40
Al Aluminium	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ar Argon
13	14	15	16	17	18
70	73	75	79	80	84
Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Kr Krypton
31	32	33	34	35	36
115	119	122	128	127	131
In Indium	Sn Tin	Sb Antimony	Te Tellurium	I Iodine	Xe Xenon
49	50	51	52	53	54
204	207	209	209	210	222
Tl Thallium	Pb Lead	Bi Bismuth	Po Polonium	At Astatine	Rn Radon
81	82	83	84	85	86

65	64	59	59	56	55	52	51	48	47	40	39	37
Zn Zinc	Cu Copper	Ni Nickel	Co Cobalt	Fe Iron	Mn Manganese	Cr Chromium	V Vanadium	Ti Titanium	Sc Scandium	Y Yttrium	La Lanthanum	Ac Actinium
30	29	28	27	26	25	24	23	22	21	20	19	18
112	108	106	103	101	96	96	93	91	89	88	87	86
Cd Cadmium	Ag Silver	Pd Palladium	Rh Rhodium	Ru Ruthenium	Tc Technetium	Mo Molybdenum	Nb Niobium	Zr Zirconium	Hf Hafnium	Sr Strontium	Ba Barium	Ra Radium
48	47	46	45	44	43	42	41	40	39	38	37	36
201	197	195	192	190	186	184	181	178	172	139	137	227
Hg Mercury	Au Gold	Pt Platinum	Ir Iridium	Os Osmium	Re Rhenium	W Tungsten	Ta Tantalum	Hf Hafnium	*	La Lanthanum	Ba Barium	Ra Radium
80	79	78	77	76	75	74	73	72	†	57	56	88

162	165	167	169	173	175
Dy Dysprosium	Ho Holmium	Er Erbium	Tm Thulium	Yb Ytterbium	Lu Lutetium
66	67	68	69	70	71
251	252	257	258	259	260
Cf Californium	Es Einsteinium	Fm Fermium	Md Mendelevium	No Nobelium	Lr Lawrencium
98	99	100	101	102	103

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

	a	X	a = relative atomic mass
Key	X	X	X = atomic symbol
	b	b	b = proton (atomic) number

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