



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice

May/June 2012

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.

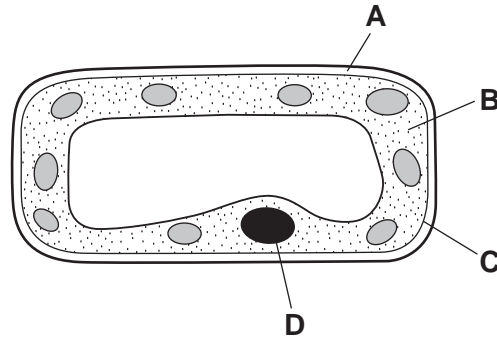
A copy of the Periodic Table is printed on page 20.

This document consists of **17** printed pages and **3** blank pages.



1 The diagram shows a section through a cell from a leaf.

Which part is the cell membrane?



2 What happens in photosynthesis?

- A Carbon dioxide is made.
- B Oxygen is used.
- C Starch is absorbed.
- D Water is used.

3 Which word equation represents aerobic respiration?

- A carbon dioxide + oxygen → glucose + water
- B carbon dioxide + water → glucose + oxygen
- C glucose + oxygen → carbon dioxide + water
- D glucose + oxygen → lactic acid

4 Some cancer treatments cause a reduction in the number of a person's white blood cells.

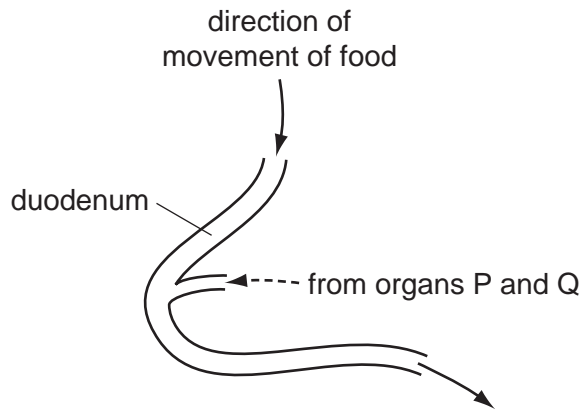
Why might this be a problem?

- A Blood takes longer to clot.
- B Infections are more likely to cause illness.
- C Insufficient oxygen reaches the brain.
- D Less carbon dioxide is carried to the lungs.

5 Why is calcium needed in the diet?

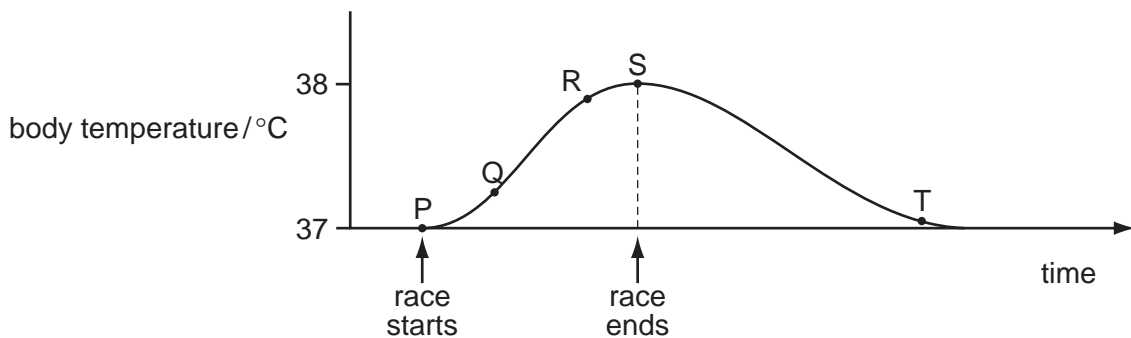
- A to make carbohydrates
- B to make teeth
- C to make enzymes
- D to make muscles hard

- 6 The diagram shows part of the alimentary canal.



Which organs are represented by P and Q?

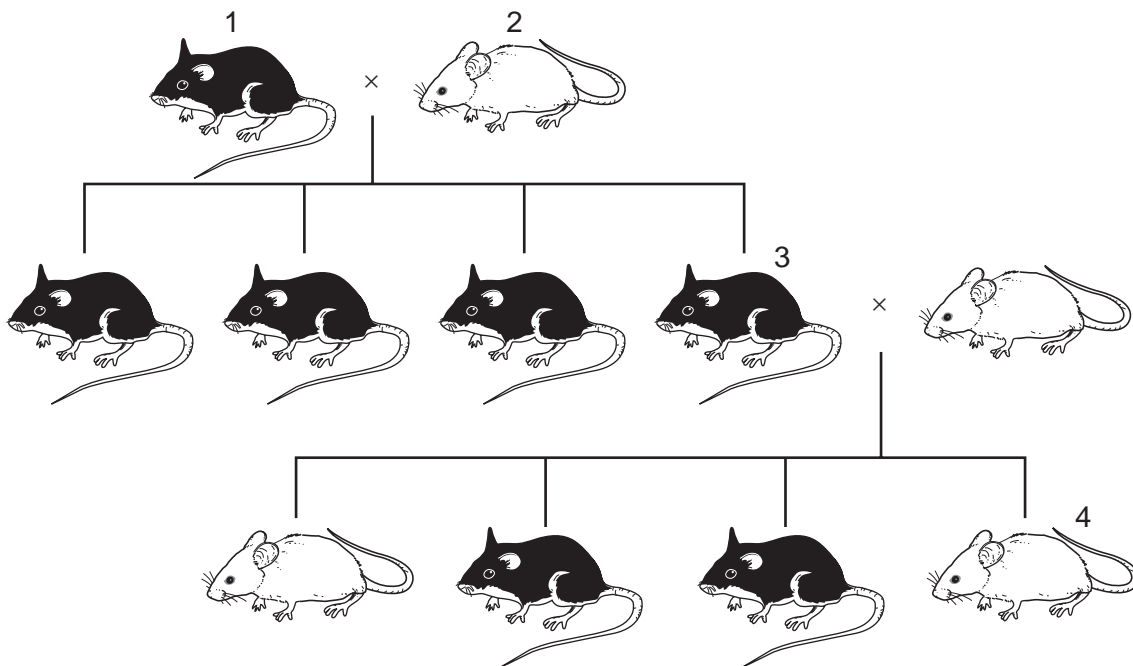
- A kidneys and pancreas
 - B liver and pancreas
 - C liver and stomach
 - D pancreas and stomach
- 7 A person touches a hot object which triggers a reflex action.
In which order does the signal travel in the reflex arc?
- A relay neurone → spinal cord → sensory neurone
 - B sensory neurone → spinal cord → motor neurone
 - C spinal cord → sensory neurone → stimulus
 - D stimulus → motor neurone → spinal cord
- 8 The graph shows body temperature before, during and after running a race on a hot day.



Which change in body temperature occurs as a result of homeostasis?

- A P to Q
- B Q to R
- C R to S
- D S to T

- 9 Which structure contracts to expel the baby during birth?
- A cervix
B oviduct
C uterus wall
D vagina
- 10 In a flowering plant, which structure contains the female gamete?
- A anther
B ovule
C pollen grain
D stigma
- 11 The diagram shows the results of a breeding experiment using black and white mice.



Which statement is correct?

- A Mouse 1 has a dominant allele for fur colour.
B Mouse 2 is heterozygous for fur colour.
C Mouse 3 is homozygous for fur colour.
D Mouse 4 is heterozygous for fur colour.

12 The diagram shows a food chain.

Which organisms pass the greatest amount of energy along the food chain?

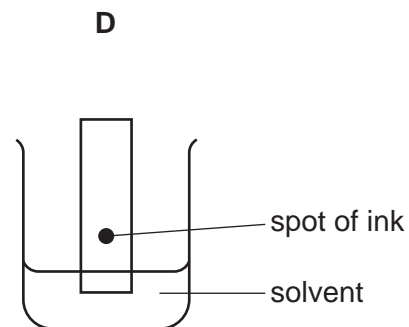
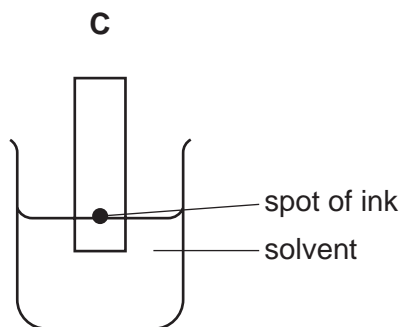
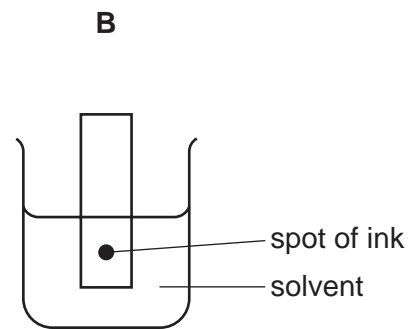
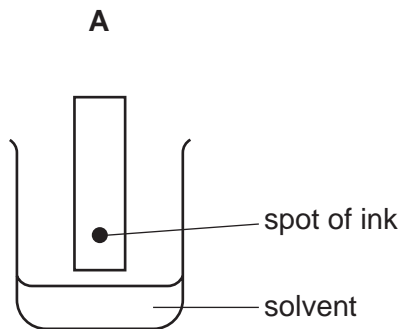


13 What can lead to global warming?

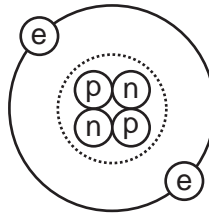
	deforestation	burning of fossil fuels
A	✓	✓
B	✓	x
C	x	✓
D	x	x

14 The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?



15 The diagram shows a helium atom.



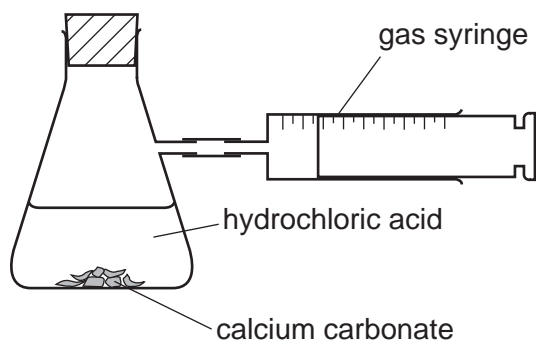
Which particles in the helium atom have approximately the same mass?

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

16 How many atoms of metals and of non-metals are shown in the formula Na_2SO_4 ?

	atoms of metals	atoms of non-metals
A	1	1
B	1	2
C	2	4
D	2	5

- 17 The apparatus shown is used to investigate the speed of reaction between hydrochloric acid and calcium carbonate.



The time to collect 50 cm^3 of gas is measured.

Using concentrated acid and lumps of calcium carbonate, the time is 150 s.

In a second experiment, the time is 90 s.

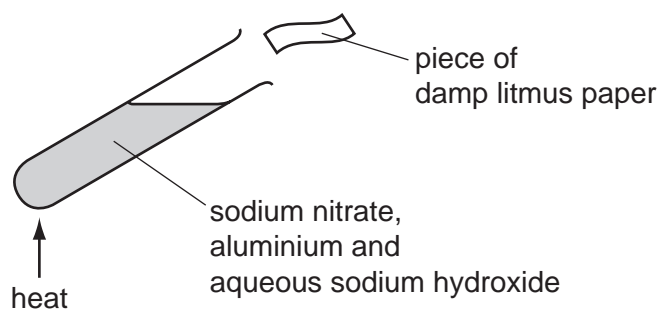
Which change was made in the second experiment?

- A larger lumps of calcium carbonate
 - B less concentrated acid
 - C lower temperature
 - D powdered calcium carbonate
- 18 Hydrogen and oxygen react explosively to form water.

Which terms describe this reaction?

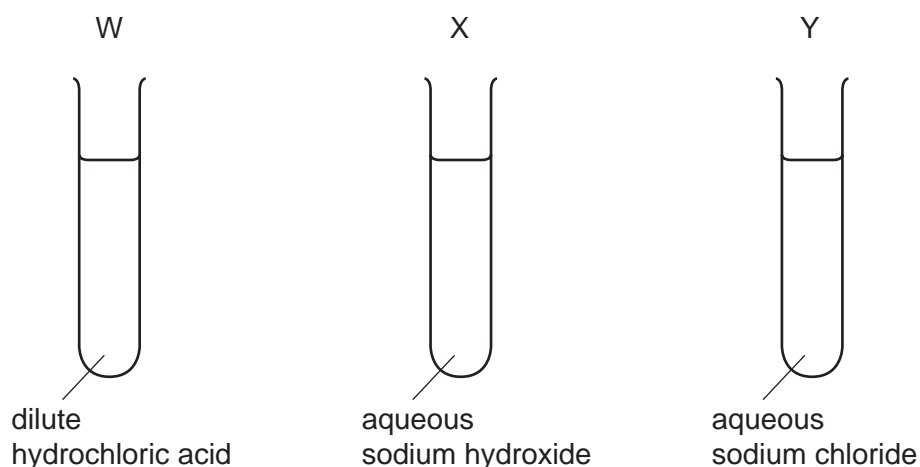
	combustion	oxidation
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 19 The diagram shows litmus paper testing the gas that is given off from the contents of the test tube.



The damp litmus paper

- A turns blue.
 - B turns colourless.
 - C turns red.
 - D turns red then colourless.
- 20 Universal Indicator solution is added to test-tubes W, X and Y.



What are the colours of the Universal Indicator?

	in W	in X	in Y
A	green	red	purple
B	purple	green	red
C	red	green	purple
D	red	purple	green

21 The table shows physical properties of some substances.

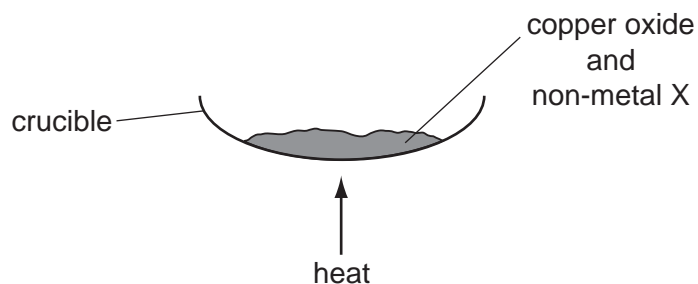
Which substance is a metal?

	malleability	density	electrical conductivity
A	brittle	high density	high
B	brittle	low density	low
C	malleable	high density	high
D	malleable	low density	low

22 Which statement about lithium, sodium and potassium is **not** correct?

- A** They are in the same group of the Periodic Table.
- B** They are in the same period of the Periodic Table.
- C** They float on water.
- D** They react with water to give a flammable gas.

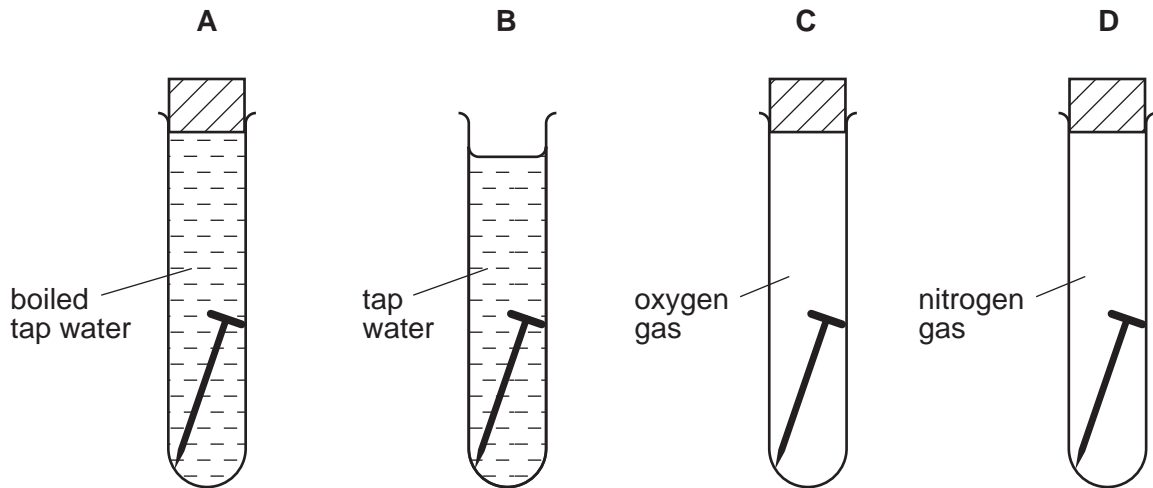
23 Copper is obtained from copper oxide by heating with non-metal X.



Which shows the identity of non-metal X and the type of reaction non-metal X undergoes?

	identity of X	type of reaction
A	carbon	oxidation
B	carbon	reduction
C	oxygen	oxidation
D	oxygen	reduction

24 In which tube does the iron nail rust in the shortest time?

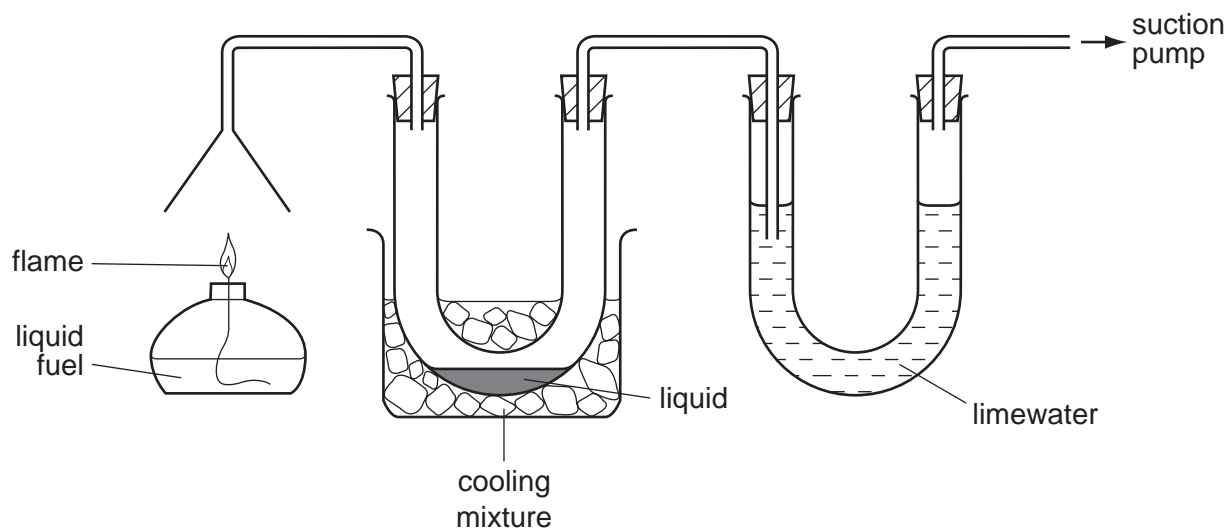


25 Fertilisers are used to supply the essential elements needed for plant growth.

Which compound supplies two of these essential elements?

- A $\text{Ca}(\text{H}_2\text{PO}_4)_2$
- B $\text{Ca}(\text{NO}_3)_2$
- C KNO_3
- D $(\text{NH}_4)_2\text{SO}_4$

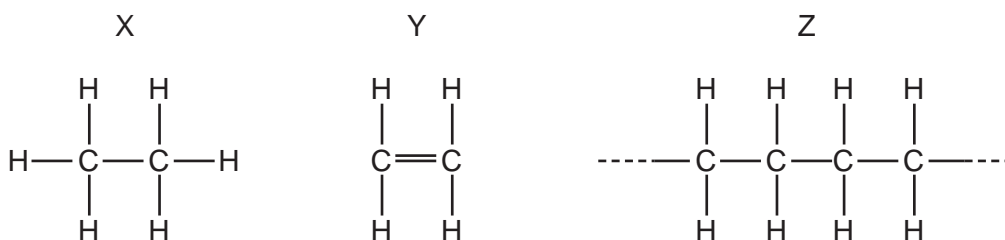
26 The burning of a fuel is investigated using the apparatus shown.



Which substances is the apparatus testing for?

- 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 three molecules.



Which molecule is a monomer and which is a polymer?

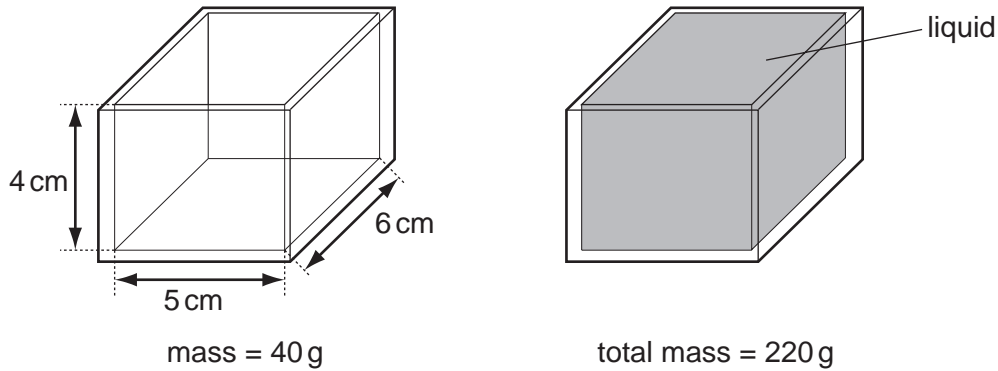
	monomer	polymer
A	X	Z
B	Y	Z
C	Y	X
D	Z	Y

- 28 A motorist starts out on a 210 km journey at 8 am. At 10 am he stops for a 30 minute break after covering 180 km. The motorist completes the journey at 11 am.

What is his average speed in covering the 210 km?

- A 60 km/h B 70 km/h C 84 km/h D 90 km/h

- 29 The diagrams show a glass tank with inside measurements of 5 cm × 6 cm × 4 cm.

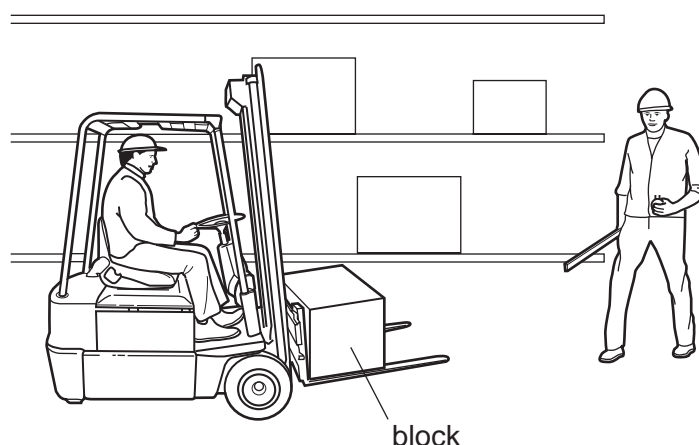


The tank has a mass of 40 g when empty. When the tank is filled with a liquid, the tank and liquid have a total mass of 220 g.

What is the density of the liquid?

- A $\frac{220}{(5 \times 6 \times 4)} \text{ g/cm}^3$
 B $\frac{(220 - 40)}{(5 \times 6 \times 4)} \text{ g/cm}^3$
 C $\frac{(5 \times 6 \times 4)}{220} \text{ g/cm}^3$
 D $\frac{(5 \times 6 \times 4)}{(220 - 40)} \text{ g/cm}^3$

- 30 A workman lifts a cubic block from ground level to a high shelf using a fork lift truck. A second workman has a metre rule and a stopwatch.



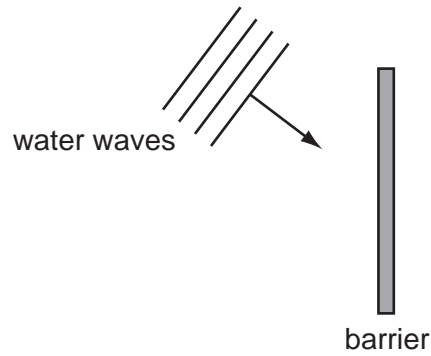
Which quantity will the second workman be able to determine, using **only** the metre rule and the stopwatch?

- A the average speed of the block as it moves up
 - B the density of the material of the block
 - C the pressure exerted by the block on the shelf
 - D the work done on the block when it is lifted
- 31 On a warm day, a driver checks the air pressure in a car tyre. Overnight the temperature drops and the air pressure in the tyre falls. There are no air leaks in the tyre.

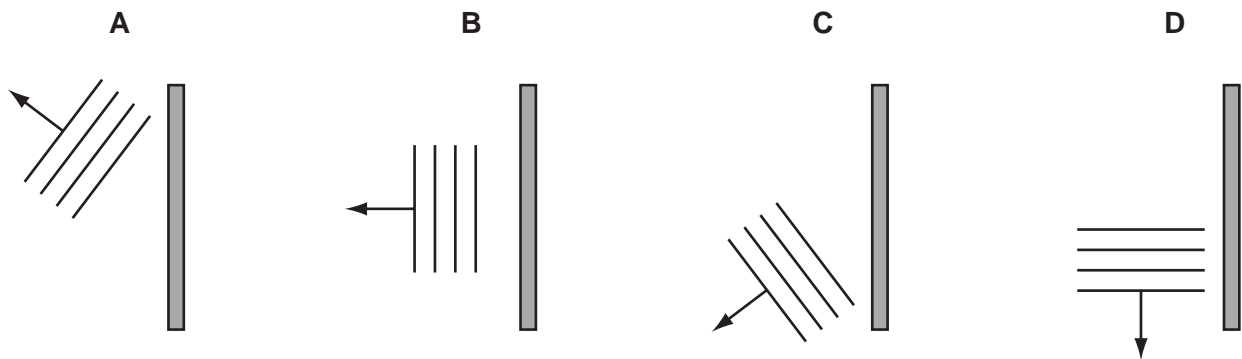
Why does the pressure fall?

- A The air molecules in the tyre move more slowly.
 - B The air molecules in the tyre stop moving.
 - C The volume of the air in the tyre decreases.
 - D The volume of the air in the tyre increases.
- 32 How is heat transferred in a vacuum?
- A by conduction and convection
 - B by convection and radiation
 - C by convection only
 - D by radiation only

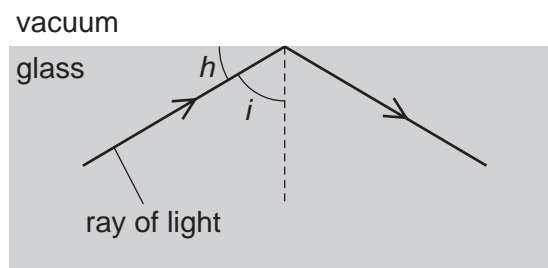
33 The diagram shows water waves travelling towards a barrier.



Which diagram shows the direction of the waves after being reflected by the barrier?



34 A glass block is surrounded by a vacuum. A ray of light strikes the inside of the glass block, and is totally reflected back into the block.



Why does this happen?

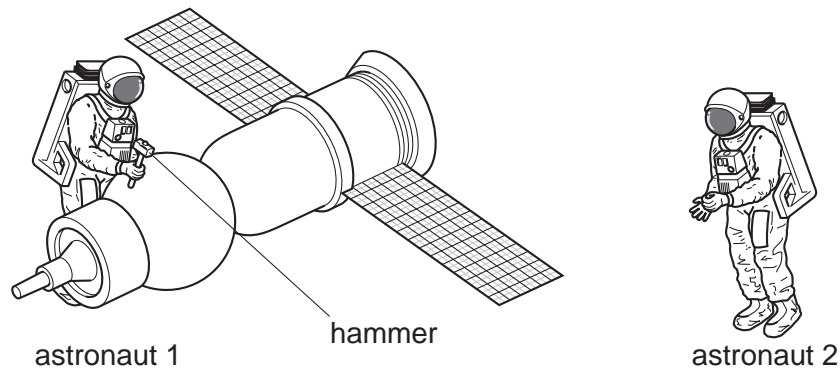
- A Angle h is greater than the critical angle.
- B Angle i is greater than the critical angle.
- C Light cannot travel through a vacuum.
- D The ray is travelling along the normal.

35 The Sun emits infra-red radiation, ultraviolet radiation and visible light.

Which statement about the time it takes these radiations to reach Earth's atmosphere is correct?

- A Infra-red radiation arrives first.
- B Ultraviolet radiation arrives first.
- C Visible light arrives first.
- D They all arrive at the same time.

36 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no air in space.



Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

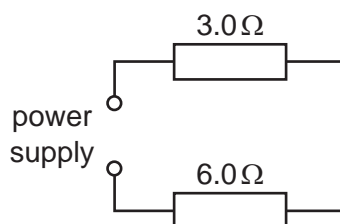
- A a louder sound
- B a quieter sound
- C a sound of the same loudness
- D no sound at all

37 The instructions for a household lamp state that the plug should be fitted with a 3 A fuse.

What could happen if, by mistake, a 13 A fuse is fitted?

- A The fuse might melt too easily.
- B The lamp might explode if a fault develops.
- C The wires connecting the lamp to the plug might overheat if a fault developed.
- D Too much voltage might be supplied to the lamp.

38 A $3.0\ \Omega$ resistor and a $6.0\ \Omega$ resistor are connected to a power supply as shown.



What is the total resistance of the circuit?

- A** $2.0\ \Omega$ **B** $3.0\ \Omega$ **C** $9.0\ \Omega$ **D** $18\ \Omega$

39 In the lighting circuit in a house, how are lamps usually connected, and what is one reason for this?

	usual connection	reason
A	parallel	to allow every lamp to have the full supply voltage
B	parallel	to share out the voltage equally between the lamps
C	series	to allow every lamp to have the full supply voltage
D	series	to share out the voltage equally between the lamps

40 What are carbon-12 and carbon-14?

- A** atoms of different elements with different nuclear masses
B atoms of different elements with the same nuclear mass
C atoms of the same element with different nuclear masses
D atoms of the same element with the same nuclear mass

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		
226	227	227										
Fr Francium 87	Ra Radium 88	Ac Actinium 89										
*58-71 Lanthanoid series †90-103 Actinoid series												
		140	141	144	150	152	157	159	162	165	167	
		Ce Cerium 58	Pr Praseodymium 59	Nd Neodymium 60	Pm Promethium 61	Sm Samarium 62	Eu Europium 63	Gd Gadolinium 64	Dy Dysprosium 66	Ho Holmium 67	Er Erbium 68	
		232	238	238	238	238	238	238	238	238	238	
		Th Thorium 90	Pa Protactinium 91	U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	
		169	173	173	173	173	173	173	173	173	173	
		Tm Thulium 69	Yb Ytterbium 70	Lu Lutetium 71	No Nobelium 102	Md Mendelevium 101	Fm Fermium 100	Er Erbium 68	Ho Holmium 67	Dy Dysprosium 66	Ho Holmium 67	
		175	175	175	175	175	175	175	175	175	175	
		Lu Lutetium 71	Yb Ytterbium 70	Lu Lutetium 71	No Nobelium 102	Md Mendelevium 101	Fm Fermium 100	Er Erbium 68	Ho Holmium 67	Dy Dysprosium 66	Ho Holmium 67	
		86	86	86	86	86	86	86	86	86	86	
		Rn Radon 86	At Astatine 85	Po Polonium 84	Bi Bismuth 83	Pb Lead 82	Tl Thallium 81	Pb Lead 82	Bi Bismuth 83	Po Polonium 84	At Astatine 85	
		84	84	84	84	84	84	84	84	84	84	
		Kr Krypton 36	Br Bromine 35	Se Selenium 34	As Arsenic 33	Ge Germanium 32	Ga Gallium 31	Zn Zinc 30	Cu Copper 29	Ni Nickel 28	Co Cobalt 27	
		80	80	80	80	80	80	80	80	80	80	
		Kr Krypton 36	Br Bromine 35	Se Selenium 34	As Arsenic 33	Ge Germanium 32	Ga Gallium 31	Zn Zinc 30	Cu Copper 29	Ni Nickel 28	Co Cobalt 27	
		127	127	127	127	127	127	127	127	127	127	
		Xe Xenon 54	I Iodine 53	Te Tellurium 52	Sb Antimony 51	Sn Tin 50	In Indium 49	Cd Cadmium 48	Ag Silver 47	Pd Palladium 46	Rh Rhodium 45	
		131	131	131	131	131	131	131	131	131	131	
		Xe Xenon 54	I Iodine 53	Te Tellurium 52	Sb Antimony 51	Sn Tin 50	In Indium 49	Cd Cadmium 48	Ag Silver 47	Pd Palladium 46	Rh Rhodium 45	
		209	209	209	209	209	209	209	209	209	209	
		Rn Radon 86	At Astatine 85	Po Polonium 84	Bi Bismuth 83	Pb Lead 82	Tl Thallium 81	Hg Mercury 80	Au Gold 79	Pt Platinum 78	Ir Iridium 77	

Key

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

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.