



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/11**

Paper 1 Multiple Choice

**October/November 2013**

**45 minutes**

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

\* 5 1 8 5 5 8 9 1 1 8 \*

**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.

**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.

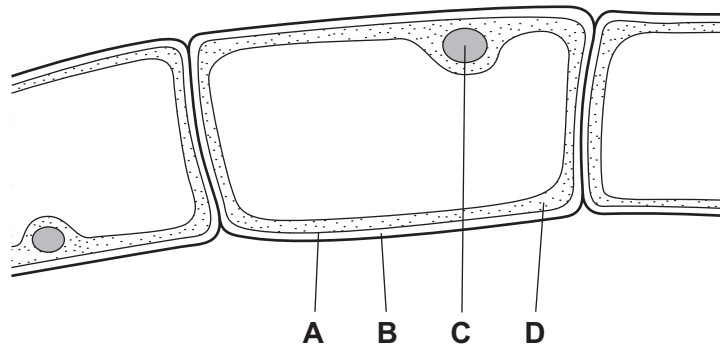
Electronic calculators may be used.

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

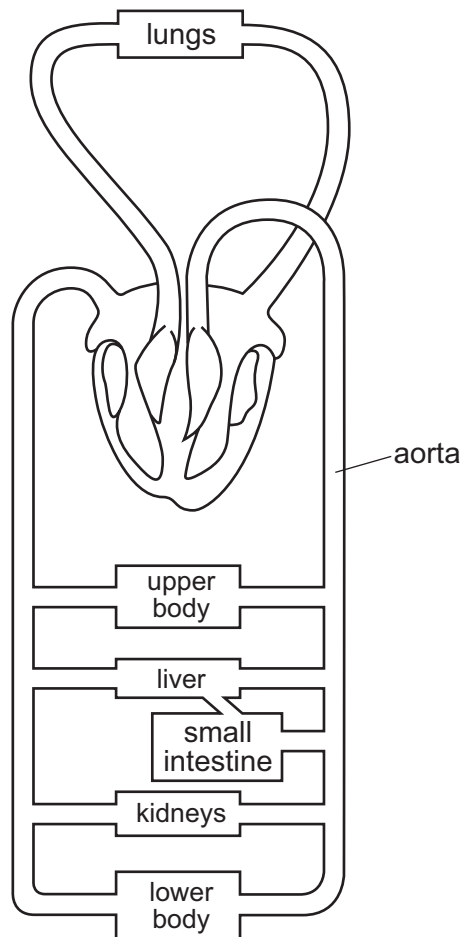


- 1 The diagram shows part of an organism that lives in water, magnified by a microscope.

Which part shows that the organism **must** be a plant?



- 2 The diagram shows the blood circulatory system of a human.



How many times must a blood cell pass through the heart on its way from the kidneys to the aorta?

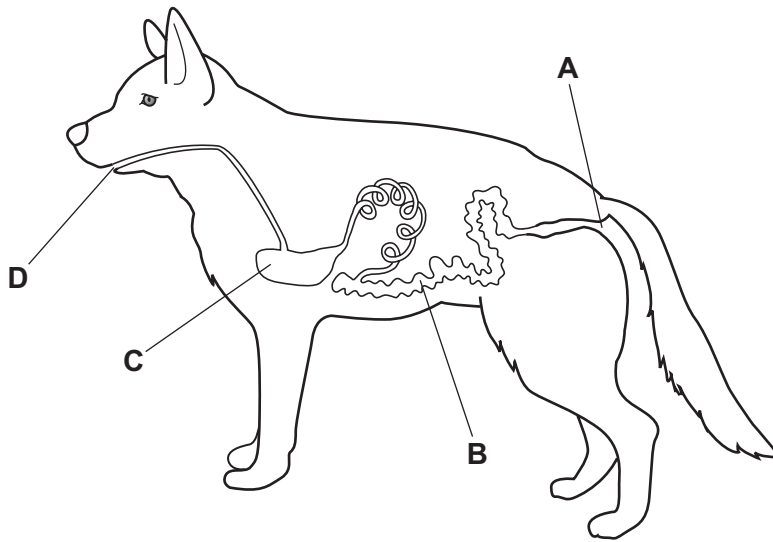
- A once only
- B twice only
- C four times
- D more than four times

3 Which row shows a chemical molecule and the basic unit from which it is made?

	chemical molecule	basic unit
<b>A</b>	glycogen	amino acid
<b>B</b>	glycogen	simple sugar
<b>C</b>	oil	amino acid
<b>D</b>	oil	simple sugar

4 The diagram shows the alimentary canal of a dog.

Where does egestion occur?



5 Which statement about blood components is correct?

- A** Platelets make antibodies.
- B** Platelets transport oxygen.
- C** White blood cells carry out phagocytosis.
- D** White blood cells transport carbon dioxide.

6 Which is **not** a way that liver cells use energy?

- A** cell division
- B** heat production
- C** movement
- D** protein synthesis

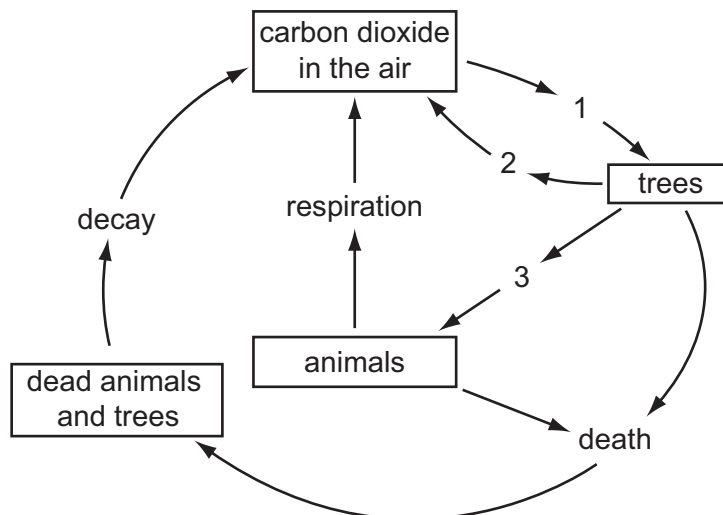
- 7 What is the meaning of homeostasis?
- A breathing faster after exercise
  - B getting rid of carbon dioxide from the lungs
  - C keeping conditions in the body constant
  - D preventing the body from getting too hot
- 8 What does the central nervous system consist of?
- A brain and peripheral nerves
  - B brain and spinal cord
  - C brain only
  - D spinal cord only
- 9 Pollination is the transfer of pollen
- A from anther to sepal.
  - B from anther to stigma.
  - C from sepal to anther.
  - D from stigma to anther.
- 10 In a plant, what leads to offspring that are identical to the parent?
- A asexual reproduction
  - B insect-pollination
  - C seed germination
  - D sexual reproduction
- 11 In mice, the allele for black fur is dominant to the allele for white fur. Two heterozygous mice mate.
- What colour are the offspring likely to be?
- A all black
  - B some black and some white
  - C all grey
  - D all white

- 12 Dung beetles lay their eggs in the faeces of plant-eating mammals like buffalo. Both the adult beetles and their young stages eat the **undigested** food in the faeces.

Which shows this food relationship?

- A buffalo → dung beetles  
buffalo → grass
- B dung beetles → grass → buffalo
- C grass → dung beetles → buffalo
- D grass → buffalo  
grass → dung beetles

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

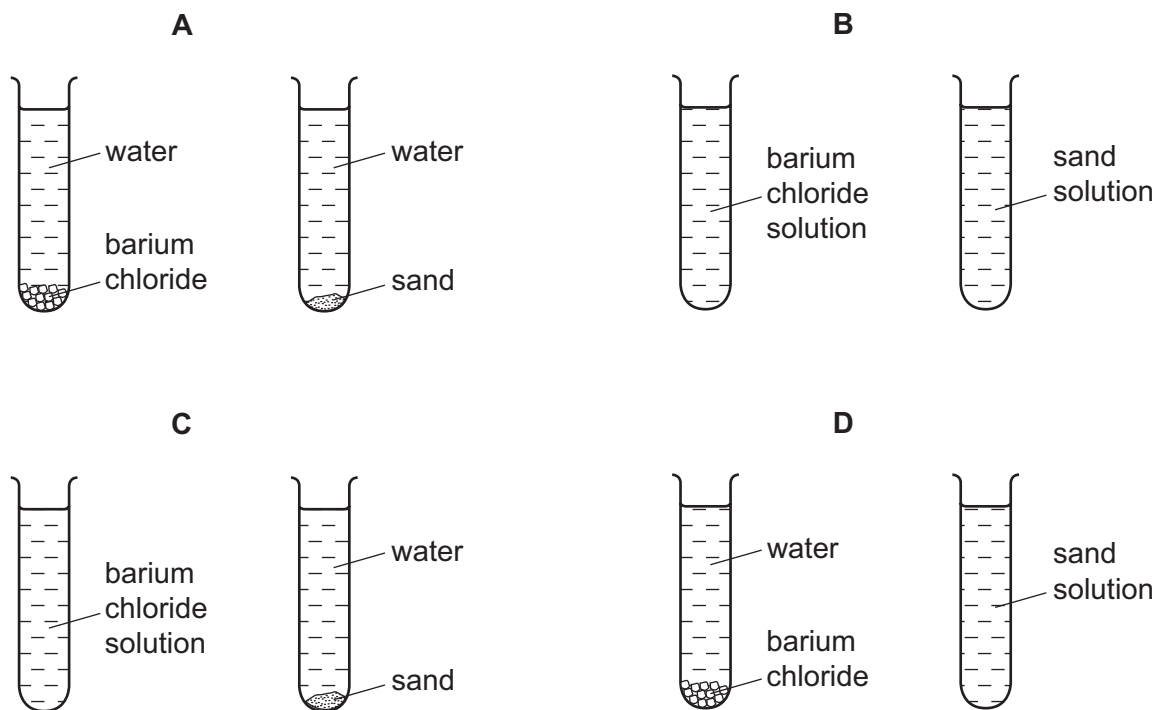


Which of these processes is reduced as a result of deforestation?

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

- 14 Small amounts of barium chloride and sand are shaken with separate samples of water in two test-tubes. The test-tubes are left to stand for 24 hours.

Which diagram shows how the test-tubes appear at the end?



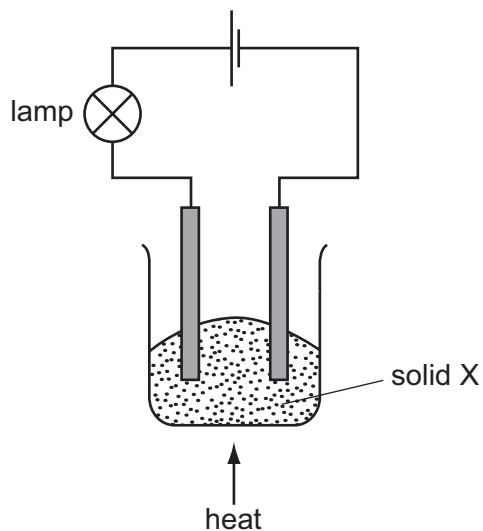
- 15 Substance Q is used to make a cooking pan.



What are the properties of substance Q?

	melting point	thermal conductivity
<b>A</b>	high	high
<b>B</b>	high	low
<b>C</b>	low	high
<b>D</b>	low	low

16 The experiment shown is used to investigate the properties of solid X.



At first, the lamp does not light.

On heating, solid X melts and the lamp lights.

What type of substance is X?

- A a compound of a metal and a non-metal
- B a compound of two non-metals
- C a metallic element
- D a non-metallic element

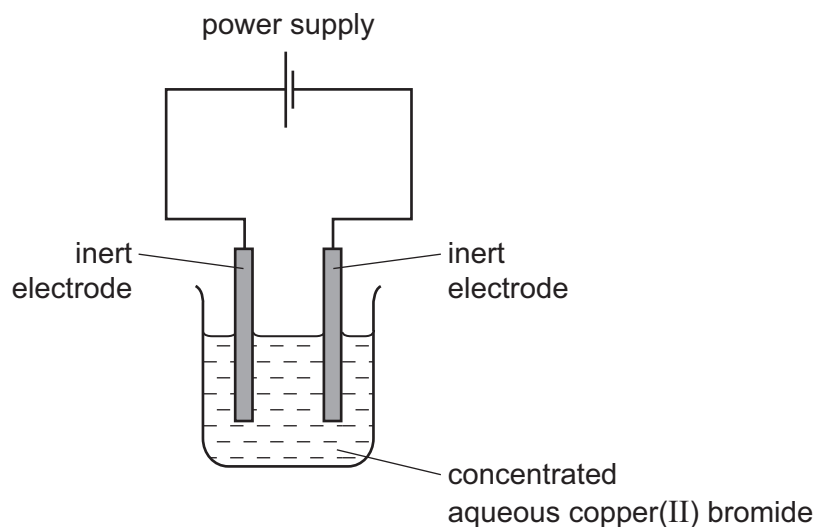
17 The table shows the temperature of some water before and after a solid is dissolved in it.

Which change is the most exothermic?

	temperature before /°C	temperature after /°C
<b>A</b>	20	18
<b>B</b>	20	40
<b>C</b>	25	18
<b>D</b>	25	42

18 The diagram shows the circuit for electrolysis of concentrated aqueous copper(II) bromide.

Copper(II) bromide is similar to copper(II) chloride.



Which row describes the products at each electrode?

	cathode	anode
<b>A</b>	bromine	copper
<b>B</b>	copper	bromine
<b>C</b>	copper	oxygen
<b>D</b>	hydrogen	bromine

19 Hydrogen can occur as an atom, an ion and a molecule.

Which row represents these particles?

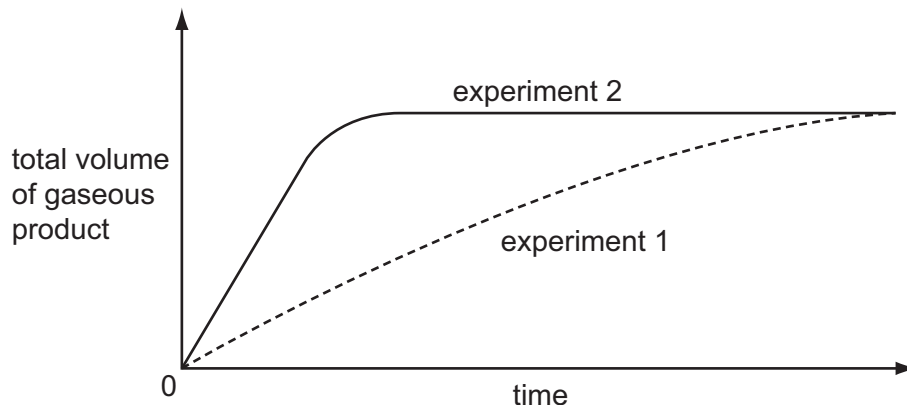
	atom	ion	molecule
<b>A</b>	H	H <sup>+</sup>	H <sub>2</sub>
<b>B</b>	H	H <sub>2</sub>	H <sup>+</sup>
<b>C</b>	H <sup>+</sup>	H	H <sub>2</sub>
<b>D</b>	H <sub>2</sub>	H <sup>+</sup>	H



- 20 Substance X does not react with dilute acid. Substance Y reacts with dilute acid, forming a gas.

The graph shows the results of two experiments.

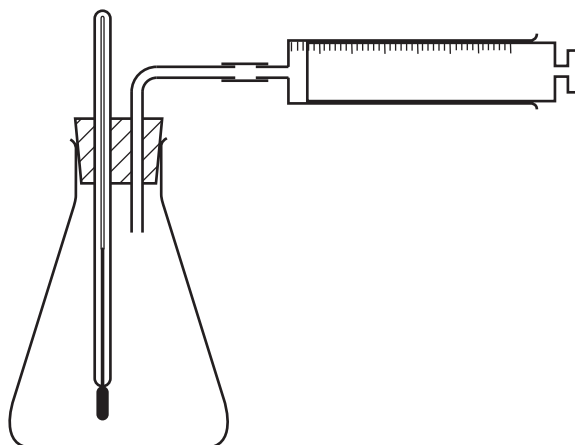
experiment 1 Y + dilute acid  
 experiment 2 X + Y + dilute acid



What do these results show?

	X is a catalyst	X is quickly used up	
<b>A</b>	✓	✓	key ✓ = true x = false
<b>B</b>	✓	x	
<b>C</b>	x	✓	
<b>D</b>	x	x	

- 21 The apparatus below is used to investigate the speed of a chemical reaction.



For which reaction is the apparatus suitable?

- A** gas E + gas F → liquid G only  
**B** solid H + solution I → solution J only  
**C** solid K + solution L → solution M + gas N  
**D** solution P + solution Q → solid R + solution Q

22 The elements from sodium to sulfur are in the same period of the Periodic Table.

Na	Mg	Al	Si	P	S
----	----	----	----	---	---

Which trend does **not** occur across the Periodic Table from sodium to sulfur?

- A The chlorides of the elements change from covalent to ionic.
- B The elements change from good to poor electrical conductors.
- C The oxides of the elements change from basic to acidic.
- D The solid elements change from malleable to brittle.

23 A label from a packet of indigestion tablets is shown.

Each tablet contains:	
magnesium carbonate	120 mg
magnesium hydroxide	15 mg
magnesium oxide	62 mg
magnesium sulfate	47 mg

Which substance does **not** neutralise stomach acid?

- A magnesium carbonate
- B magnesium hydroxide
- C magnesium oxide
- D magnesium sulfate

24 The elements in a Group of the Periodic Table are solid at 20 °C.

The reactivity of the elements increases down the group.

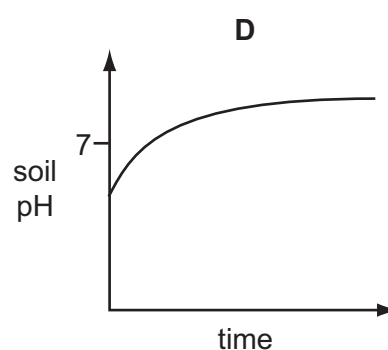
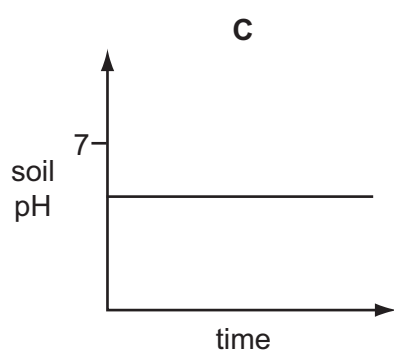
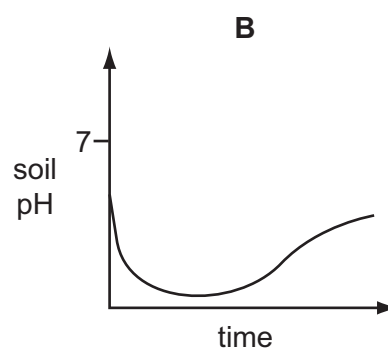
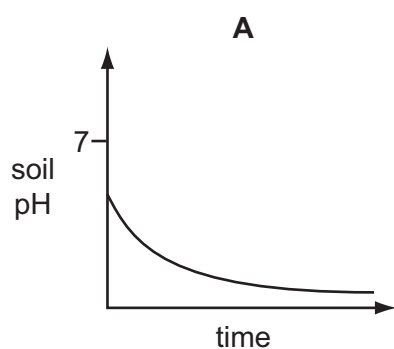
Which statements about this group of elements and their oxides are correct?

	the elements are in	their oxides are
A	Group I	acidic
B	Group I	basic
C	Group VII	acidic
D	Group VII	basic

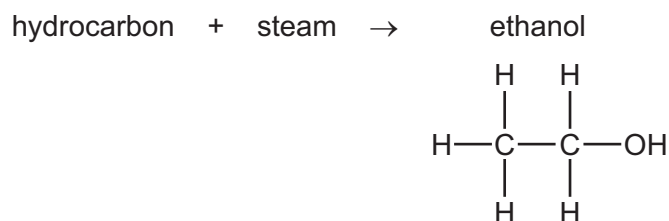
- 25 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

	type of reaction	temperature change
<b>A</b>	endothermic	decrease
<b>B</b>	endothermic	increase
<b>C</b>	exothermic	decrease
<b>D</b>	exothermic	increase

- 26 Which graph shows how the pH of the soil changes when lime is added?



27 Ethanol can be made by reacting steam with a hydrocarbon.

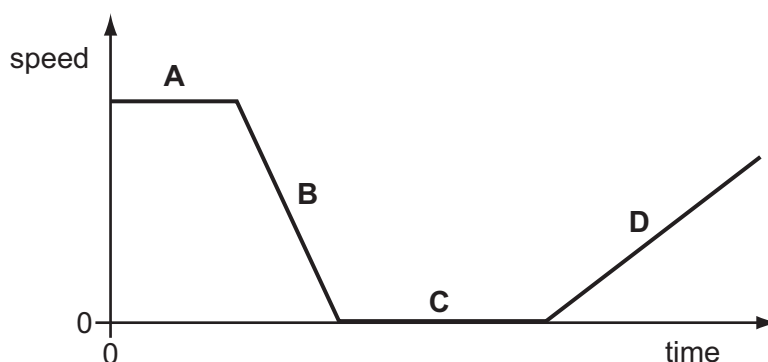


What is the name of the hydrocarbon?

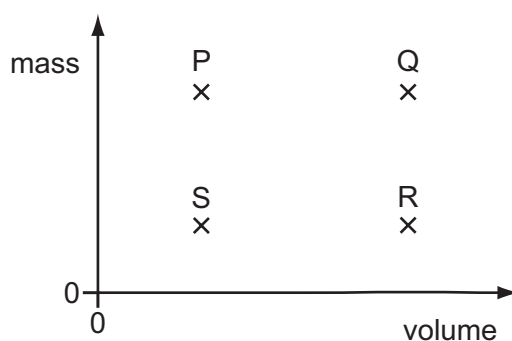
- A ethane
- B ethene
- C methane
- D propene

28 The graph shows the motion of a train during part of a journey.

At which labelled point on the graph could the train be waiting at a station?



29 The diagram shows a graph with values of mass against volume for four different objects P, Q, R and S.



Which two objects have the same density?

- A P and Q
- B P and R
- C R and S
- D S and Q

30 An aeroplane flies at a constant speed and height for several hours.

Which type of energy **must** change during this part of the flight?

- A the gravitational energy of the aeroplane
- B the kinetic energy of the aeroplane
- C the store of chemical energy in the fuel tank of the aeroplane
- D the thermal energy of the aeroplane

31 Liquid in a beaker evaporates quickly.

Which row shows what happens to the mass and to the temperature of the liquid in the beaker?

	mass	temperature
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

32 A sample of liquid is allowed to cool for 20 minutes. Its temperature is recorded every two minutes.

The results are shown in the table.

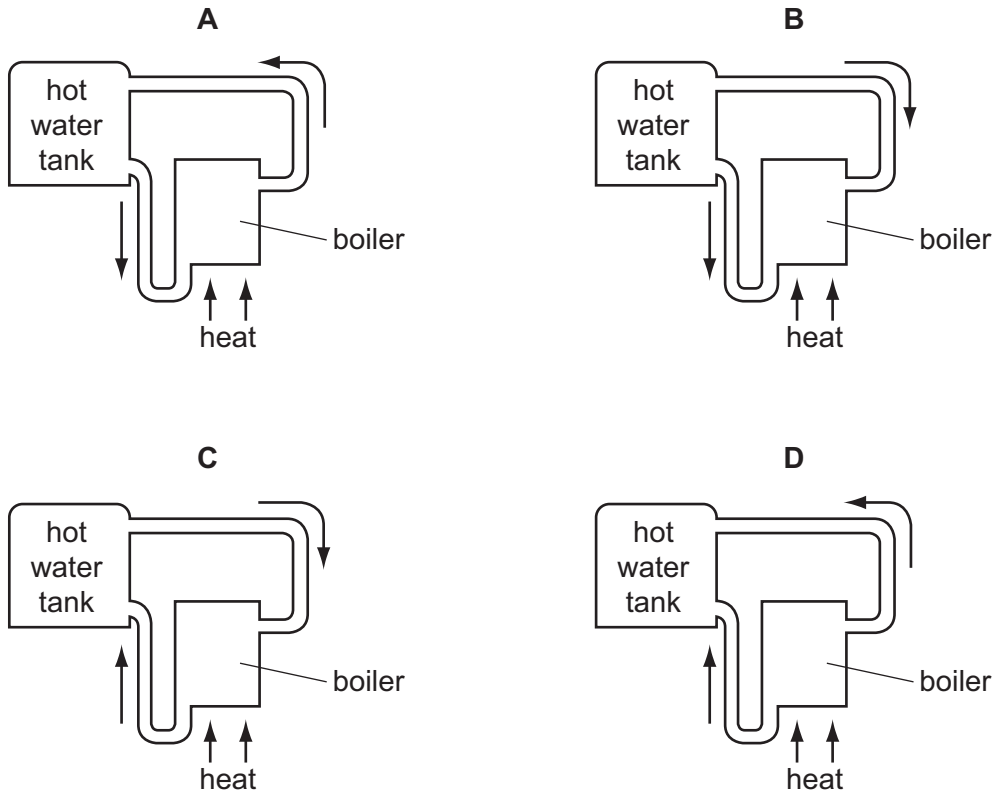
time / minutes	0	2	4	6	8	10	12	14	16	18	20
temperature / °C	90.8	80.9	74.1	67.4	61.9	57.0	53.0	50.2	48.5	47.3	46.1

How should the sample be described at the end of the 20 minutes?

- A all liquid
- B all solid
- C in the process of boiling
- D in the process of solidifying

33 The diagrams show part of a water-heating system which is working by convection.

Which diagram shows the flow of water in the system?



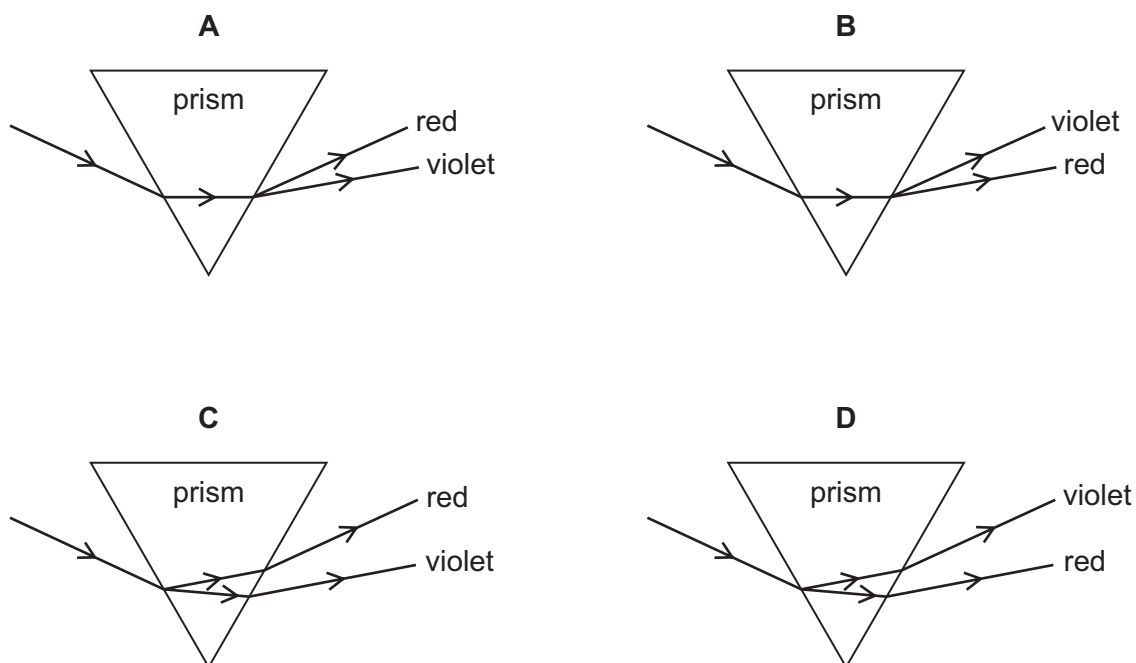
34 A student counts how many waves pass point P in 30 seconds.



Using only this information, what can the student calculate?

- A the amplitude of the wave
- B the frequency of the wave
- C the speed of the wave
- D the wavelength of the wave

35 Which diagram shows the dispersion of white light as it passes through a glass prism?



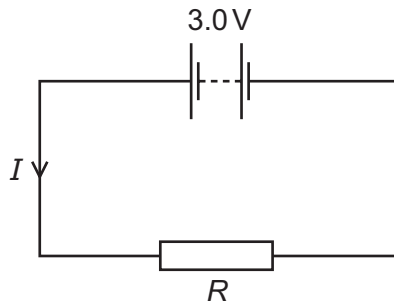
36 Which row shows how the speed and the wavelength of microwaves compare with those of  $\gamma$ (gamma)-rays?

	speed	wavelength
<b>A</b>	less than $\gamma$ -rays	greater than $\gamma$ -rays
<b>B</b>	less than $\gamma$ -rays	less than $\gamma$ -rays
<b>C</b>	the same as $\gamma$ -rays	greater than $\gamma$ -rays
<b>D</b>	the same as $\gamma$ -rays	less than $\gamma$ -rays

37 What is the approximate value of the frequency of the highest-pitched sound that can be heard by a young person?

- A** 20 Hz      **B** 200 Hz      **C** 2000 Hz      **D** 20 000 Hz

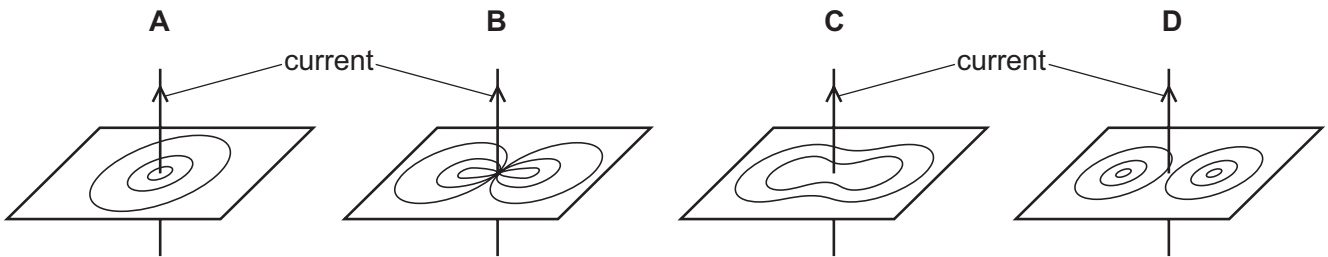
38 The circuit shows a current  $I$  in a resistor of resistance  $R$ .



Which row gives possible values of  $I$  and of  $R$ ?

	$I/A$	$R/\Omega$
<b>A</b>	1.5	1.5
<b>B</b>	1.5	2.0
<b>C</b>	6.0	2.0
<b>D</b>	4.0	12.0

39 Which diagram shows the magnetic field pattern around a straight wire carrying a current?



40 A proton has charge  $q$  and mass  $m$ . A neutron has no charge and mass  $m$ .

Which row shows the charge and mass of an  $\alpha$ -particle?

	charge	mass
<b>A</b>	$2q$	$2m$
<b>B</b>	$2q$	$4m$
<b>C</b>	$4q$	$2m$
<b>D</b>	$4q$	$4m$









## 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																11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10						
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12																27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18						
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20															70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36							
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	94 <b>Ti</b> Titanium 22	96 <b>Mo</b> Molybdenum 42	98 <b>Y</b> Yttrium 39	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	126 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54											
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	186 <b>Re</b> Rhenium 75	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86												
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																											
†																												
*58-71 Lanthanoid series																												
†90-103 Actinoid series																												
140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71																	
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97	98 <b>Cf</b> Californium 98	99 <b>Es</b> Einsteinium 99	100 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103																

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

a	X
Key	b

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

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