UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/12**

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)

1166451575

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.

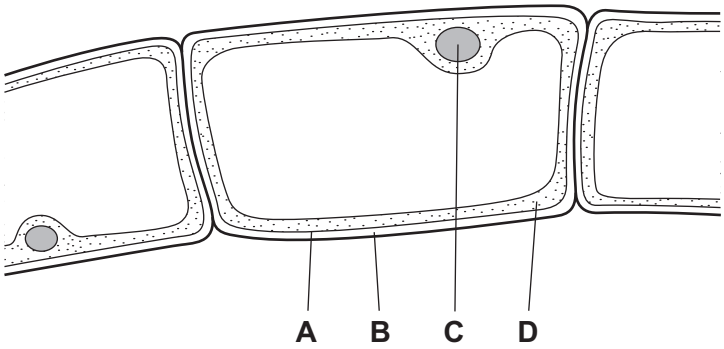
Read the instructions on the Answer Sheet very carefully.

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.

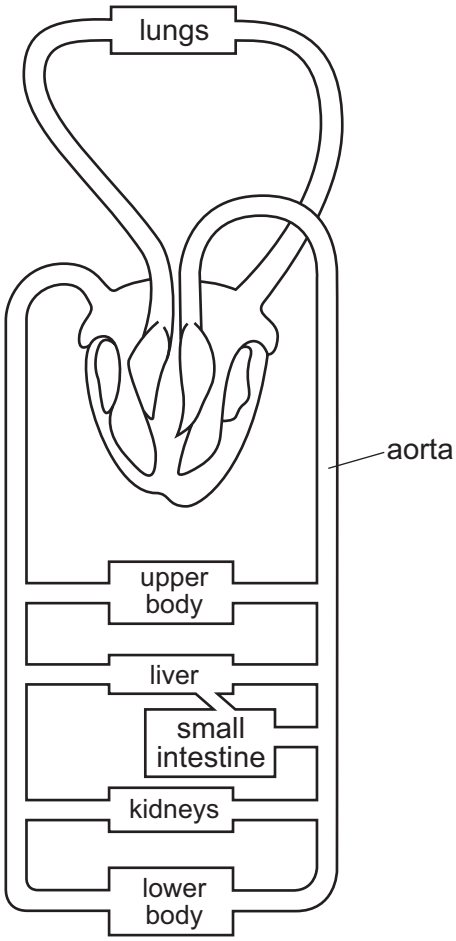
This document consists of **18** printed pages and **2** blank pages.

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 statement about blood components is correct?

A Platelets make antibodies.

B Platelets transport oxygen.

C White blood cells carry out phagocytosis.

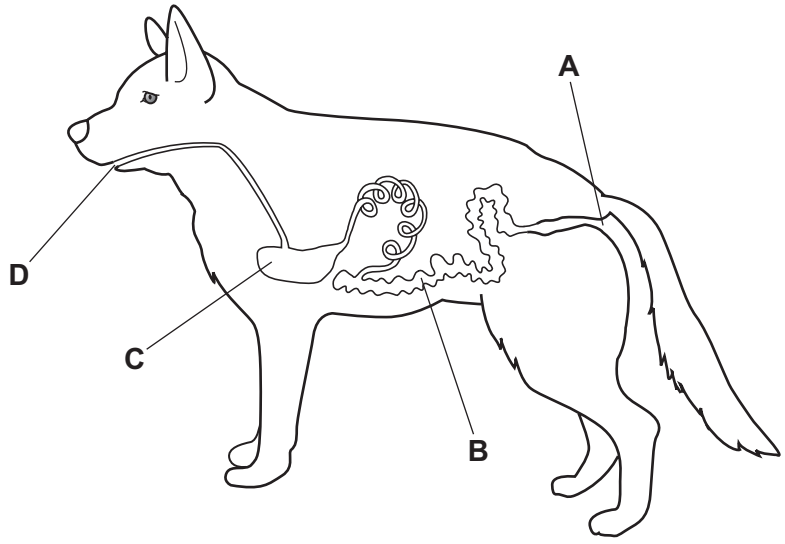
D White blood cells transport carbon dioxide.

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

	chemical molecule	basic unit
A	glycogen	amino acid
B	glycogen	simple sugar
C	oil	amino acid
D	oil	simple sugar

5 The diagram shows the alimentary canal of a dog.

Where does egestion occur?



6 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

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

A cell division

B heat production

C movement

D protein synthesis

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 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

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 Pollination is the transfer of pollen

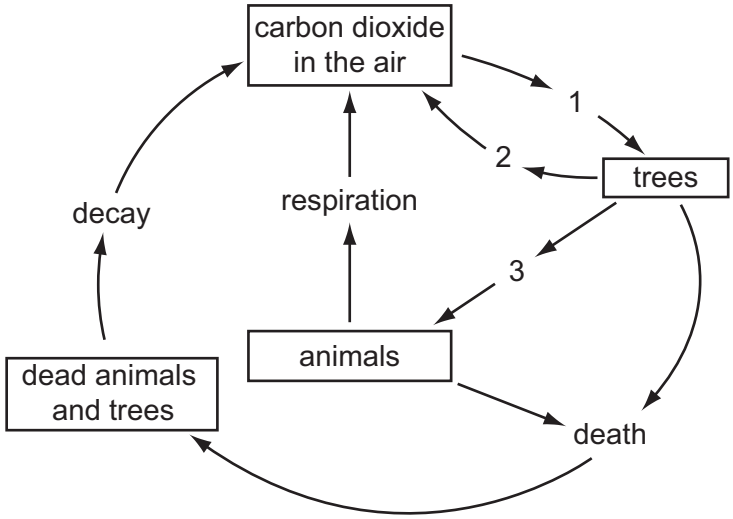
A from anther to sepal.

B from anther to stigma.

C from sepal to anther.

D from stigma to anther.

12 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

13 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?

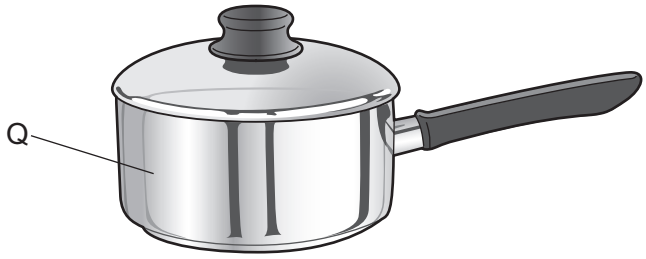
A buffalo → dung beetles; buffalo → grass

B dung beetles → grass → buffalo

C grass → dung beetles → buffalo

D grass → buffalo; grass → dung beetles

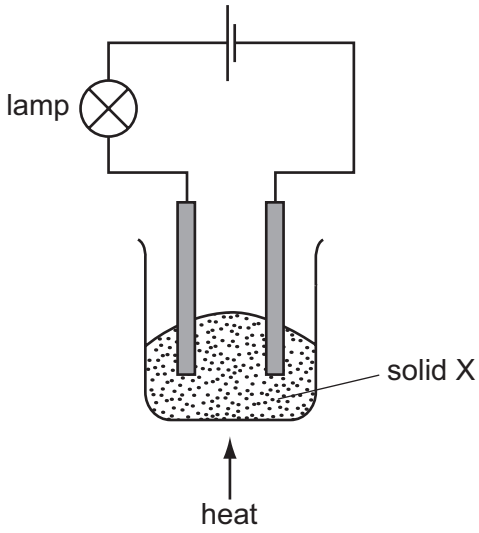
14 Substance Q is used to make a cooking pan.



What are the properties of substance Q?

	melting point	thermal conductivity
A	high	high
B	high	low
C	low	high
D	low	low

15 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

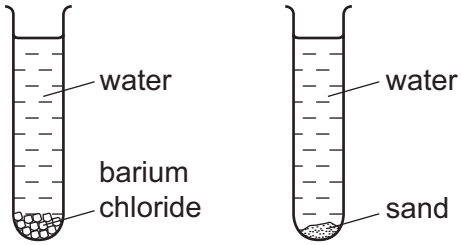
C a metallic element

D a non-metallic element

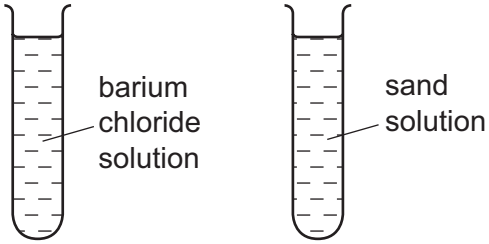
16 Small amounts of barium chloride and sand are shaken with separate samples of water in two test-tubes. The test-tubes are left to stand for 24 hours.

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

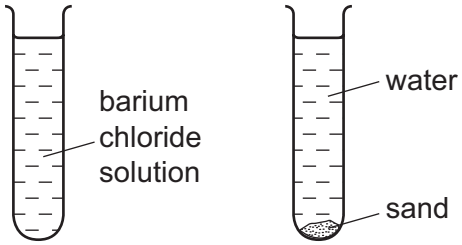
A



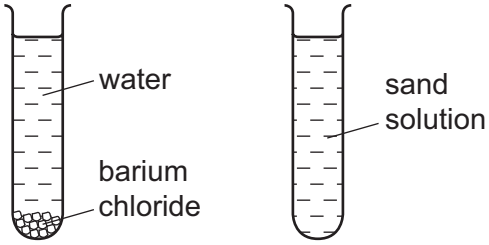
B



C

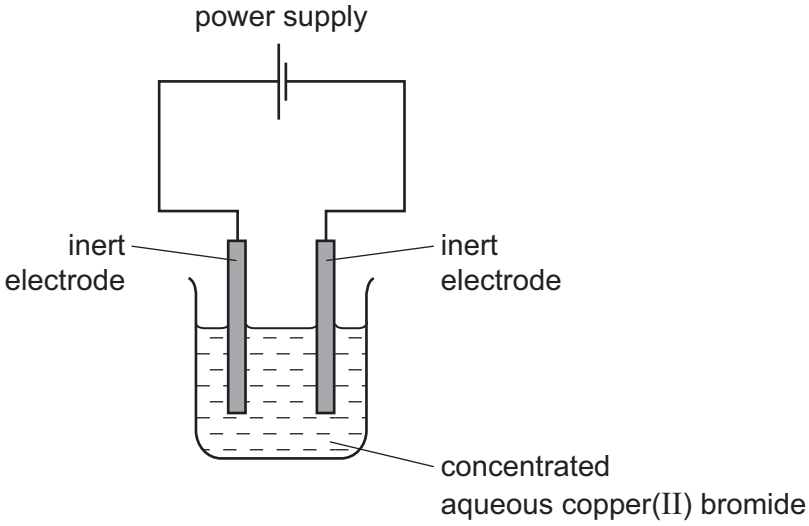


D



17 The diagram shows the circuit for electrolysing concentrated aqueous copper(II) bromide.

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



Which row describes the products at each electrode?

	cathode	anode
A	bromine	copper
B	copper	bromine
C	copper	oxygen
D	hydrogen	bromine

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

Which row represents these particles?

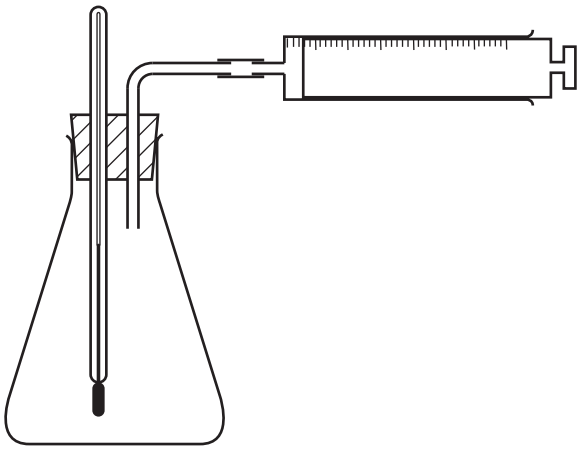
	atom	ion	molecule
A	H	H^+	H_2
B	H	H_2	H^+
C	H^+	H	H_2
D	H_2	H^+	H

19 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
A	20	18
B	20	40
C	25	18
D	25	42

20 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 $\rightarrow$ liquid G only

B solid H + solution I $\rightarrow$ solution J only

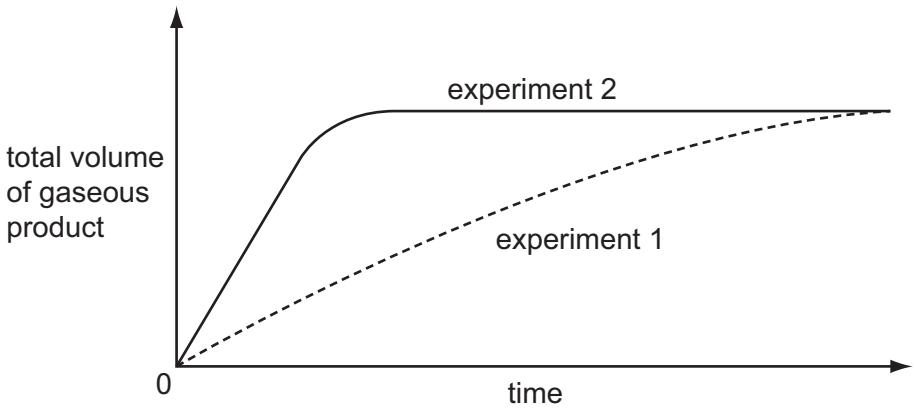
C solid K + solution L $\rightarrow$ solution M + gas N

D solution P + solution Q $\rightarrow$ solid R + solution Q

21 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
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key
✓ = true
✗ = false

22 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

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

Na	Mg	A*l*	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.

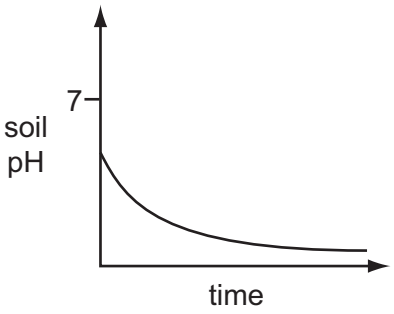
25 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

	type of reaction	temperature change
A	endothermic	decrease
B	endothermic	increase
C	exothermic	decrease
D	exothermic	increase

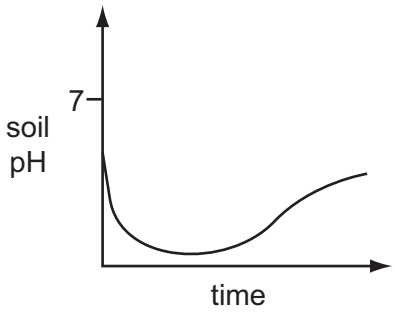
[Turn over

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

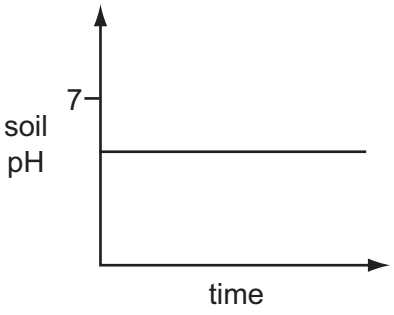
A



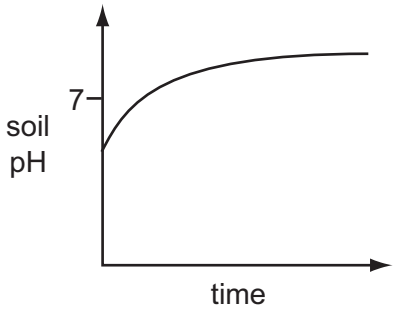
B



C

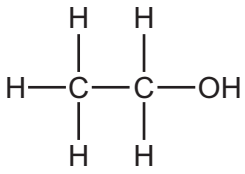


D



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

hydrocarbon + steam → ethanol



What is the name of the hydrocarbon?

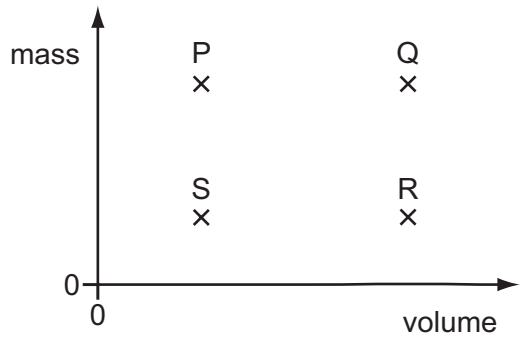
A ethane

B ethene

C methane

D propene

28 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

29 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

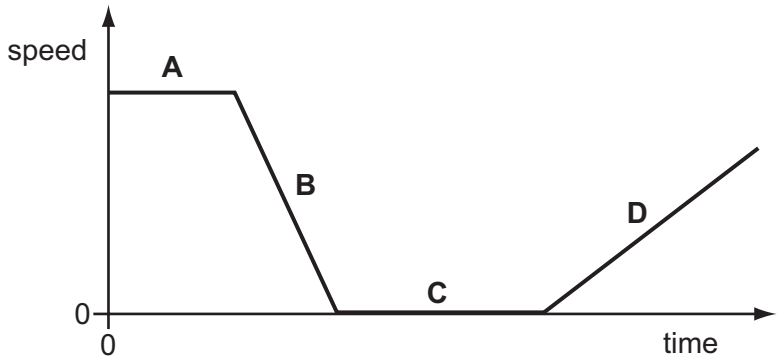
B the kinetic energy of the aeroplane

C the store of chemical energy in the fuel tank of the aeroplane

D the thermal energy of the aeroplane

30 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?



31 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

32 Liquid in a beaker evaporates quickly.

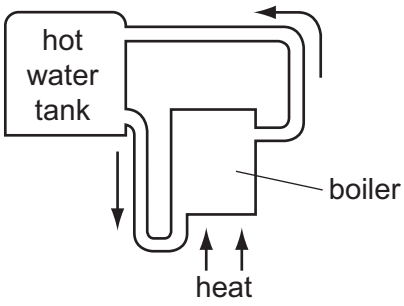
Which row shows what happens to the mass and to the temperature of the liquid in the beaker?

	mass	temperature
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

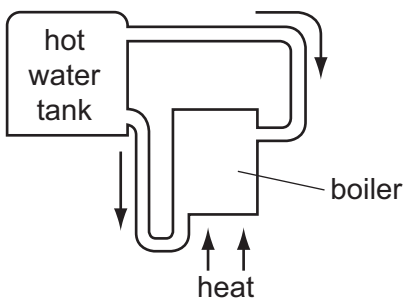
33 The diagrams show part of a water-heating system which is working by convection.

Which diagram shows the flow of water in the system?

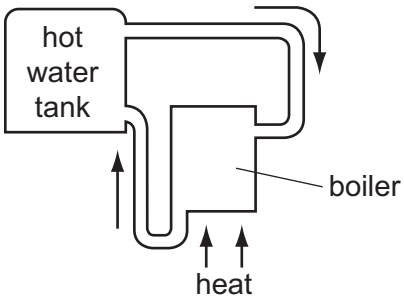
A



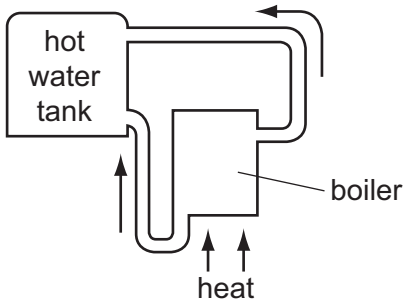
B



C

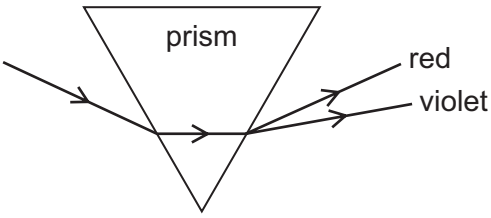


D

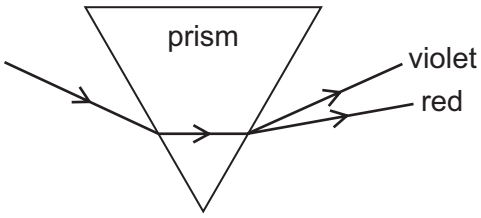


34 Which diagram shows the dispersion of white light as it passes through a glass prism?

A



B



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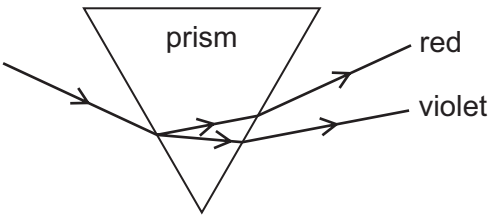

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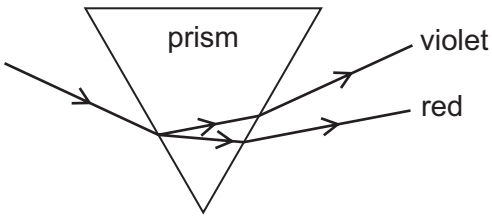
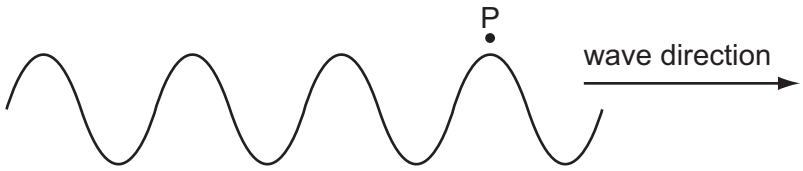


35 A student counts how many waves pass point P in 30 seconds.



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

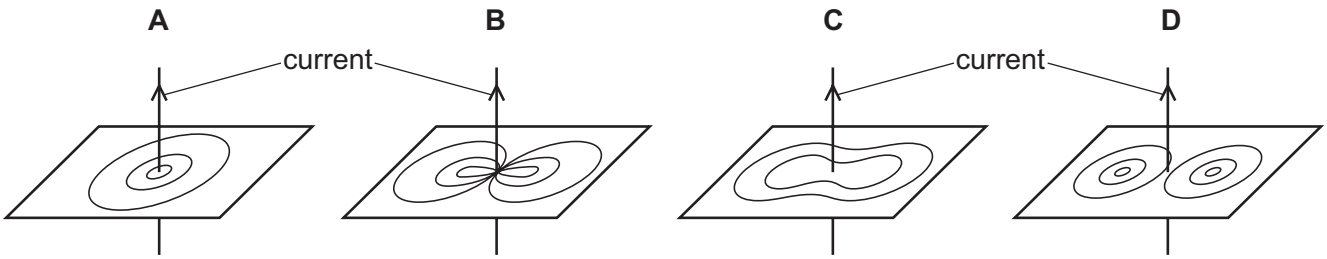
36 What is the approximate value of the frequency of the highest-pitched sound that can be heard by a young person?

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

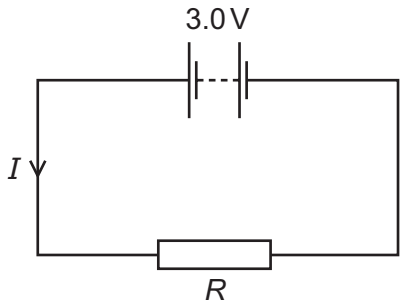
37 Which row shows how the speed and the wavelength of microwaves compare with those of γ(gamma)-rays?

	speed	wavelength
A	less than γ-rays	greater than γ-rays
B	less than γ-rays	less than γ-rays
C	the same as γ-rays	greater than γ-rays
D	the same as γ-rays	less than γ-rays

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



39 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 / Ω
A	1.5	1.5
B	1.5	2.0
C	6.0	2.0
D	4.0	12.0

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 α-particle?

	charge	mass
A	$2q$	$2m$
B	$2q$	$4m$
C	$4q$	$2m$
D	$4q$	$4m$

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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
					1 H Hydrogen 1										
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.).