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Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE **0653/02**

Paper 2

October/November 2003

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
A copy of the Periodic Table is printed on page 16.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

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1	
2	
3	
4	
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7	
8	
9	
Total	

This document consists of **15** printed pages and **1** blank pages.

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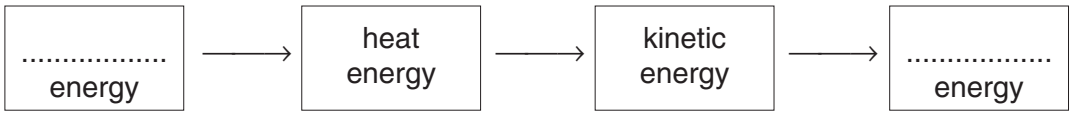
1 Windfarms are areas of land containing many wind turbines. Four thousand wind t can produce the same power as one coal-fired power station.

(a) (i) State the main energy change that takes place in a wind turbine.

..... energy ⟶ ..... energy [1]

(ii) Complete the sequence of energy changes in a coal-fired power station.



[2]

(b) Wind power is said to be a renewable source of energy.

Explain what the term *renewable* means.

.....

.....[1]

(c) Nuclear fission is used to produce electricity in nuclear power stations. The Sun's energy is produced by nuclear fusion.

Explain the difference between nuclear fission and nuclear fusion.

.....

.....

.....[2]

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2 A boy went to his doctor because he felt tired all the time.

His doctor took a sample of his blood. The doctor tested the blood. She found that the b did not have enough red blood cells.

The doctor told the boy that he was suffering from anaemia. She explained to the boy that he should eat more iron in his diet.

(a) (i) What do red blood cells do?

.....

.....[1]

(ii) Explain why not having enough red blood cells made the boy feel tired.

.....

.....

.....[2]

(b) (i) Explain why eating more iron would help the boy to increase the number of red blood cells in his body.

.....

.....

.....[2]

(ii) The boy asked his doctor to tell him which kinds of foods he should eat, in order to get more iron. Name **two** foods that she might have suggested.

.....[2]

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3 **(a)** **(i)** The formula of chlorine molecules is Cl_2.

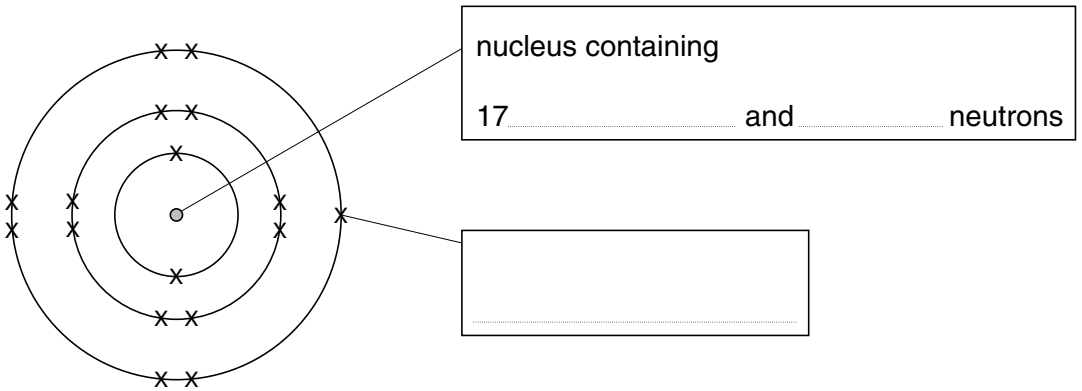
Explain what this formula means.

.....

.....[1]

(ii) An atom of chlorine has a proton number of 17 and a nucleon number of 35.

A diagram of this chlorine atom is shown in Fig. 3.1.
Complete the labelling of the diagram.



[3]

Fig. 3.1

(b) Explain why chlorine is sometimes used to treat drinking water before it is supplied to homes.

.....

.....

.....[2]

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4 Fig. 4.1 shows an electrical device.

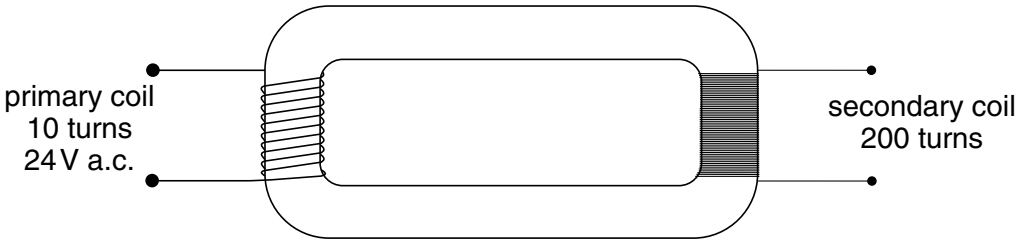

Fig. 4.1

(a) Name this device.

.....[1]

(b) Calculate the output voltage. Show your working and state any formula that you use.

formula

working

..... volts [2]

(c) Electricity is transmitted for long distances through cables.
Why does the voltage need to be high for transmission over long distances?

.....

.....

.....[2]

(d) An electricity supply is 240 V a.c. The frequency of the electricity supply is 50 Hz. Explain the meaning of the following terms.

(i) *a.c.* .....

.....[2]

(ii) *Hz* .....

.....[1]

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5 The words on the left in Fig. 5.1 are ecological terms.

(a) Match each word with its definition by drawing a line between them. One has been done for you.

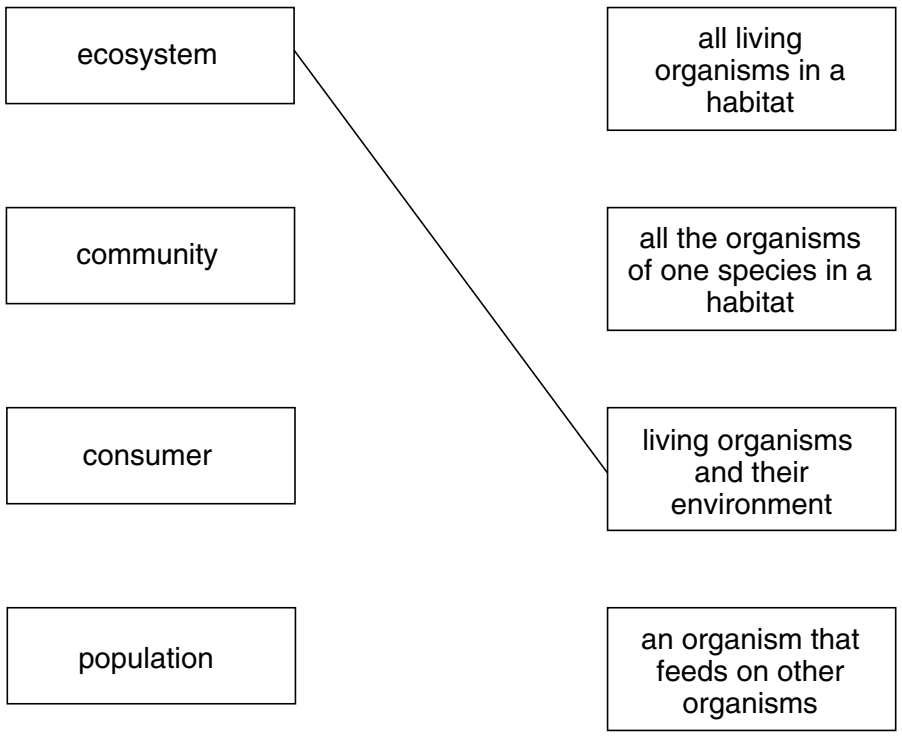

Fig. 5.1

[2]

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(b) A student investigated the population of snails in a wood. She collected 50 snails, measured the shell length of each one. She also recorded the number of stripes on their shells.

Fig. 5.2 shows the graphs that she drew to display her results.

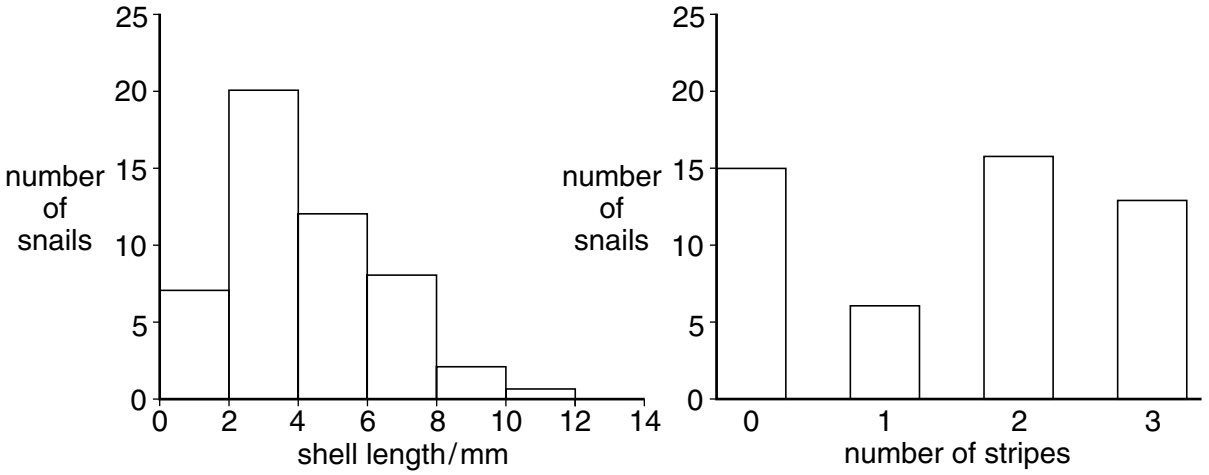

Fig. 5.2

(i) The student thought that the variation in the length of the snail shells could be caused by their environment.

Suggest **one** environmental factor that could cause the variation in the length of the snail shells.

.....[1]

(ii) The student thought that the variation in the number of stripes was probably caused by the snails' genes.

The student was able to keep the snails for many months in order to investigate this.

What should she do, and what result should she look for?

.....

.....

.....[2]

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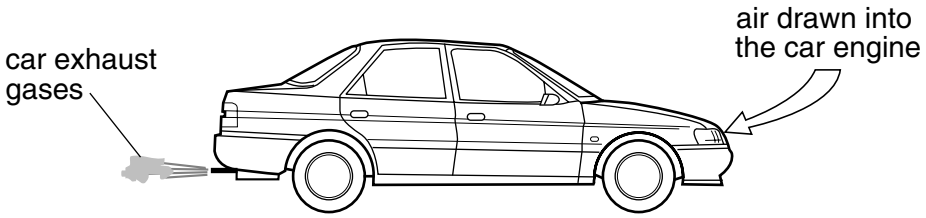
6 In a car engine, fuel containing hydrocarbons reacts with oxygen from the air. The p of this reaction enter the air with the exhaust gases.



(a) (i) Name the element that makes up nearly 79% of the air.

.....[1]

(ii) The gas argon is present in air. Explain why argon does not react with the hydrocarbon fuel in the car engine.

.....

.....[1]

(iii) Explain why it is very dangerous to leave a car engine running inside a closed building.

.....

.....

.....[2]

(b) The energy needed to launch a space shuttle is released when a mixture of hydrogen and oxygen react to form the compound water.

(i) The symbolic equation for this reaction is shown below.

$$2H_2 + O_2 \rightarrow 2H_2O$$

This equation is said to be *balanced*. Explain what this means.

.....

.....[1]

(ii) Describe **one** way in which a mixture of two gaseous elements is different from a compound of the same elements.

.....

.....

.....[1]

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(c) Suggest why the use of hydrogen as a car fuel would cause less air pollution than the hydrocarbon fuels.

.....

.....

.....

.....[2]

[Question 7 can be found on page 10]

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7 Fig. 7.1 shows a racing car. It is designed to accelerate rapidly and to go very fast.

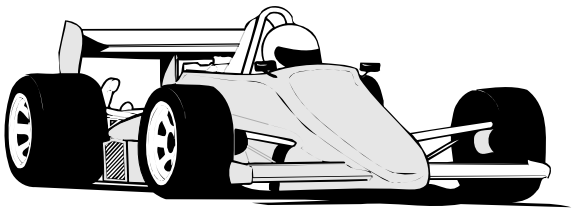

Fig. 7.1

(a) The car took 1.2 hours to complete a race of 288 kilometres.

Calculate the average speed of the car in kilometres per hour.
Show your working and state any formula that you use.

formula

working

..... km/h [2]

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(b) A speed/time graph for the car is shown in Fig. 7.2. It shows the motion of the c
a 26 second period.

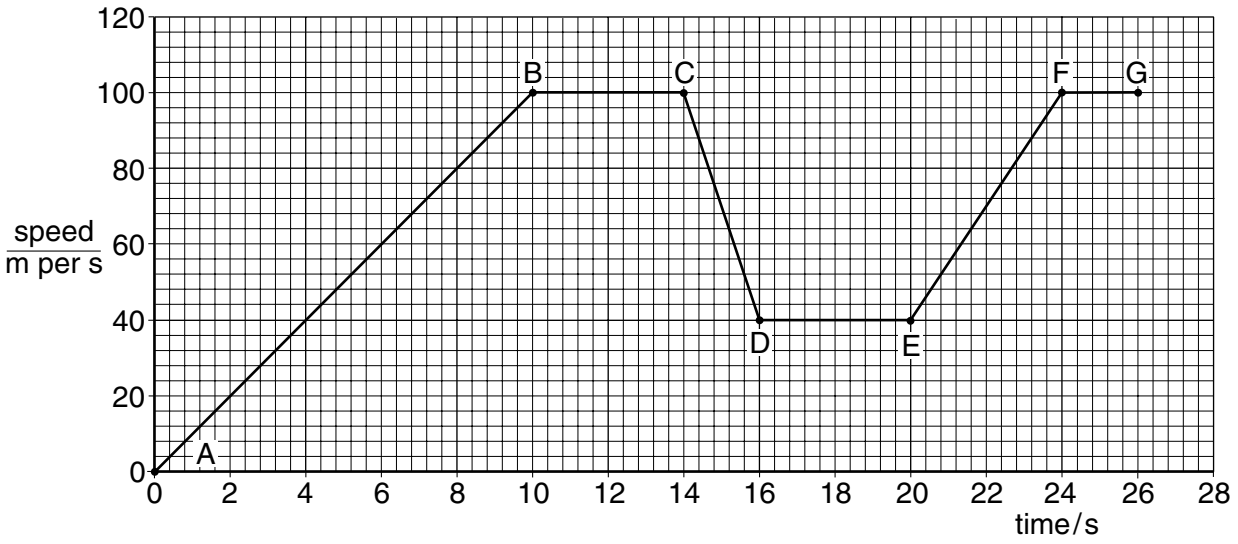

Fig. 7.2

(i) At which point is the car not moving?

.....[1]

(ii) State **one** part of the graph when the car was travelling at a constant speed. Explain your answer.

.....

.....

.....[2]

(iii) State **one** part of the graph when the car was slowing down.

.....[1]

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8 Fig. 8.1 shows the structure of the contents of the human thorax (chest).

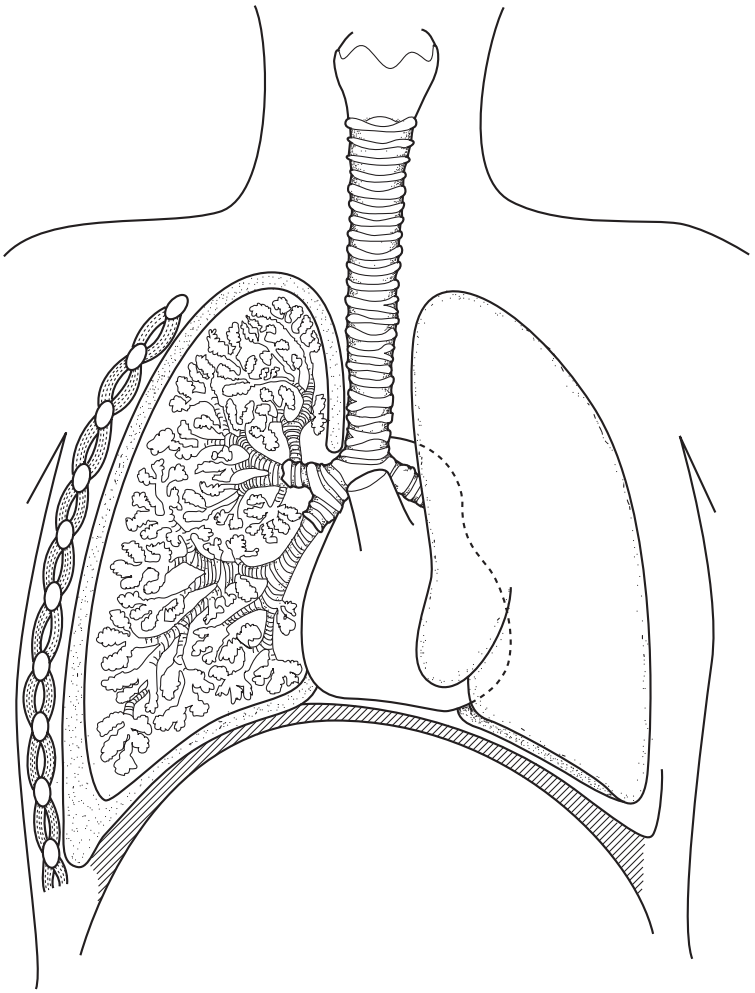

Fig. 8.1

(a) On Fig. 8.1, draw label lines to each of the following structures and label them with the appropriate **letter**.

A a pleural membrane
B a bronchus
C the place where gas exchange takes place
D the heart

[4]

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(b) The lining of the trachea contains

- goblet cells and
- cells with cilia.

(i) Describe how these cells help to keep the lungs clean.

.....

.....

.....

.....[2]

(ii) Explain how smoking can lead to the development of bronchitis.

.....

.....

.....

.....[2]

[Question 9 can be found on page 14]

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9 **(a)** Choose words from the list below to complete the passage. Each word is used once, more than once or not at all.

aluminium	**electrolyte**	**positive**
anode	**iron**	**solution**
cathode	**negative**	**sulphur**

Electrolysis is a process used in industry to make important elements such as ..... .

In electrolysis a pair of electrodes dip into a liquid called an ..... . Metal ions have a ..... charge and are attracted towards the ..... .
[4]

(b) **(i)** Describe **one** observation that would be made during the electrolysis of copper chloride solution.

.....

.....[1]

(ii) In electrolysis, compounds are split into their elements.

Complete the word chemical equation for the reaction that occurs in the electrolysis of copper chloride solution.

copper chloride → [1]

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium	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	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K otassium	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	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	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	226 Ra Radium 88	227 Ac Actinium 89 †															

3-71 Lanthanoid series	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
0-103 Actinoid series	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 Lawr 103

y

a
X
b

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.).

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