

Centre Number	Candidate Number	Name
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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.

For Examiner's Use	
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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.

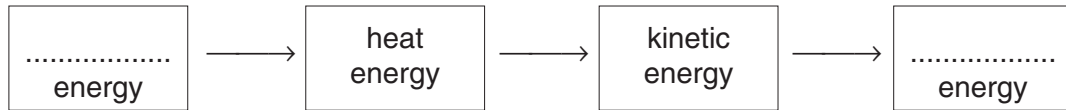
Stick your personal label here, if provided.

1 Windfarms are areas of land containing many wind turbines. Four thousand wind turbines 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]

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 boy 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]

- 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.

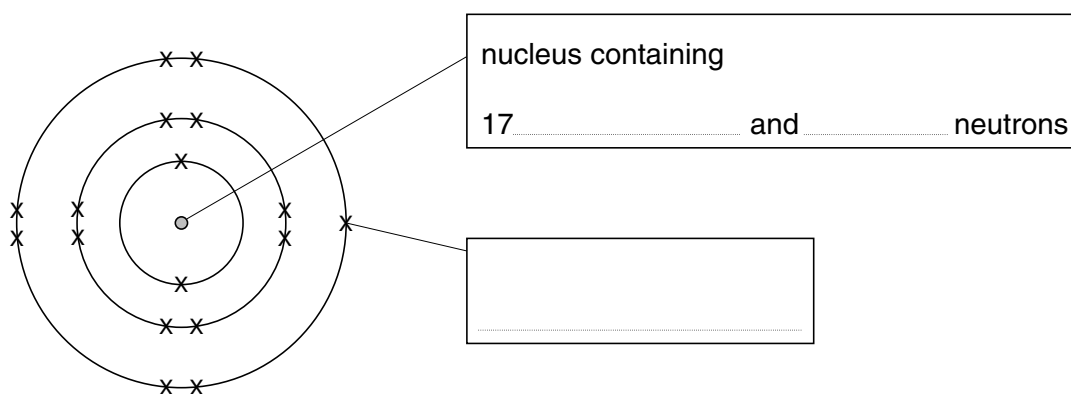


Fig. 3.1

[3]

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

.....

[2]

4 Fig. 4.1 shows an electrical device.

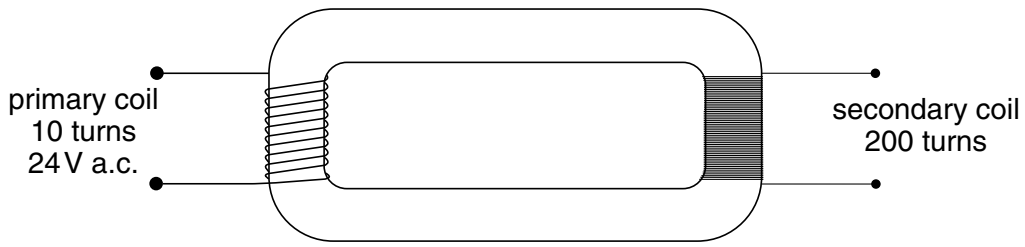


Fig. 4.1

(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]

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.

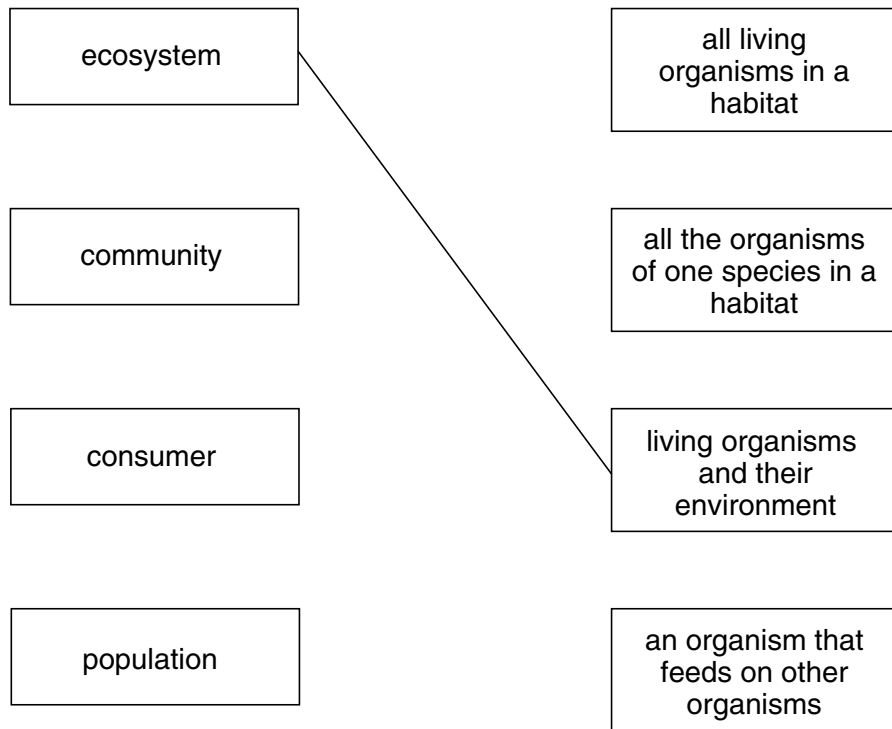


Fig. 5.1

[2]

- (b) A student investigated the population of snails in a wood. She collected 50 snails, and 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.

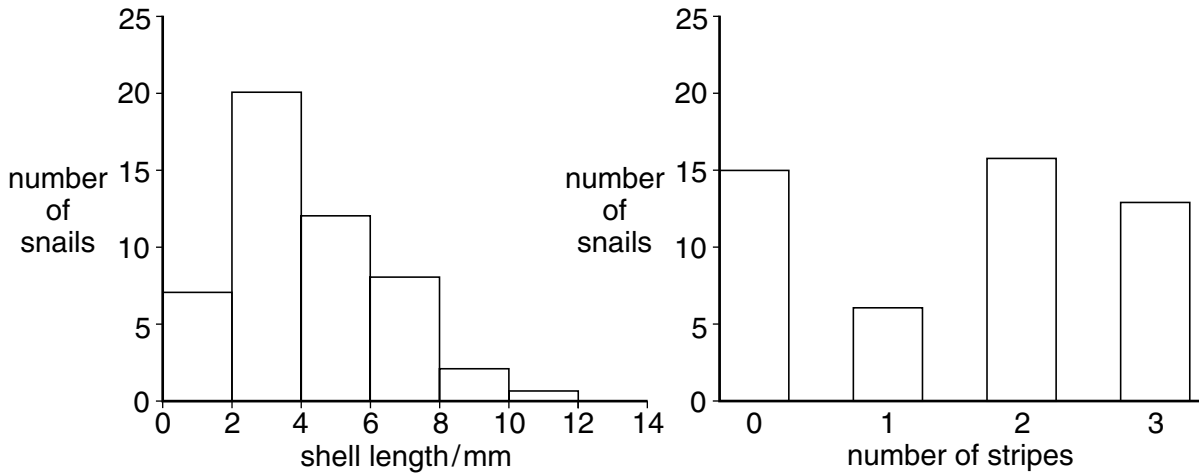


Fig. 5.2

- (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.

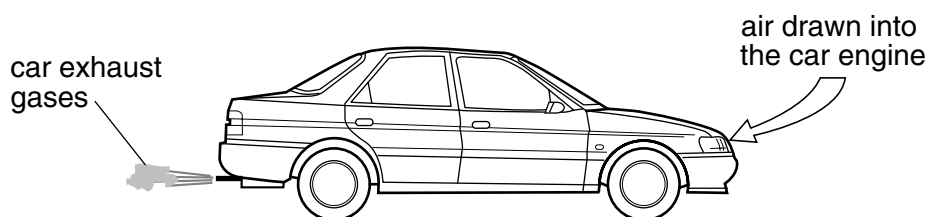
The student was able to keep the snails for many months in order to investigate this.

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

.....

[2]

- 6 In a car engine, fuel containing hydrocarbons reacts with oxygen from the air. The products 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.

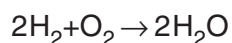
.....
.....[1]

- (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.



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]

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

.....

.....

.....

.....[2]

[Question 7 can be found on page 10]

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

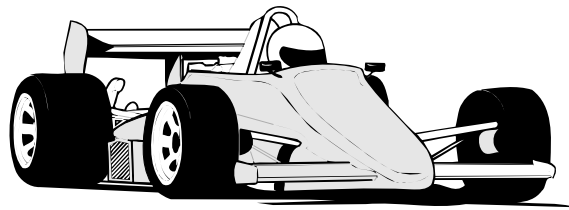


Fig. 7.1

- (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]

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

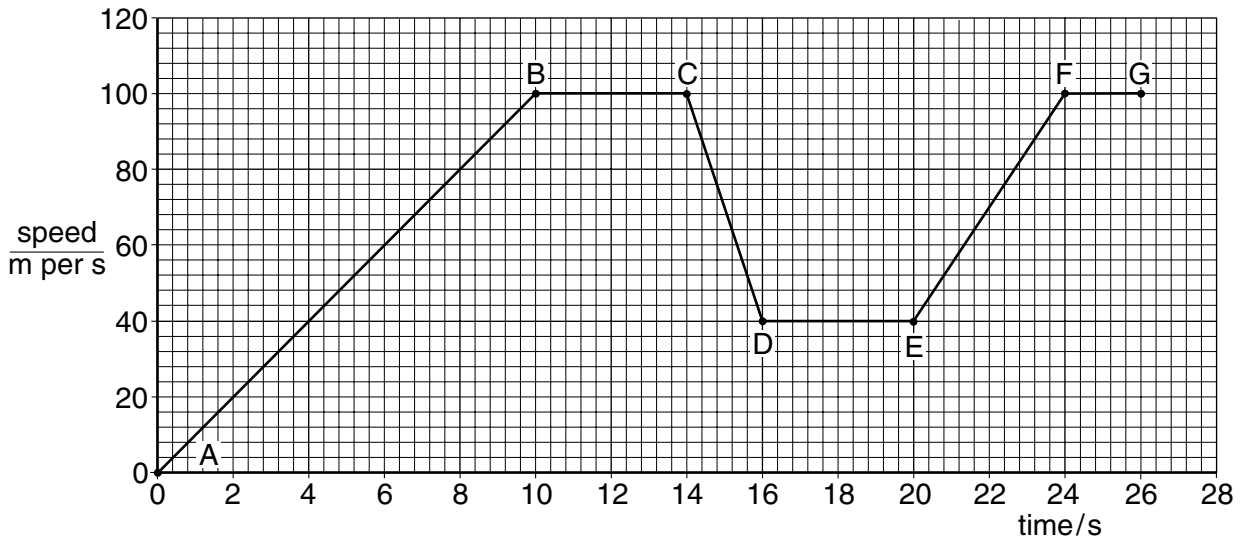


Fig. 7.2

(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]

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

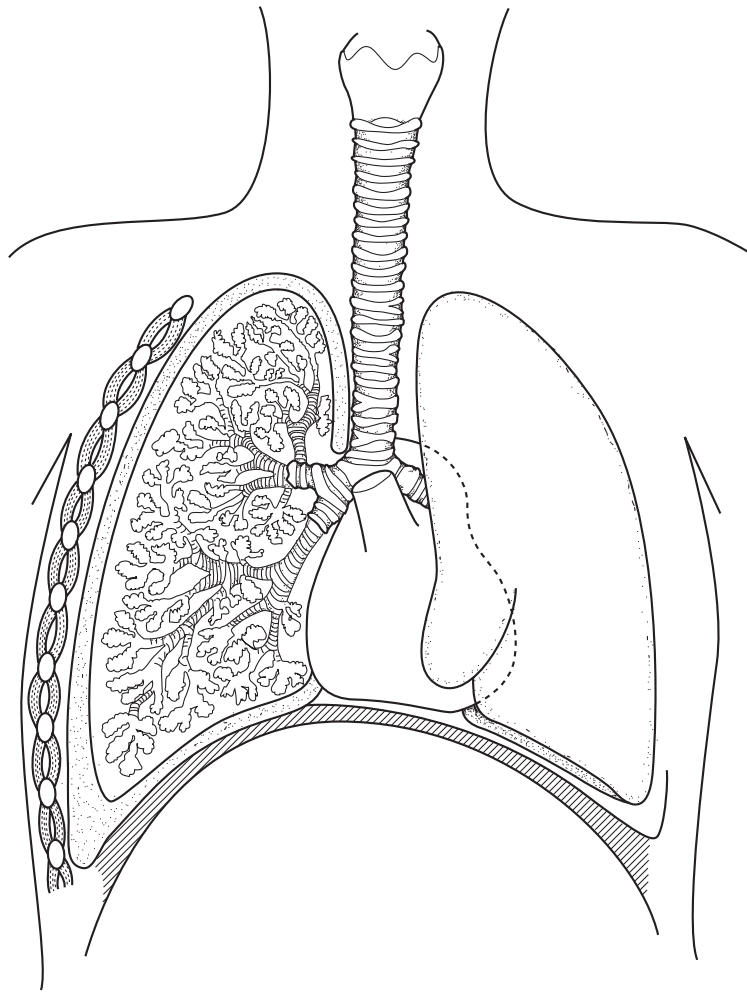


Fig. 8.1

- (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]

(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]

- 9 (a) Choose words from the list below to complete the passage. Each word is used **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]

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		
3 Li Lithium 4	9 Be Beryllium 4		5 B Boron 6	6 C Carbon 6	7 N Nitrogen 7	8 O Oxygen 8	9 F Fluorine 9	10 Ne Neon 10	
11 Na Sodium 12	24 Mg Magnesium 12		13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	
19 K Potassium 19	40 Ca Calcium 20		31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	
37 Rb Rubidium 37	88 Sr Strontium 38		49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	
55 Cs Caesium 55	137 Ba Barium 56		81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	
87 Fr Francium 87	226 Ra Radium 88		201 Hg Mercury 80	79 Au Gold 79	78 Pt Platinum 78	77 Ir Iridium 77	76 Os Osmium 76	75 Re Rhenium 75	
		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	
		90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	
			98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	
			66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	

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

a	X
b	

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

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