Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

COMBINED SCIENCE

0653/02

Paper 2

October/November 2003

1 hour

For Examiner's Use

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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.

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

Loca

9

Total

	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 ———————————————————————[1]			
	(ii)	Complete the sequence of energy changes in a coal-fired power station.			
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			
		[2]			
(b)	Wind power is said to be a renewable source of energy.				
	Explain what the term renewable means.				
		[1]			
(c)		clear fission is used to produce electricity in nuclear power stations. The Sun's ergy 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.

3 (a) (i) The formula of chlorine molecules is Cl_2 . Explain what this formula means. 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. nucleus containing 17 and neutrons [3] Fig. 3.1 (b) Explain why chlorine is sometimes used to treat drinking water before it is supplied to homes.

4 Fig. 4.1 shows an electrical device.

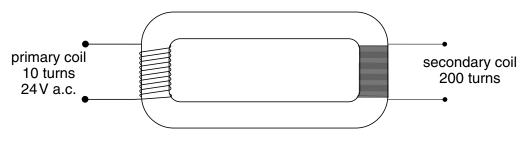


	Fig. 4.1
(a)	Name this device.
	[1]
(b)	Calculate the output voltage. Show your working and state any formula that you use.
	formula
	working
	volts [2]
(c)	Electricity is transmitted for long distances through cables. Why does the voltage need to be high for transmission over long distances?
	[2]
(d)	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.

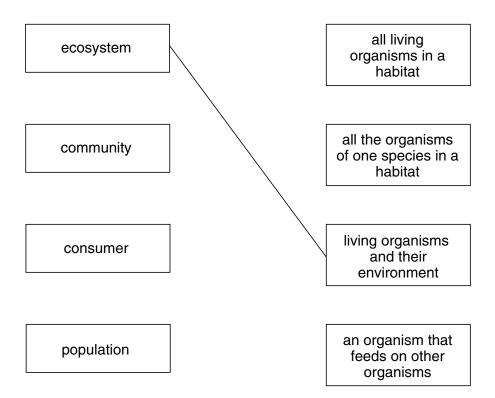


Fig. 5.1

[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.

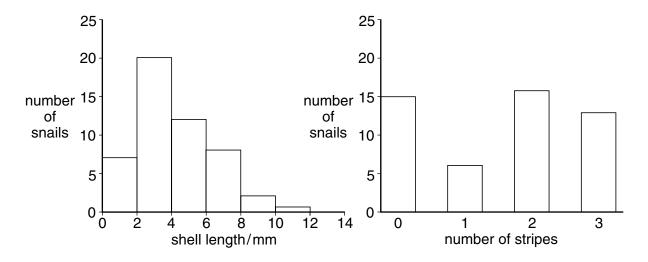


Fig. 5.2

(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.

111

(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)		energy needed to launch a space shuttle is released when a mixture of hydroger 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.

[41		

(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]

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



Fig. 7.1

(a)	The car took 1.	2 hours to	complete a	race of 288	kilometres.
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Calculate the average speed of the car in kilometres per hour.

Show your working and state any formula that you use.
formula

 	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.

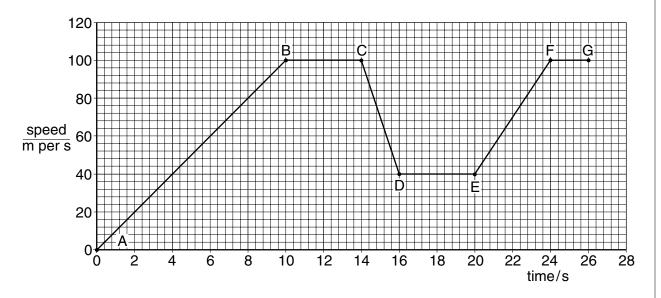


Fig. 7.2

(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).

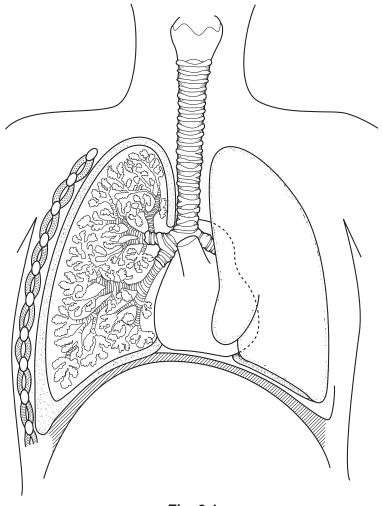


Fig. 8.1

- (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	
	Elec	ctrolysis is a prod	cess used in indu	ustry to make im	portant elements such	
	as					
	In e	lectrolysis a pair	of electrodes di	p into a liquid cal	led an	Meta
	ions	have a	charg	ge and are attrac	ted towards the	[4]
(b)	(i)	chloride solutio	n.		during the electrolysis of co	
	(ii)	In electrolysis,	compounds are	split into their ele	ments.	
		Complete the woof copper chlor		uation for the rea	action that occurs in the electro	olysis
		copper	chloride $ ightarrow$			[1]

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DATA SHEET
The Periodic Table of the Elements

																							Г
		0	4 H	Helium 2	20	Ne	Neon 10			Argon 18	84	궃	Krypton 36	131	Xe	Xenon 54		R	Radon 86				ļ
		II/			19	ш	Fluorine 9	35.5	73	Chlorine 17	80	ğ	Bromine 35		Н	lodine 53		Αţ	Astatine 85				į
		>			16	0	Oxygen 8	32	ഗ	Sulphur 16	62	Se	Selenium 34	128	<u>e</u>	Tellurium 52			_				
		>			14	z	Nitrogen 7		Δ.	rus		As	Arsenic 33	122	Sb	Antimony 51	209	ä	_				
		2			12	ပ	Carbon 6	28	Si	Silicon 14	73	Ge	Germanium 32	119	Sn		207	Pp	Lead 82				
		≡			Ξ	ш	Boron 5	27	Νſ	Aluminium 13	02	Са	Gallium 31		In	Indium 49		11	Thallium 81				
IS											99	Zu	Zinc 30	112	ၓ	Cadmium 48	201	Ħ	Mercury 80				į
I ne Periodic I able of the Elements											64	C	Copper 29	108	-	47		Αn	Gold 79				!
le or the	Group										69	Z	Nickel 28	106	Pd	Palladium 46	195	풉	Platinum 78				
dic I ab	Ģ				1						69	ပိ	Cobalt 27	103	몺	Rhodium 45	192	1	Iridium 77				
ne Peric			- I	Hydrogen 1									Iron 26			Ruthenium 44	190	SO	76				
											55	Mn	Manganese 25		ည	Technetium 43	186	Be	Rhenium 75				:
												ဝံ	Chromium 24	96	Mo	Molybdenum 42	184	≽	Ę				
											51	>	Vanadium 23	93	QN	Niobium 41	181	Та	Tantalum 73				
											48	F	Titanium 22	91	Zr	Zirconium 40	178		E				1
											45	တွ	Scandium 21	88	>	Yttrium 39	139	La	Lanthanum 57 *	227	Ac	Actinium 189 †	
		=			6	Be	Beryllium 4	24	Mg	Magnesium 12	40	Ca	Calcium 20	88	Š	Strontium 38	137	Ва	Barium 56	226	Ba	Radium 88	
		_			7	=	Lithium 3	23	Na	Sodium 11	39	¥	Potassium 19	85	Se Se	Rubidium 37	133	S	Caesium 55		ì	Francium 87	
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0 0 0	140	141	144		150	152	157				167	169	173	175
iold series	ပီ	Ā	2	Pm	Sm	Eu	gg	T			ш	Ę	Υb	Γn
בי מפוופס	Cerium 58	Praseodymium 59	Neodymium 60	Promethium 61	Samarium 62	Europium 63	Gadolinium 64	92	Dysprosium 66	Holmium 67	Erbium 68	Thulium 69	Ytterbium 70	Lutetium 71
a = relative atomic mass	232		238											
X = atomic symbol	H	Ра	⊃	N	Pu	Am	Cm	æ	ర	Es	Fn	Md		בֿ
b = proton (atomic) number	Thorium 90	Protactinium 91	Uranium 92		Plutonium 94	Americium 95	Curium 96	Berkelium 97	Californium 98	Einsteinium 99	Fermium 100	Mendelevium 101	Nobelium 102	Lawrencium 103
				4										

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

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

Key