UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Ordinary Level

COMBINED SCIENCE

5129/02

Paper 2

May/June 2005

2 hours 15 minutes

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 or rough working. Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.

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 24.

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.

For Examiner's Use

This document consists of 21 printed pages and 3 blank pages.

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[Turn over

1 Fig. 1.1 shows the electronic structure of an atom of chlorine.

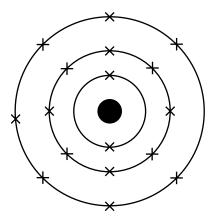


Fig. 1.1

(a)	(i)	State the Group of the Periodic Table in which chlorine is placed.
	(ii)	Use the information in Fig. 1.1 to give a reason for your answer to (a)(i).
		[2]
(b)		orine exists as a diatomic molecule. Draw a diagram of a chlorine molecule showing outer electrons only.
		[2]
(c)		orine reacts with an aqueous solution of potassium iodide producing potassium oride and iodine.
	(i)	State the type of reaction that takes place.
	(ii)	Construct an equation for the reaction.
		[2]

2 (a) (i) Name a nitrogen-containing ion that is essential to plants.

(ii) State the use of this ion in a growing plant.

[2]

(b) A farmer wants to add the ion named in (a)(i) to the soil.
Name a compound that the farmer could spread on the fields to add this ion.

.....[1]

(c) Suggest how a river flooding a field can remove the ion from the soil.

.....

3 Fig. 3.1 shows how the displacement of particles in a wave varies with distance along the

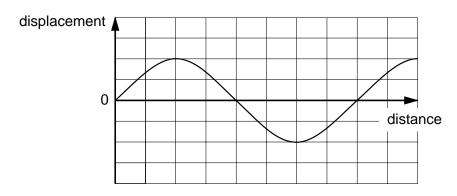


Fig. 3.1

- (a) On Fig. 3.1 draw a line to show a wave with the same amplitude and with half the wavelength. [2]
- (b) Name the region of the electromagnetic spectrum with waves of
 - (i) the longest wavelength,
 - (ii) the shortest wavelength.[2]

wave.

4 Fig. 4.1 shows three lamps and switches connected to a cell. All the switches are open.

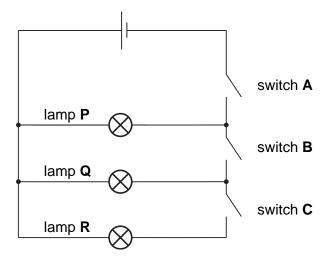


Fig. 4.1

1	۱۵)	State which	lamp or la	mno if	any liahta	uhan awitah	A only	, io o	hood
۱	aı	State which	iaiiip oi id	אוווף, בעוווג	ariy, ngin v	WIIGH SWILCH		/ 15 C	noscu.

.....[1]

(b) State which switches must be closed to make lamp Q light but not lamp R.

.....[1]

(c) When all the lamps are lit, the current through each lamp is 0.25 A. Calculate the current from the cell.

.....A [1]

(d) An ammeter is used to measure the current from the cell.
On Fig. 4.1, mark with the letter **X** a suitable position for the ammeter. [1]

5			gestion is caused when too much acid is produced in the stomach. Indigestion may be d by chewing tablets containing magnesium carbonate.				
	(a)		indigestion tablet containing magnesium carbonate is crushed and shaken with er and Universal Indicator solution is added.				
		Stat	e the final colour of the solution[1]				
	(b)		acid present in the stomach is hydrochloric acid. equation for the reaction between magnesium carbonate and hydrochloric acid is				
			$\mathrm{MgCO_3}$ + 2HC l \rightarrow MgC l_2 + CO $_2$ + H $_2$ O				
		(i)	Name the ion that is present in aqueous hydrochloric acid and all other aqueous acids.				
			[1]				
		(ii)	State the type of reaction that occurs between hydrochloric acid and magnesium carbonate.				
			[1]				
	(iii) Describe a test that you could use to prove carbon dioxide is given off in reaction.						
			test				
			result				
			[2]				

6 Fig. 6.1 shows the human alimentary canal.

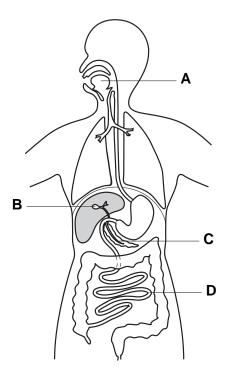


Fig. 6.1

(a) Name the	parts labelled	
--------------	----------------	--

A	 	
В		
C	 	
D	 	[4]

(b) A person eats some bread.

State two effects of saliva on the bread.

1.

2.[2]

(c) Fig. 6.2 shows some of the bread as it moves down part of the alimentary canal.

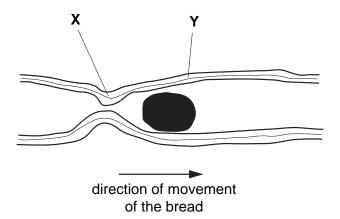


Fig. 6.2

(i)	Name the process that causes the movement.	
		[1]
(ii)	State what the muscles of the intestine are doing at point X and at point Y .	
	Χ	
	Υ	[2]

7 Fig. 7.1 shows an electromagnet.

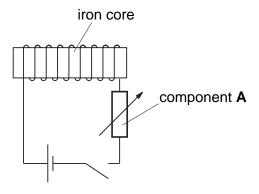


Fig. 7.1

(a)	Name component A [1]
(b)	State one way in which the strength of the electromagnet can be increased.
	[1]
(c)	The core is made of iron rather than steel. State one difference between the magnetic properties of iron and steel.
	[1]

8 A suspended balloon is rubbed with a duster. This produces a negative charge on the balloon.

A charged acetate strip is brought near to the balloon. The balloon moves towards the acetate strip as shown in Fig. 8.1.

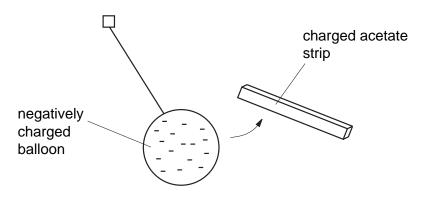


Fig. 8.1

Explain why the balloon moves towards the acetate strip.	
[2	2]

9	Pet	etrol, hydrogen and ethanol are used as fuels for cars.					
	(a)	(i)	Name one of these three fuels that produces carbon monoxide as it burns.				
		(ii)	Name one of these three fuels that produces sulphur dioxide as it burns.				
				[2]			
	(b)		en sulphur dioxide escapes into the environment it dissolves in water to produ I rain. State two effects of acid rain on the environment.	ice			
		1					
		2		[2]			
	(c)		te the gas, present in the air, that is needed for any fuel to burn.	,			
				[1]			
	(d) Suggest how the process of respiration is similar to the combustion of fuels.						
				••••			
				[2]			
10	Am	moni	a is manufactured by reacting nitrogen with hydrogen in the presence of a cataly	′st.			
	(a)	Balance the equation for the reaction.					
			$N_2 + \underline{\hspace{1cm}} H_2 \rightarrow \underline{\hspace{1cm}} NH_3$	[1]			
	(b)	Stat	te the temperature and the pressure used in the manufacture of ammonia.				
		tem	perature°C				
		pres	ssureatm	[2]			
	(c)	(i)	Name the catalyst used in the manufacture of ammonia.				
		(ii)	Give a reason why a catalyst is used in the process.				
				[2]			

11 Fig. 11.1 shows the male reproductive system.

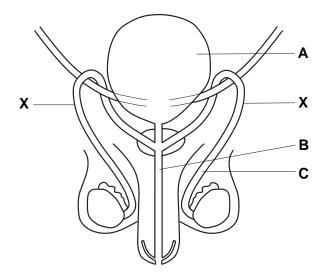


Fig. 11.1

(a)	Name and give th	e function of	f each of the	structures	labelled A,	B and C.
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Α	name
	function
В	name
	function
С	name
	function
	[6]

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(b)	Cut	ting both of the tubes shown at the points marked X is a form of contraception.
	(i)	Explain why this method is effective.
		[1]
	(ii)	Suggest one advantage and one disadvantage of this method of contraception.
		advantage
		disadvantage
		[2]

12 Two plane mirrors are used to reflect a ray of light. The ray of light follows the path shown in Fig. 12.1.

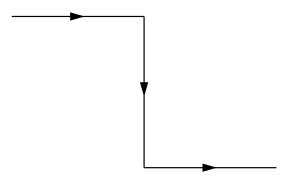


Fig. 12.1

On Fig. 12.1, draw two plane mirrors in the correct positions to reflect the ray along this path.

13	Nuc	clei o	f a radioactive isotope of iodine, $^{131}_{53}\mathrm{I}$, emit beta-particles.
	(a)	Cal	culate the number of neutrons in a nucleus of $^{131}_{53}\mathrm{I}.$
			[1]
	(b)	Wh	en a nucleus of $^{131}_{53}\mathrm{I}$ emits a beta-particle, state the change in
		(i)	the number of neutrons,
		(ii)	the number of protons[2]
	(c)	The Sixt	half-life of $^{131}_{53}\mathrm{I}$ is eight days. een days ago, a sample of $^{131}_{53}\mathrm{I}$ emitted 16 000 beta-particles per second.
		(i)	Calculate the number of half-lives in sixteen days.
		(ii)	Use your answer to (c)(i) to calculate the number of beta-particles now emitted per second by the sample.

(a)	Def	ine relative atomic mass.
		[2]
(b)	cark	element, X , is extracted from the oxide of the element, X_2O_3 , by reduction with equation for the reaction is
		$X_2O_3 + 3C \rightarrow 2X + 3CO$
	The	relative molecular mass of X ₂ O ₃ is 160.
	(i)	Calculate the relative atomic mass of X.
		[A _r : O,16]
		[1]
	(ii)	Calculate the mass of carbon that reacts with 8.0 g of the oxide, $\rm X_2O_3$.
		$[A_r: C,12]$

14

15	(a)	Mar	ny human mothers feed their babies on breast milk.
		(i)	State what is in breast milk that helps babies' muscles to develop.
		(ii)	Name the mineral in breast milk that helps babies' haemoglobin to develop.
	((iii)	State what is in breast milk that helps a baby to overcome a disease such as influenza.
			[3]
	(b)	(i)	Suggest two advantages, other than those in (a), of breast milk rather than powdered milk mixed with water.
			1
			2
		(ii)	Suggest a disadvantage of feeding babies on breast milk.
			[3]

16 (a) State the formula used to calculate the moment of a force.

.....[1]

(b) Fig. 16.1 shows a spanner being used to tighten a nut.

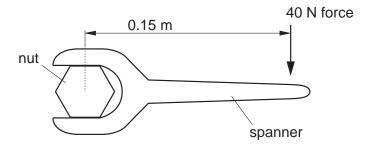


Fig. 16.1

Calculate the moment of the 40 N force about the centre of the nut.

[2]

17 A kettle, as shown in Fig. 17.1, has a power rating of 1500 W.

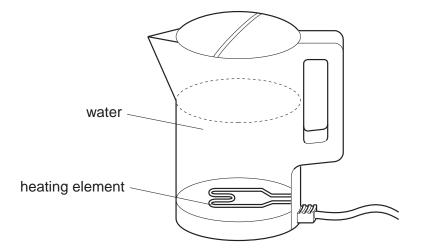


Fig. 17.1

(a)	Explain what is meant by the term <i>power rating</i> .
	[1]
(b)	
	[1]
(c)	The water at the bottom of the kettle is heated. Explain, in detail, how the rest of the water in the kettle is heated by convection.
	[3]

18 Study the reactions shown in Fig. 18.1.

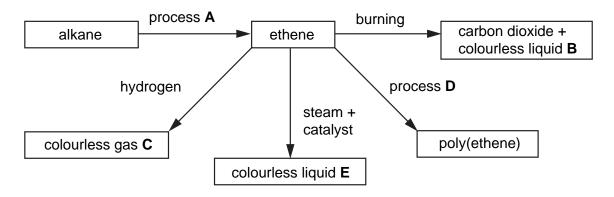


Fig. 18.1

1	a۱	Identify	/ tha	processes	Δ	and	ח
1	a)	identiii	y une	processes	А	anu	υ.

(b) Identify the substances B, C and E.

(c) Draw a diagram to show the structure of ethene.

[1]

[4]

19 Fig. 19.1 shows part of the carbon cycle.

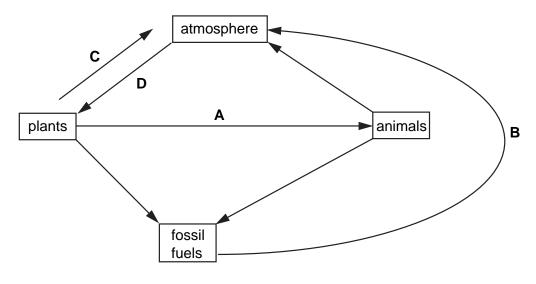


Fig. 19.1

(a)	Name a compound containing carbon that is found in the Earth's atmosphere.
	[1

(b) Name the processes labelled **A**, **B**, **C** and **D**. Choose only words from the list below. You may use the words once, more than once or not at all.

D

20 A ball is thrown horizontally from a tall building and it follows the path shown in Fig. 20.1.

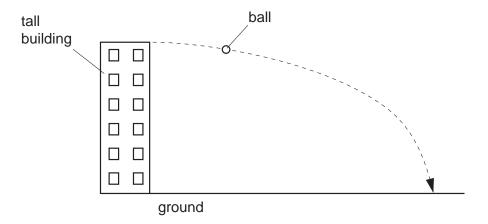


Fig. 20.1

- (a) How can you tell from the path of the ball that there is a force acting on it?
- (b) On Fig. 20.1 draw an arrow to show the direction of the force on the ball after it has left the building. [1]
- (c) State the form of energy
 - (i) lost by the ball as it falls to the ground,
 - (ii) gained by the ball as it falls to the ground.[2]

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DATA SHE	The Periodic Table of the Elements
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		0	4 H	Helium	20	Ne		40	Αľ		84	ž	Krypton	131	Xe	Xenon		Rn	Radon				175	Ľ	Lutetium
		IIA		2	19	ш	Fluorine 10	35.5	73	Chlorine 18		Ŗ	38	27		lodine 54		At	Astatine 86				73	Хþ	_
		1				_	6			17			38			53			88						
		ΙΛ			16	0	Oxygen 8	32	S	Sulphur 16	79	Se	Selenium 34	128	<u>e</u>	Tellurium 52		Po	Polonium 84				169	T	Thulium
		^			14	Z	Nitrogen 7	31	₾	Phosphorus 15	75	As	Arsenic 33	122	Sb	Antimony 51	209	ö	Bismuth 83				167	ш	Erbium
		\wedge			12	ပ	Carbon 6	28	Si	Silicon 14	73	Ge	Germanium 32	119	Sn	Tin 50	207	Po	Lead 82				165	운	Holmium
					1	Δ	Boron 5	27	Ρſ	Aluminium 13	20	Ga	Gallium 31	115	In	Indium 49	204	11	Thallium 81				162	Dy	Dysprosium
S											65	Zu	Zinc 30	112	ၓ	Cadmium 48	201	Hg	Mercury 80				159	Q L	Terbium
The Periodic Table of the Elements											64	D C	Copper 29	108	Ag	Silver 47	197	Αu	Gold 79				157	gg	Gadolinium
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È					J						55	Mn	Manganese 25		ည	Technetium 43	186	Re	Rhenium 75				144	Š	Neodymium
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200)5										-	51	29/0	2/M	/J/0)5	_						*	7	-

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141
Praseodymium Neodymium Promethium Samarium Europium Samarium Sa
141
Praseodymium
Praseodymium
Praseodymium 69 Praseodymium 69 Protactinium 91
<u>a</u> .v. o
Cerium 58 232 Th Thorium 90

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

b = proton (atomic) number

a = relative atomic mass X = atomic symbol

α ×

Key