



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CANDIDATE NAME												
CENTRE NUMBER								ANE IUME	ΤE			

COMBINED SCIENCE

0653/23

Paper 2 (Core)

October/November 2010

1 hour 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.

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.

DO **NOT** WRITE IN ANY BARCODES.

Answer all questions.

A copy of the Periodic Table is printed on page 24.

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.

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1	
2	
3	
4	
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9	
10	
Total	

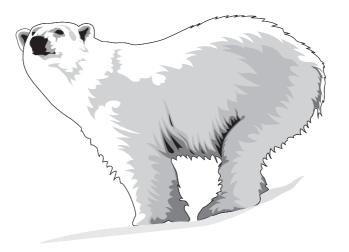
This document consists of 21 printed pages and 3 blank pages.



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1 (a) Polar bears live in the cold, arctic region. They have thick, white fur.





	Des	scribe how fur keeps a polar bear warm.	
			••••
			 [2]
(b)	(i)	Above the arctic region the ozone layer is decreasing, allowing more ultraviol radiation, which can cause chemical changes, to reach the surface of the Earth.	et
		State one danger to human beings of being exposed to large quantities ultraviolet radiation.	of
			[1]
	(ii)	Ultraviolet radiation is part of the electromagnetic spectrum.	
		Name one other radiation which is part of the electromagnetic spectrum and state a use of this radiation.	te
		name	
		use	[2]

2 (a) The apparatus shown in Fig. 2.1 can be used to react lead oxide and carbon.



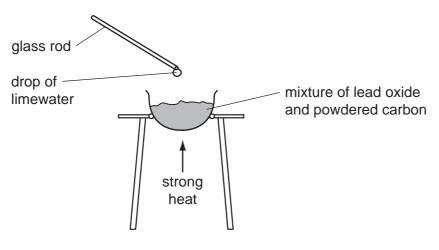


Fig. 2.1

When the mixture is heated, molten metal is formed in the container and the drop of lime water on the end of the glass rod becomes cloudy.

(i)	Suggest the word equation for the reaction between lead oxide and carbon. not write a symbolic equation.	Do
		[2]
(ii)	State one substance, shown in your equation in (i), which is a compound.	
	Explain why this substance is described as a compound and not as an element.	
	substance	
	explanation	
		[3]

(b) Fig. 2.2 shows some of the apparatus used in the electrolysis of copper chloride solution.

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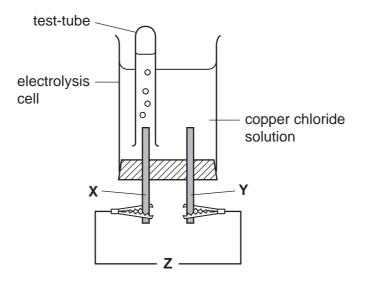


	Fig. 2.2
(i)	What is missing from position Z in Fig. 2.2?
	[1]
(ii)	Name the gas which collects in the test-tube, and explain whether electrode ${\bf X}$ is the anode or the cathode.
	gas
	Electrode X is thebecause
	[2]

3 A healthy plant growing in a pot was watered and placed in a sunny window. A transparent plastic bag was placed over the plant, as shown in Fig. 3.1.

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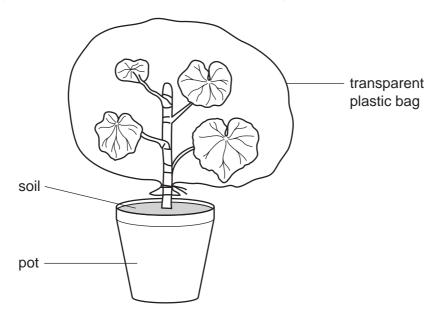


Fig. 3.1

- (a) The temperature near the window fell overnight. The next morning, small droplets of liquid water were visible on the inside of the plastic bag.
 - (i) Name the process by which plant leaves lose water vapour.

[1]	
 Г.1	

(ii) Name the small holes in the leaf through which the water vapour is lost.

[1]
נין

(iii) Explain why the water formed droplets of liquid on the plastic bag.

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(b) Fig. 3.2 shows a cell from the plant leaf.



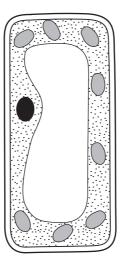


Fig. 3.2

- (i) On the diagram of the cell in Fig. 3.2, label and name **two** structures that would **not** be present in an animal cell. [2]
- (ii) Name the part of the leaf in which this cell could be found.

L '.

(iii) The cell in Fig. 3.2 can photosynthesise.

Write the word equation for photosynthesis.



[2]

4 (a) Fig. 4.1 shows the speed-time graph for a train.

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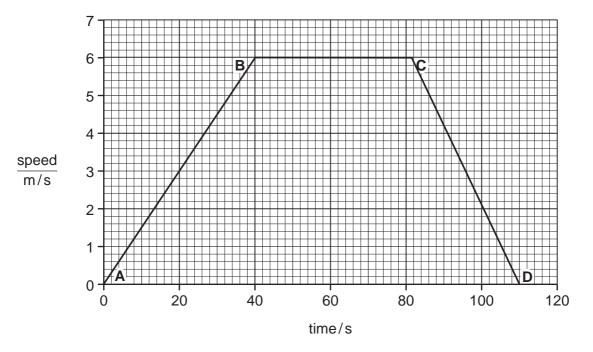


Fig. 4.1

The brakes are applied at **C**. Calculate how long it takes the train to stop.

S	[1]

- **(b)** Another train, on a journey lasting 10 minutes, travelled at a constant speed of 9 m/s.
 - (i) Show that the distance travelled by the train during this journey was 5400 m.
 State the formula that you use and show your working.

formula used

working

[2]

(ii)	The average force needed for the train to maintain the speed of 9 m/s was 10 000 N.	
	Calculate the work done by the train over 10 minutes.	
	State the formula that you use and show your working.	
	formula used	
	working	
	ı ro)]
	J [2	-]

Use

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5 Fig. 5.1 shows some stages in the formation of a human fetus.

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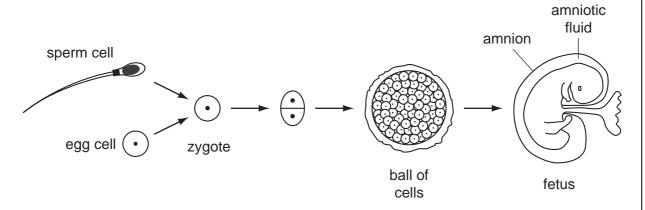


Fig. 5.1

(a)		t human cells contain 46 chro hromosomes each.	mosomes, but egg cells and sperm cells contain o	nly
	Sug	gest a reason for this.		
				[1]
(b)	Nam	ne the part of the reproductive	system in which each of these events takes place.	
	(i)	Eggs are produced.		[1]
	(ii)	Fertilisation		[1]
(c)	Desc	cribe the function of the amnic	on.	
				[2]

(d)	The fetus develops in the uterus.	
	It is attached to the uterus by the umbilical cord and placenta.	
	It obtains nutrients from its mother's blood, through the placenta.	
	Suggest why a pregnant woman should have more iron and calcium in her diet the when she is not pregnant.	an
	iron	
	calcium	
		[3]

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			[1]
		with wet hands rather than dry hands.	
		Explain why you are quite likely to be electrocuted if you handle an electrical de	vice
6	(a)	Electrical equipment can be dangerous, especially when it is handled with wet hand	S.

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(b) Fig. 6.1 shows a simple electric circuit.

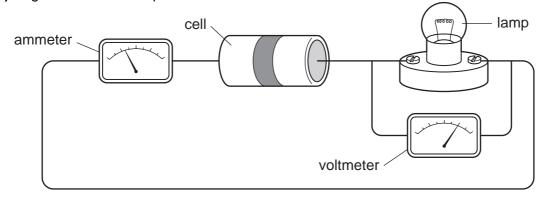


Fig. 6.1

Draw the circuit diagram for the circuit in Fig. 6.1 using the correct symbols.

[3]

(c) Fig. 6.2 shows a circuit built by a student.

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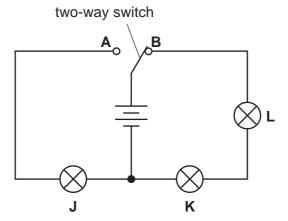


Fig. 6.2

(i) The switch is at position **B**.

Which lamps will be lit? [1]

(ii) The switch is then moved to position A.

What happens to lamps J, K and L?

lamp J

lamp **K**

lamp **L** ______

(d) The student has six resistors as shown in Fig.6.3.

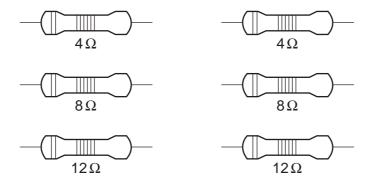


Fig.6.3

Describe how he can combine **two** of these resistors to get a total resistance of 20 ohms.

.....

[1

(e) Power stations produce electricity.

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Six stages in the production of electricity at a coal-fired power station are shown below.

- A electricity produced
- **B** coal burned
- C steam produced
- **D** turbine driven by steam
- **E** turbine turns generator
- F water boils

Using the letters ${\bf A}$ to ${\bf F}$, list the stages in the correct order in the boxes below. Two have been done for you.



[2]

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Please turn over for Question 7.

				16				
7	` '	e chemical s cleon (mass	-	oms shown be	elow inc	clude proton (ato	omic) numbers and	
			$^{16}_{8}$ O $^{3}_{1}$	³¹ ₅ P ³² ₁₆ S	⁷⁰ G	a		
	(i) State which of these symbols represent atoms of elements in the same group of the Periodic Table							
							[1]	
	(ii) Complete Table 7.1 which shows the names and the numbers of protons and neutrons in two of the atoms shown above.							
				Table 7.1				
			element name	protons	;	neutrons		
			oxygen					
				15		16		
							[2]	
	(b) Chlorine and hydrogen combine to form hydrogen chloride which dissolves in water to produce hydrochloric acid.							
	(i)	Suggest a chloride.	substance which	n reacts with h	ydroch	nloric acid to for	m the salt, copper	
							[1]	
	(ii)		n element from the			Periodic Table v	vhich reacts safely	

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[1]

(c) Ethene is a gaseous compound of carbon and hydrogen.

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Fig. 7.2 shows two different chemical reactions, **1** and **2**, involving ethene.

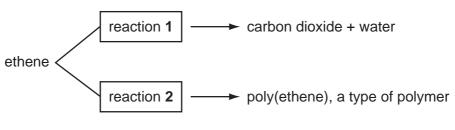


	Fig.7.2	
(i)	For reactions 1 and 2, deduce the type of chemical reaction which occurs.	
	reaction 1	
	reaction 2	[2]
(ii)	For reaction 2 , describe briefly what happens to the molecules of ethene during t reaction.	he
		. . [1]

8 Soya beans are an important crop in many tropical and subtropical countries, because they contain a lot of protein.

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(a) Fig. 8.1 shows how the yield of soya beans is affected by the pH of the soil in which they are grown.

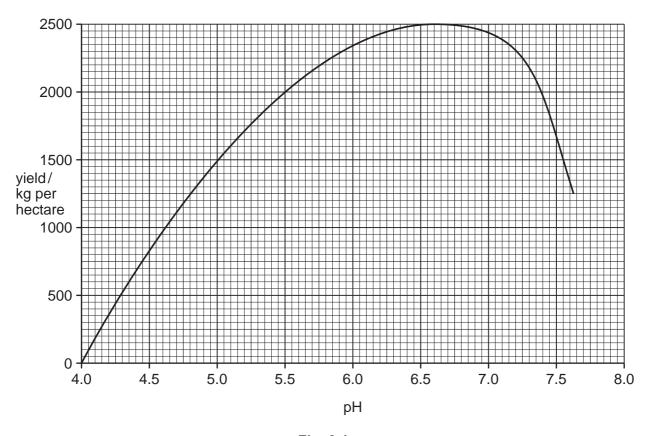


Fig. 8.1

A farmer grows soya beans in a field where the soil has a pH of 5.5.

(i)	What v	vield of	heans	could he	aet	from	his	cron?
111	, vviiai v	vi c iu oi	Dealis	COUIG HE	ueı	поп	HIIO	CIOD:

(ii)	State the	pH range in which soya beans g	row b	pest.	
	between		and		[1]

(iii) The farmer decides to add calcium carbonate to the soil in his field.

Explain why this would help him to achieve a higher yield of soya beans.

.....

kg per hectare

[1]

(b)	The	e field is on a steep slope.
	Des	scribe two things the farmer could do to reduce the risk of soil erosion.
	1	
	2	
		[2]
(c)		ya beans are seeds. They grow after the flowers on the soya plants have been inated.
	(i)	Soya flowers often have violet-coloured petals.
		Suggest how soya flowers are pollinated.
		[1]
	(ii)	Explain why soya beans only grow after the flowers have been pollinated.
	(11)	Explain why soya beans only grow after the howers have been pollinated.
		[2]
((iii)	Describe how you would test a soya bean seed for protein. State the result you would expect.
		test
		result [2]

For Examiner's Use **9 (a)** Complete Table 9.1 to show the properties of alpha, beta and gamma radiations.

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Table 9.1

	description	charge	range in air	ionising ability
alpha		positive	5 cm	very strong
beta	electron		50 cm	
gamma	wave		many kilometres	weak

[4]

(b))	Many	people	e have	smok	e dete	ectors	in	their	houses.
-----	---	------	--------	--------	------	--------	--------	----	-------	---------

Smoke detectors contain a radioactive source which emits alpha radiation.

•	n wny tne n the hous	•	radiation	Trom	tne	smoke	detector	is not	danger	ous to	people
											[1]

10 In many countries, river water is collected and treated to make it safe for humans to drink.

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(a) State and explain which **two** of the processes shown below are used to treat river water so that it becomes safe to drink.

	a	dding chlorin	ie	chromatog	raphy	evaporatio	n	filtration	
	first	process							
	ехр	lanation							
	sec	ond process							
	ехр	lanation							
									[4]
(b)		fur dioxide is taining sulfur				eleased into t	he air wh	en fossil fu	els
	(i)	Describe how	w sulfur di	oxide gas c	ould cause _l	pollution of wa	ter in rive	rs and lake	s.
									[3]
	(ii)	Suggest one reduced.	way in w	hich sulfur	dioxide emi	ssions into the	e atmosph	ere are be	ing
									[1]

(c) Fig. 10.1 shows a diagram of a water molecule, H_2O .

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Choose words or phrases from the following list to complete the labelling of the diagram.

covalent bond	hydrogen atom	ionic bond
nucleus	oxygen atom	proton

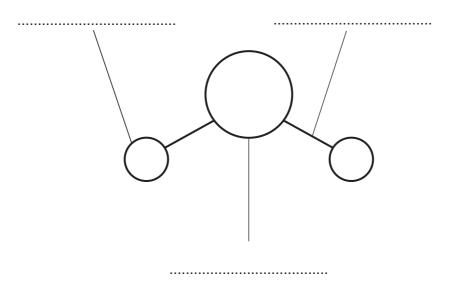


Fig. 10.1

[3]

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DATA SHEET
The Periodic Table of the Elements

	0	4 He Helium	Neon 10 Neon 10 Ar Argon	84 Krypton 36	131 Xe Xenon 54	Rn Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103
Group	II/		19 Fluorine 9 35.5 C1 Cthorine	80 Br Bromine 35	127 I lodine 53	At Astatine 85		173 Yb Ytterbium 70	Nobelium 102
	IN		16 Oxygen 8 32 \$ \$ \$ \$Sulfur	Selenium	128 Te Tellurium 52	Po Polonium 84		169 Tm Thulium 69	Md Mendelevium 101
	>		14 Nitrogen 7 31 97 Phosphorus 15	75 As Arsenic 33	Sb Antimony 51	209 Bi Bismuth 83		167 Er Erbium 68	Fm Fermium
	Ν		Carbon 6 Carbon 8 Silicon 14	73 Ge Germanium 32	119 Sn Tin	207 Pb Lead 82		165 Ho Holmium 67	ES Einsteinium 99
			11 B 80000 5 27 A1 Aluminium	70 Ga Gallium 31	115 I n Indium	204 T t Thallium 81		162 Dy Dysprosium 66	Cf Californium 98
				65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury 80		159 Tb Terbium 65	BK Berkelium 97
				64 Copper 29	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64	Carium Ourium
				59 Nickel 28	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63	Am Americium 95
			,	59 Cobalt	Rhodium 45	192 I r Iridium		Sm Samarium 62	Pu Plutonium
		T Hydrogen		56 Fe Iron	Ru Ruthenium 44	190 Os Osmium 76		Pm Promethium 61	Neptunium 93
				Manganese	Tc Technetium 43	186 Re Rhenium 75		Neodymium 60	238 U Uranium
				Chromium 24	96 Mo Molybdenum 42	184 W Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91
			_	51 Vanadium 23	93 Nb Niobium 41	181 Ta Tantalum 73		140 Cer ium 58	232 Th Thorium
				48 Ti Titanium	91 Zr Ziroonium 40	178 Hf Hafnium			nic mass Ibol nic) number
				Scandium 21	89 Y Yttrium 39	139 La Lanthanum 57 *	227 AC Actinium 89	d series series	a = relative atomic mass X = atomic symbol b = proton (atomic) number
	=		Be Beryllium 4 24 Magnesium 12	40 Ca Calcium	Strontium 38	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	x x □
	_		7	39 K Potassium	Rubidium 37	133 CS Caesium 55	Fr Francium 87	*58-71 L	Key

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