

# UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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NAME	E			
CENTRE		CANDIDATE		
NUMBER		NUMBER		

### COMBINED SCIENCE

0653/21

Paper 2 (Core)

October/November 2012

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 20.

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.

For Examiner's Use			
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2			
3			
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9			
Total			

This document consists of 18 printed pages and 2 blank pages.



1 (a) Complete Table 1.1 by choosing one of the words from the list to match statement.

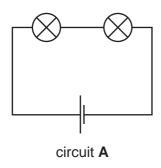
ammeter	ampere	electron	insulator
ohm	volt	voltmeter	watt

Table 1.1

statement	word
a particle with a negative electrical charge	
an instrument that measures electrical current	
the unit of potential difference	
a material that does not conduct electricity	

[4]

(b) Fig. 1.1 shows two circuits, **A** and **B**. All the lamps and both cells are the same.



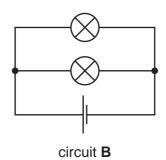


Fig. 1.1

(i) One lamp is unscrewed from circuit **A**.

State what happens to the other lamp.

Explain your answer.

Explain your answer.	
	[2]

(ii)	Explain why lights in a house are connected as in circuit <b>B</b> and <b>not</b> as in circ	For iner's
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iii)	The resistance of each lamp is $1.2\Omega$ .	
	Calculate the combined resistance of the two lamps in circuit <b>A</b> .	
	State the formula that you use and show your working.	
	formula used	
	working	
	Ω [2]	

2 (a) Fig. 2.1 shows part of the carbon cycle.

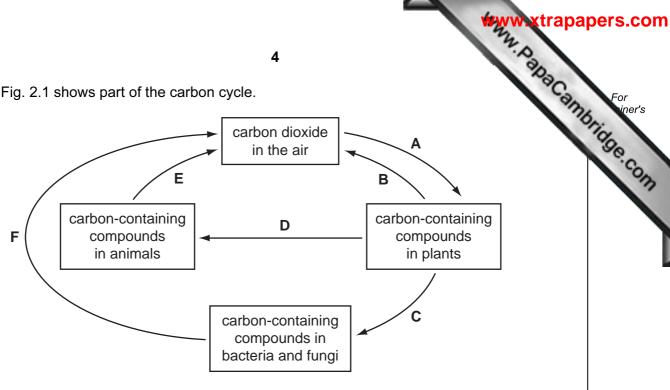


Fig. 2.1

- State the letter that represents photosynthesis in Fig. 2.1. (ii) State the three letters that represent respiration in Fig. 2.1. [1] ..... ..... ..... (iii) Name **one** carbon-containing compound in plants. [1] (iv) State the approximate percentage of carbon dioxide in the air.
- (b) (i) Earthworms play an important part in the carbon cycle. They eat leaves, and egest material containing plant nutrients into the soil.

Explain the meaning of the term egest.

[2]

(ii) Underline the two words that describe the position of an earthworm in a food chain.

> carnivore herbivore producer consumer

[1]

(iii)	Fishermen catch large numbers of earthworms to use as bait.
	There are concerns that too many earthworms are being collected.
	Suggest why it is important to conserve earthworms.
	[2]

[3]

(a) Fig. 3.1 shows how a digital pH meter is used to measure the pH of some liquids 3

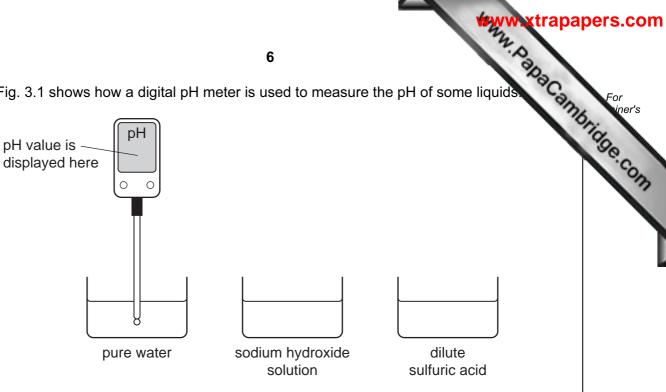


Fig. 3.1

(i) Complete Table 3.1 by suggesting suitable pH values for the different liquids.

Table 3.1

liquid	рН
pure water	
sodium hydroxide solution	
dilute sulfuric acid	

	(ii)	Suggest <b>one</b> advantage of using a digital pH meter rather than a piece of litr paper to compare the acidity of two different acid solutions.	nus
			[1]
b)		scribe how a student could use a solution of acidified silver nitrate to find ether or not an unlabelled solution contains sodium chloride.	out
			[2]

[2]

(c)	When a reactive	metal i	s added	to a	dilute	acid,	the	metal	reacts	and	dissolve
	gas is given off.										

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	7	
	en a reactive metal is added to a dilute acid, the metal reacts and dissolves For iner's	
(i)	Name <b>one</b> reactive metal that must <b>not</b> be added to a dilute acid.	
	Explain why this metal should not be added to acid.	١
	metal	
	explanation	

(ii) Fig. 3.2 shows how a student tested the gas given off when magnesium was added to dilute hydrochloric acid.

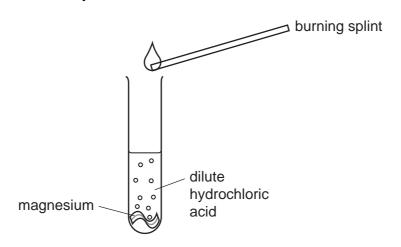


Fig. 3.2

State and explain what the student observed when he carried out this test.

observation	
explanation	[2]

(a)		scribe the energy changes that take place between the athlete taking off and landing in the high jump.
		[3]
(b)	Afte	er jumping, the athlete is sweating.
	(i)	Describe, in terms of particles, how evaporation occurs from the surface of a liquid.
		[2]
	(ii)	Explain how this process will cool down the athlete.
		[1]

Please turn over for Question 5.

5 Table 5.1 shows some of the nutrients contained in 100 g of five foods.

Table 5.1

shows some	of the nutrients	10 contained in 10 Table 5.1	00 g of five foods	S.
		nutr	ients	
food	sugar/g	starch/g	protein/g	fat/g
Α	0	0	13	10
В	14	6	7	0
С	0	0	14	6
D	6	8	12	14
E	9	14	3	0

(a)	('')	Willich two nutrients listed in Table 5.1 are carbonydrates:
		and[2]
	(ii)	Which nutrient listed in Table 5.1 contains nitrogen atoms in its molecules?
		[1]
(	iii)	State the letters of <b>two</b> foods in Table 5.1 that could have come from animals.
		and[1]
(	iv)	State the letter of <b>one</b> food that would appear orange-brown when tested with iodine solution, and give a purple colour when tested with biuret reagent.
		[1]
	(v)	State the letter of the food that provides the most energy per 100 g.
		[1]
(b)	Tab	ole 5.1 does <b>not</b> contain information about vitamins or minerals.
	Out	tline the symptoms that a person may develop if their diet is deficient in
	(i)	vitamin D,
		[1]
	(ii)	iron.
		[1]

(c)	Explain why eating a lot of foods containing sugar can increase the risk of tooth	1
	[3]	

6 Some types of firework are made by filling a cardboard tube with firework mixture. Find mixture is made from several solid substances which have been powdered and mixtugether.

Fig. 6.1 shows a typical firework.

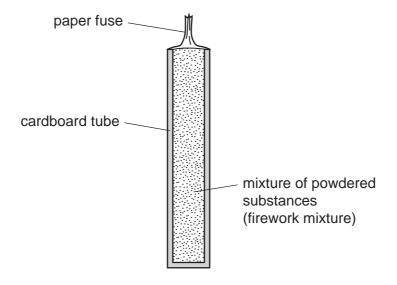


Fig. 6.1

When the paper fuse is lit, exothermic chemical reactions occur inside the firework.

(a) (i) State two forms of energy that are released when the firework mixture reacts.

	1	
	2	[2]
(ii)	State the effect on the rate of reaction of using firework mixture in the powder.	form of a
		- 43

(b) Some firework mixtures contain aluminium which is oxidised when the firework is

Table 6.1 shows the numbers of protons and electrons in four particles, **A**, **B**, **C** and **b** which are involved in the oxidation of aluminium.

Table 6.1

particle	number of protons	number of electrons
Α	8	10
В	13	13
С	8	8
D	13	10

	(i)	Atoms of the element aluminium have the proton number 13.
		State and explain which particle, <b>B</b> or <b>D</b> , in Table 6.1 is an <b>atom</b> of aluminium.
		particle
		explanation
		[1]
	(ii)	State and explain which <b>two</b> particles in Table 6.1 could be found bonded together in aluminium oxide.
		particles and
		explanation
		[3]
(c)	Fire	ework mixtures contain the compound potassium perchlorate, KC <i>l</i> O <sub>4</sub> .
		en potassium perchlorate is heated, a colourless gas is given off which re-lights a wing splint.
	(i)	State the name of this gas. [1]
	(ii)	Suggest how potassium perchlorate in the firework mixture helps the mixture to burn.
		[2]

14

(a) On the grid below, draw a wave with an amplitude of 2 cm and a wavelength of 4

On your diagram, clearly label the amplitude and the wavelength. [3] (b) (i) Two sound waves, A and B, have the same frequency. A has a greater amplitude than B. What difference would you hear? \_\_\_\_\_\_[1] (ii) Two sound waves, X and Y, have the same amplitude. X has a greater frequency than Y. What difference would you hear? (c) Energy travels to the Earth from the Sun. State whether this transfer of energy is by conduction, convection or radiation. Explain your answer.

8 Fig. 8.1 shows the male reproductive system.

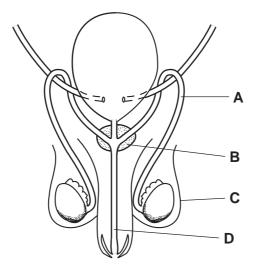


Fig. 8.1

(a)	(i)	Name parts <b>C</b> and <b>D</b> .			
		c			
		D	[2]		
	(ii)	State the functions of parts <b>A</b> and <b>B</b> .			
		A			
		В	[2]		
	(iii)	On Fig. 8.1, use a label line and the letter <b>S</b> to indicate where male gametes a made.	are [1]		
(b)	The	e human immunodeficiency virus (HIV) can be transmitted during sexual intercours	se.		
	Out	tline <b>two</b> other ways in which HIV can be transmitted.			
	1				
	2.				
			[2]		

			10
9	Chl	orine	is released when hydrochloric acid reacts with the compound, manganese of
	(a)	(i)	Explain why chlorine is an example of an <i>element</i> and <b>not</b> a <i>compound</i> .
			[2]
		(ii)	Describe a safe test for chlorine gas.
			[2]
			mplified diagram of the apparatus used to produce chlorine is shown in Fig. 9.1.  chlorine gas  electrodes yas  solution of compound X  permeable membrane
			·
			Fig. 9.1
		(i)	State the meaning of the term anode.

(ii)	A student knows that compound <b>X</b> in Fig. 9.1 is either sodium hydroxide, Nacl.
	Using information from Fig. 9.1, deduce whether compound ${\bf X}$ is sodium hydroxide or sodium chloride.
	Explain your answer.
	<b>X</b> is
	explanation
	[1]
	orine is found in Group 7 of the Periodic Table. Two of the other elements in oup 7 are bromine and iodine.
(i)	Chlorine is a gas at room temperature.
	What are the physical states of bromine and iodine at room temperature?
	bromine
	iodine [2]
(ii)	Explain briefly why a solution of sodium bromide turns orange when chlorine is bubbled through it.
	[2]
	Chl Gro

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The Periodic Table of the Elements DATA SHEET

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				20	A. Tall
	0	4 <b>He</b> Helium	Neon 10 Ar	18 84 Krypton 36 131 Xe Xe Xenon 87 Radon 88	m
	IIA		19 Fluorine 9 35.5 <b>C1</b>	80 Brownine 35 127 127 127 At Astatine 85	Yb Yb Vrterblum 70 Nobellum 102
	I		0 Oxygen 32 S	79 Selentum 34 Tel Tel Tel Tel Tel Polontum 84 Polontum 84	Tm Tm Median (89 Median) (101 M
	^		Nitrogen 7 31 31	75 <b>AS</b> Arsenic 33 Artification 51 209 Bi Bismuth 83	Erbium 68 Femum 100
	\ <u>\</u>		Carbon 6 Carbon 8 28 Signary	Commonlum 32 Commonlum 32 Th9 Sn Tin 50 Th Pb Lead	Homium 67  Homium 67  Es  Einsteinium 99 (f.1.p.).
	Ξ		11  B Boron 5  A1  A1	70 <b>Ga</b> Galfurm 31 115   <b>n</b> Indium 49 204 <b>T1</b> Thaffurm 81	140         141         144         Pm         150         152         157         159         162         162         165         162         165         162         162         163         162         162         163         162         163         163         163         163         162         163         163         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165         165
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				64 Copper 108 Ag Silver 197 Au Gold 79 Gold 179	Gadolinium
Group				59 Ni	Eu Europium 63 Americium 95 Americium 73 at roor
Gr				59 Cobait 27 To 27 Rh Rhodium 45 I 192 I ridium 777	Sam artum 62 Sam artum 62 Pu Putonlum 94 Sam artum 84 Sam artum 84 Sam artum 85 Sam
		T Hydrogen		56 Fe Iron 26 PR 101 PR 101 PR 101 PR 100 PR 190 PR	Pm Prometrium 61 NP Neptunium 93
				Manganese 25 TC Technetium 43 Re Renium 75	Nd Neodymium 60 238 U Uranium 92 One mole
				52 Chromium 24 Mo Molybdenum 42 184 W Tungsten 74	Praseodymium 59 Pratectinium 91 Protactinium 9
				51 V Vanadium 23 93 Mb Nb	140 Ceeruum 58 232 Th Thortum 90 The v
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