

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

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CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

COMBINED SCIENCE

0653/02

Paper 2 (Core)

October/November 2009

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 Exam	iner's Use
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Total	

This document consists of 19 printed pages and 1 blank page.



Table 1.1 shows the results of food tests made on two different foods. 1

Table 1.1

ole 1.1 shows the resu	2 Ilts of food tests made on two di	fferent foods.	For iner's
	Table 1.1		Office .
food	colour with iodine solution	colour with biuret solution	Secon
Α	blue-black	blue	
В	brown	purple	

(a)	Use	the results in Table 1.1 to state the nutrient present in food A and in food B .	
	food	d A	
	food	d B	[2]
(b)	The	enzyme amylase is present in saliva. It helps to digest starch in the mouth.	
	(i)	Explain what is meant by the term <i>enzyme</i> .	
			••••
			[2]
	(ii)	Some people do not produce amylase in their saliva or other digestive juices.	
		Explain why these people cannot obtain energy from the starch in their diet.	
			••••
			[3]
	(iii)	The inability to produce amylase can be passed on from parents to their children	-
		Suggest what causes this inability.	
			[1]
	(iv)	Dogs are carnivores. Dogs do not produce amylase.	
		Explain why carnivores, such as dogs, do not need to produce amylase.	
			[1]

www.PapaCambridge.com (a) Fig. 2.1 shows some of the gases which are released into the air when vol 2 erupt.

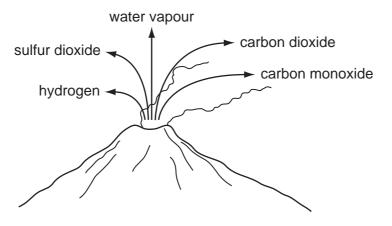


Fig. 2.1

(i)	Which gas shown in Fig. 2.1 is an element?	[1]
(ii)	Explain how volcanic eruptions could cause acid rain.	
		[2]
Car	bon dioxide molecules are formed when two non-metallic elements combine.	

(ii) Complete Table 2.1 by drawing the displayed (graphical) formula of carbon dioxide.

Table 2.1

(i) State the type of chemical bonding in a carbon dioxide molecule.

(b)

	molecular formula	displayed formula
water	H ₂ O	H – O – H
carbon dioxide	CO ₂	

[1]

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3 Radiation can be used to monitor the thickness of paper in a paper mill.

Fig. 3.1 shows a radiation detector connected to a control unit. This sends messages machines that adjust the gap between the rollers.

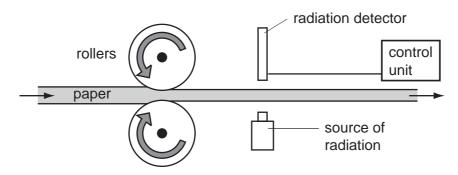


Fig. 3.1

(a) The following sentences describe what happens if the paper sheet produced is too thin.

The sentences are in the wrong order.

- **A** The gap between the rollers is increased.
- **B** The paper sheet is now rolled a little thicker.
- **C** A signal goes from the detector to the control unit.
- **D** The paper sheet absorbs less beta radiation so more reaches the detector.

Arrange the sentences in the correct order.

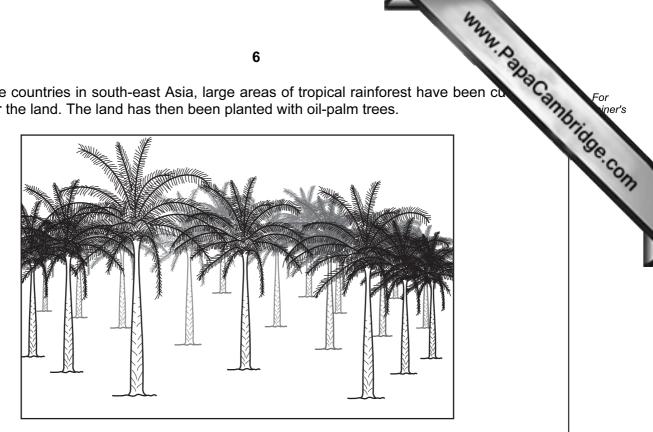


(b) Explain why an alpha radiation source **cannot** be used to monitor the thickness of the paper sheet.

[1]

[2]

In some countries in south-east Asia, large areas of tropical rainforest have been cut to clear the land. The land has then been planted with oil-palm trees.



(a)	Exp	plain how cutting down tropical rainforest may affect each of the following.	
	(i)	soil erosion	
			••••
			[2]
	(ii)	species diversity	
			[2]

www.PapaCambridge.com **(b)** Oil palm rats often live in oil-palm plantations. The rats eat the oil-palm fruits. Owls prey on the oil-palm rats.

(i) Draw a food chain to show this information.

[2]

(ii)	For each consumer	organism r.	in your	food	chain,	state	whether	it is	ар	roducer	or	а
											[1]

[1]

- Plastics are suitable materials for making containers in which to store acids. Acids stored in containers made of galvanised steel. 5
 - (a) Acids are neutralised by alkalis.
 - (i) Complete the general word equation below.

	May	
	8	
	s are suitable materials for making containers in which to store acids. Acids in containers made of galvanised steel.	For iner's
(a) Aci	ids are neutralised by alkalis.	Tage
(i)	Complete the general word equation below.	G.COM
6	acid + alkali +	
		[2]
(::\		[-]
(ii)	State the element which is present in all acids.	
		[1]
(iii)	Sodium hydroxide solution is an example of an alkali.	
	Write the chemical formula of sodium hydroxide.	
		[1]
(b) (i)	Name the main metallic element in steel.	
		[1]
(ii)	Describe what is meant by the term <i>galvanised</i> , and state briefly why some steel galvanised.	l is
		[2]
(iii)	Explain why galvanised steel is not a suitable material for making containers us for storing acids.	ed

(c)	Pol ma	y(propene) is a compound used in making plastics. Poly(propene) is a polyton de of the monomer, propene (C_3H_6).
	(i)	State the total number of atoms combined in one molecule of propene.
		[1]
	(ii)	Explain why propene is an example of a hydrocarbon.
		[1]
	(iii)	Poly(propene) molecules are formed when propene is heated with a catalyst.
		Describe how propene molecules react to form poly(propene). You may draw a simple diagram if it helps you to answer this question.
		[2]

6 A motorcyclist begins a journey on his motorcycle. The motorcycle starts from re stops at a road junction after 80 seconds. The motorcycle then moves off again completes the journey.

(a) Fig. 6.1 shows a graph of the motion of the motorcycle.

Explain your answer.

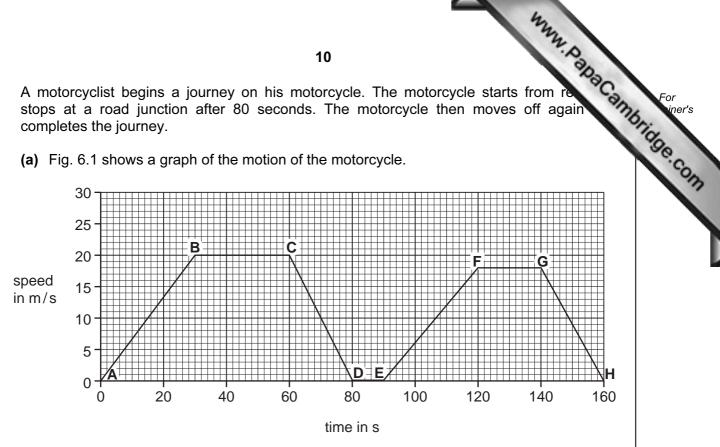


Fig. 6.1

(i)	From the start of the journey, how long of 10 m/s?	did it take the motorcyclist to reach a sp	eed
		s	[1]
(ii)	For how long was the motorcyclist travel	ling at a steady speed of 20 m/s?	
		s	[1]
(iii)	During which two parts of the journey wa	as the motorcyclist slowing down?	
	from	to	
	and from	to	[1]
	scribe the motion of the moving motorcycle same as the force produced by the eng		ıces

(c) Motorcycle engines use petrol as a fuel.

www.PapaCambridge.com When motorcycle engines are tested at the factory, a tube should be attached to the exhaust pipe.

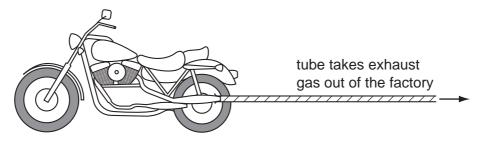


Fig. 6.2

(i)	Exp	lain why the exhau	ust gas must be remo	oved from the facto	ry.	
	•••••					
	•••••					
						[2]
(ii)		nplete the sentendine.	ces to show the ene	rgy changes invol	ved in the motorcy	/cle
	•	Fuel contains		energy.		
	•	Fuel burns in the	engine to produce		energy	
		and		energy.		[3]

www.PapaCambridge.com 7 Fig. 7.1 shows a transverse section of part of a leaf. The arrows show water moveme

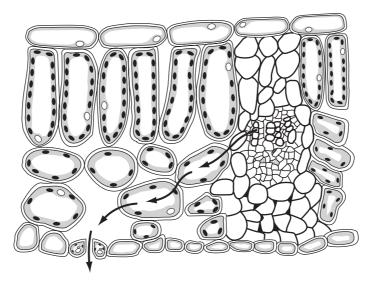


Fig. 7.1

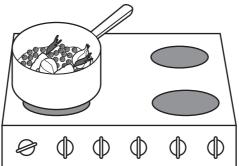
		C	
(a)	On	Fig. 7.1, label each of following structures, using label lines.	
	(i)	a palisade cell	[1]
	(ii)	a stoma	[1]
(b)	Des	scribe the function of each of these parts of a palisade cell. nucleus	
			[2]
	(ii)	cell surface membrane	[1]
(c)	(i)	Explain why palisade cells need a good supply of water.	
	(ii)	Name the type of cell that transports water from the roots to a leaf.	
			[1]

(d)	(i)	Fig. 7.1 shows water moving through the leaf and out into the surrounding an	Can
		In what state, solid, liquid or gas, is the water as it moves from the leaf into the air	
			[1]
	(ii)	Name the process by which the water moves out of the leaf into the air.	
			[1]

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8 (a) Fig. 8.1 shows an aluminium saucepan on a cooker. Vegetables are being coboiling water in the pan.



		0				Φ	\bigoplus	
				Fig.	8.1			
(i)	State how the er the water.	nergy p	asses	s from	the h	ot co	oker th	nrough the base of the pan to
								[1]
(ii)	Suggest why sau	ıcepan	handl	es ar	e ofter	n made	e from	plastic rather than metal.
								[1]
(b) Fig.	. 8.2 shows three	differen	ıt way	s in w	hich p	article	es may	be arranged in substances.
		(
	A				В			С
				Fig.	8.2			
(i)	Which diagram be saucepan?	oest re	prese	nts th	ie way	/ parti	cles a	re arranged in the aluminium
	Explain your ans	wer.						
	diagram			•••••				
	explanation							
								[1]

	(ii)	Which diagram best represents the way particles are arranged in the water saucepan?
		_
		Explain your answer.
		diagram
		explanation
		[1]
(c)	Fig.	8.3 shows a block of aluminium which has a mass of 540 g.
		aluminium
		2 cm 540 g 10 cm
		10 cm
		Fig. 8.3
	(i)	Calculate the density of the block.
		State the formula that you use and show your working.
		a / am ³ [2]
		g/cm ³ [3]
	(ii)	Calculate the weight of the block. Assume that the gravitational field strength of the Earth is $10N/kg$.
		N [1]

www.PapaCambridge.com A student uses dilute hydrochloric acid to test four pieces of rock, W, X, Y and Z. 9 She allows some of the acid to fall onto the samples and observes what happens.

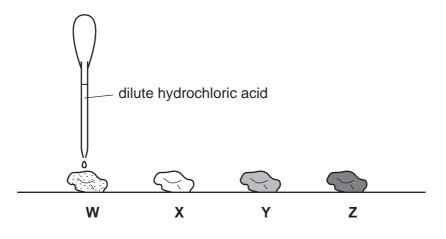


Fig. 9.1

Her observations are shown in Table 9.1.

Table 9.1

rock	appearance before acid added	reaction with acid
W	light grey	carbon dioxide gas produced
Х	white	no reaction
Υ	green	carbon dioxide gas produced
Z	dark grey	no reaction

(a) (i)	State which of the rocks W , X , Y and Z , contain a carbonate.						
		Explain your answer.						
		rocks						
		explanation						
		[2						
(ii)	Copper is a transition metal. Suggest and explain which rock contains the compound, copper carbonate.						
		rock						
		explanation						
		[2						

(b) Copper metal can be extracted from copper carbonate in two stages as sh

www.PapaCambridge.com Fig. 9.2. stage 2 stage 1 copper mixture of black copper copper carbonate oxide solid Q and metal copper oxide Fig. 9.2 (i) The reaction in stage 1 is an example of thermal decomposition. State what has to be done to copper carbonate in order to cause this reaction to occur. [1] (ii) A black solid **Q** is mixed with the copper oxide made in stage **1**. The reaction in stage 2 occurs when this mixture is heated. Complete the word equation for this reaction, using the correct chemical name for substance Q. copper copper oxide [2] (iii) Name the type of chemical reaction in (ii) and explain your answer briefly.

www.PapaCambridge.com (iv) Draw a diagram of a simple electrical circuit which could be used to show a product of the reaction in stage 2 is a metal.

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The Periodic Table of the Elements DATA SHEET

	_	oυ ^ξ	o (b) ∈	_ _	_ Lo	- w 2	C 16		وا ج
	0	Helium	20 Neon	40 Ar Argon	84 Krypton 36	131 Xe Xenon	Radon 86	-	Lu Lutetium
	=		19 Fluorine	35.5 C1 Chlorine	80 Br Bromine	127 I lodine	At Astatine 85		173 Yb Ytterbium
	5		16 Oxygen	32 S ufur	79 Selenium 34	128 Te rellurium	Po Polonium 84		169 Tm Thulium
	>		14 N Nitrogen 7	31 Phosphorus 15	75 AS Arsenic 33		209 Bi Bismuth 83		167 Er Erbium
	≥		12 C Carbon 6	28 Si icon	73 Ge Germanium 32	Sn Tin 50	207 Pb Lead		165 Ho Holmium
	=		11 Boron	27 A1 Aluminium 13	70 Ga Gallium 31	115 In Indium	204 T 1 Thallium		Dy Dy Dysprosium
					65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury 80		159 Tb Terbium
					64 Copper	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64
Group					59 Nickel	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63
Ş					59 Co Cobalt	103 Rh Rhodium 45	192 I r Indium		Samarium
		1 Hydrogen			56 F.e. Iron		190 Os Osmium 76		Pm Promethium
					Manganese	Tc Technetium 43	186 Re Rhenium 75		144 Ne odymiu 60
					Chromium	96 Mo Molybdenum 42	184 W Tungsten 74		Pr Praseodymium 59
					51 V Vanadium 23	Niobium 41	181 Ta Tanalum		140 Ce Cerium
					48 T Trtanium	91 Zr Zirconium 40	178 ‡ Hafnium * 72		
					Scandium	89 < Yttrium 39	139 La Lanthanum 57 *	227 Ac Actinium 89	series eries
	=		Be Beryllium	24 Mg Magnesium	40 Ca Calcium	Sr Strontium	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series
	_		7 L.i Lithium	23 Na Sodium	39 K Potassium 19	85 Rb Rubidium 37	133 Cs Caesium 55	Fr Francium 87	*58-71 L£

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

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Mo

Fm

Es

ਲ

Curium

Am

å

238

Ра

232 **7** Thorium

a = relative atomic mass X = atomic symbol

Key

90

b = proton (atomic) number

Plutonium Pu

Californium 98 ರ

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