

1 hour 15 minutes



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

Paper 2 (Core)			May/June 2009
COMBINED SO	CIENCE		0653/02
CENTRE NUMBER		CANDIDATE NUMBER	
CANDIDATE NAME			

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.

For Exam	iner's Use
1	
2	
3	
4	
5	
6	
7	
8	
9	
Total	

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





1 Fig. 1.1 shows a section through a tooth.

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Fig. 1.1

(a)	Nam	e parts A, B and C .	
	Α		
	В		
	С		[3]
(b)	Expla	ain how teeth help with digestion.	
			•••
			 [2]
(c)		e one mineral and one vitamin that are essential for the growth of strong teet bones.	th
	min	eral	
	vita	min [[2]

2 (a) A student investigated how a change in potential difference across a lamp affected the current flowing through it.

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She used wires to connect the components shown in Fig. 2.1 to make a circuit.

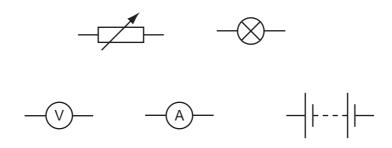


Fig. 2.1

(i) Using the correct symbols from Fig. 2.1, draw a diagram to show the circuit she used.

2	1
J	ı

(ii) Explain why the variable resistor is included in the circuit.

[1]

(iii) Her results are shown in Table 2.1.

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Table 2.1

potential difference across lamp/V	current through lamp/A	resistance of lamp filament/ Ω
4	1.2	3.3
8	1.5	
12	1.7	7.1

Complete the table by calculating the missing resistance and writing your answer in the empty box.

State the formula that you use and show your working.

formula

working

[2]

(b) Electricity can kill.

Identify and explain the electrical hazard shown in Fig. 2.2.

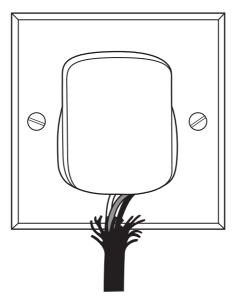


Fig. 2.2

		•••
	[2	<u>'</u> 1

3

(a) The names of six elements are shown below. chlorine carbon cobalt neon silicon sodium Choose the element from the list which is the least reactive, which is used to sterilise drinking water, which is a metal that forms coloured compounds. [3] **(b)** Fig. 3.1 shows a diagram of an atom. Fig. 3.1 (i) State the nucleon number (mass number) of the atom shown in Fig. 3.1. (ii) State the name of the element made of atoms like the one in Fig. 3.1. Explain your answer briefly. element explanation

(c) Fig. 3.2 shows a test for a gas which is produced when a solid element **A** reacts in a solution **B**.

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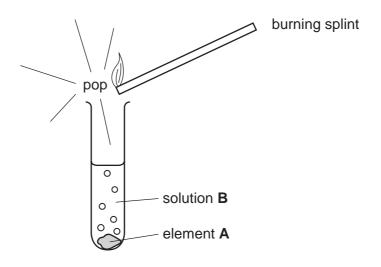


Fig. 3.2

Name the gas produced in this reaction, and suggest the names of element ${\bf A}$ and solution ${\bf B}$.

gas	
element A	
solution B	[3]

4 Fig. 4.1 shows an arum lily.

Arum lilies have flowers that are pollinated by insects.

There are many tiny flowers on a stalk, inside a large white structure called a spathe.



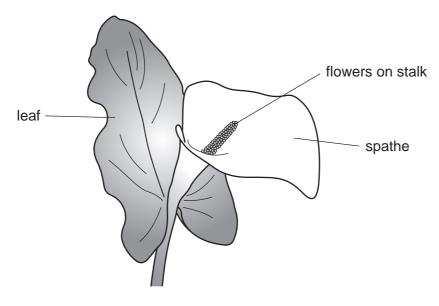


Fig. 4.1

(a)	(i)	Name the part of the flower in which pollen is made.	
			[1]
	(ii)	What does a pollen grain contain?	
			[1]
((iii)	Explain the meaning of the term <i>pollination</i> .	
			 [2]

(b) Arum lilies produce heat energy to raise the temperature of the flowers. This helps to attract insects to the flowers. They use respiration to do this.

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A researcher investigated whether there was a relationship between the temperature of the flowers inside an arum lily spathe and the rate of oxygen use.

He took 15 arum lilies, and measured the temperature and rate of oxygen use for each one.

Fig. 4.2 shows his results.

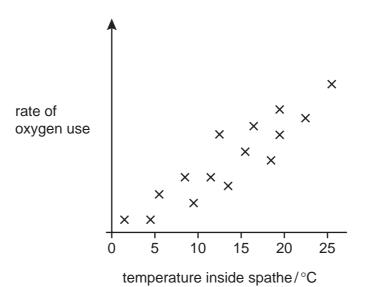


Fig. 4.2

(i)	Describe the relationship between the temperature inside the spathe and the rate of oxygen use by the arum lily.
	[1]
(ii)	Explain the reasons for the relationship you have described.
	[2]

		10	
(c)	The fuel that the arum lilies use	to produce the he	eat energy is glucose.
	Describe how the lilies obtain a	supply of glucose	
			[2]
(d)	The leaves of arum lilies conta chloroplasts.	in palisade cells, v	which are typical plant cells containing
	Complete the diagram of a palis	sade cell. Include t	hese structures in your labels.
	cell membrane	cell wall	chloroplast
	cytoplasm	nucleus	vacuole
			[4]

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Please turn over for Question 5.

		12
5		rings, who lived in Scandinavia about 1200 years ago, sailed in boats called as across the sea to Britain.
	(a) (i)	They travelled 900 km in 150 hours.
		Calculate their average speed for this journey.
		State the formula that you use and show your working.
		formula
		working
		km/h [2]
	(ii)	At one stage on their journey they were travelling at 7.2 km/h.
		Calculate their speed in m/s.
		Show your working.
		m/s [1]
	(b) A lo	ngship was moving at constant speed. The diagram shows four forces acting on it.
		thrust

weight

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[1]

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Name two forces which must be equal in size.

friction

(c)	The Vikings used animal furs to make clothes to keep them warm.
	Explain in terms of conduction and convection how fur clothes would have kept the Vikings warm.
	[3]
(d)	The volume of the wood used to construct the longship was 9 m ³ .
	If the density of the wood was 800kg/m^3 , calculate the mass of the wood used.
	State the formula that you use and show your working.
	formula
	working
	kg [2]
(e)	The major energy source used to propel the longship was the wind. Wind is a renewable energy source.
	(i) Name one other renewable energy source.
	[1]
	(ii) Nama and non rangwahla anaray saures
	(ii) Name one non–renewable energy source.
	[1]

6 (a) Fig. 6.1 shows industrial apparatus used for the fractional distillation of petroleum (crude oil).

For Examiner's Use

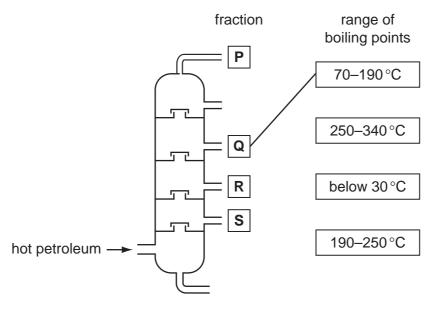


Fig. 6.1

Draw lines on Fig. 6.1 connecting the fractions, **P**, **Q**, **R** and **S** to the correct boiling point range. The line for fraction **Q** has been drawn for you. [2]

(b) Plastics and steel are both used to make buckets.

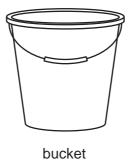


Fig. 6.2

(i)	Suggest buckets.	one	reason	why	plastics	are	suitable	materials	from	which	to	make
						•••••						
												[1]

(ii)	Buckets made from steel must be protected from rusting.						
	Name the element and the compound which react with mild steel to form rust.						
	element						
	compound	[2]					
(iii)	Describe briefly one suitable method of protecting a steel bucket from rusting.						
		[1]					
(iv)	Name the element which is oxidised when rust forms.						
		[1]					
(v)	Name the alloy from which cutlery is made.						
	cutlery						
	Fig. 6.3						
		[1]					

7 Read the following description of a food web.

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- Ants collect leaves from trees and take them into their nests.
- A fungus grows on the leaves and breaks them down.
- The ants eat the leaves, and also the fungus.
- Small birds eat the ants, and hawks eat the small birds.
- Pangolins eat only ants.

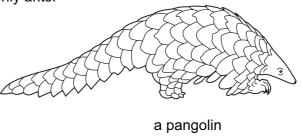
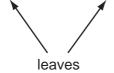


Fig. 7.1

(a) In the space below, complete a food web that includes all of the organisms described in Fig. 7.1.



[3]

(b)	(i)	Name the producer in this food web.					
		[1]					
	(ii)	Name a decomposer in this food web.					
		[1]					
(c)	Par	ngolins are becoming rare in some parts of the world.					
	Use the information in Fig. 7.1, and your own knowledge, to explain why it is important to prevent deforestation if we want to conserve pangolins.						
		[2]					

18 8 (a) A hotel has a lift (elevator). It moves through a vertical height of 3 m between each 00000 Fig. 8.1 (i) A passenger travels in the lift. The passenger has a mass of 80 kg and weighs 800 N. The mass of the empty lift is 1200 kg. Calculate the total weight of the passenger and lift. Show your working. [2] (ii) Calculate the work done when the lift and passenger move up three floors, from Floor 1 to Floor 4. State the formula that you use and show your working. formula working

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[2]

(b)	(i)	In the restaurant, music is being played through loudspeakers.	
		Explain how the sound coming from the loudspeakers reaches the people in t restaurant.	he
			[2]
	(ii)	The amplitude of the sound waves is increased. What effect will this have on the sounds heard by the people in the restaurant?	
			[1]

9 Fig. 9.1 shows the main steps in a method used by a student to make salts.

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In separate experiments the student reacted the carbonate of a metal and the oxide of a metal with dilute sulfuric acid.

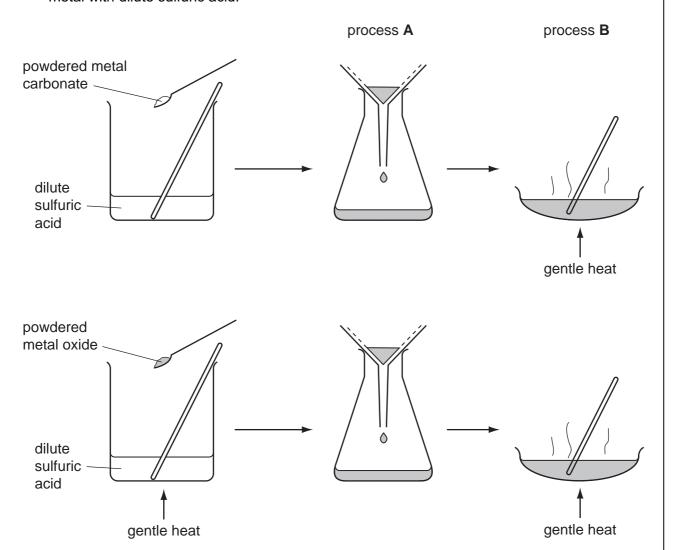


Fig. 9.1

(a) Name processes A and B shown in Fig. 9.1.

process A	
process B	 [2]

(b) Suggest and explain why the student used **powdered** solids in the reactions with dilute sulfuric acid.

(c) (i) Name the salt which is produced when zinc oxide reacts with dilute sulfuric acid.							
[1]							
(ii) Complete the word equation for the reaction of copper carbonate with sulfuric acid.							
copper carbonate + sulfuric acid + +							
 (d) (i) The salt calcium chloride is made when calcium oxide reacts with hydrochloric acid. The symbolic equation for this reaction is shown below. CaO + HCl → CaCl₂ + H₂O Explain whether or not this equation is balanced. 							
Explain whether or not this equation is balanced.							
[2]							
(ii) A student reacted calcium oxide with hydrochloric acid using the apparatus shown in Fig. 9.2.							
thermometer							
hydrochloric							
calcium oxide acid							
Fig. 9.2							
The student noticed that the temperature of the mixture increased.							
Explain this observation.							
[1]							

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DATA SHEET
The Periodic Table of the Elements

	0	4 He Helium	20 Se Neon 10	40 Ar Argon	84 K rypton 36	131 Xe Xenon	Rn Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103	
			19 T Fluorine	35.5 C1 Chlorine	80 Br Bromine	127 I lodine	At Astatine 85		173 Yb Ytterbium 70	Nobelium	
	IN		16 O Oxygen 8	32 S Sulfur	79 Se Selenium 34		Po Polonium 84		169 Tm Thulium	Mendelevium 101	
	>		14 N Nitrogen 7	31 Phosphorus	AS Arsenic				167 Er Erbium 68	Fm ermium	
	2		12 C Carbon 6	28 Si Silicon	73 Ge Germanium 32	30 Sn Tin 50	207 Pb Lead		165 Ho Holmium 67		
	=			11 Boron 5	27 A1 Auminium	70 Ga Gallium 31	115 In Indium 49	204 T t Thallium		162 Dy Dysprosium 66	
					65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury		159 Tb Terbium 65		
					64 Copper	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64		
dno					59 X Nickel	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63		
Group					59 Co Cobalt	Rhodium 45	192 Ir Iridium		Sm Samarium 62		
		1 Hydrogen			56 Fe Iron 26	Ruthenium	190 OS Osmium 76		Pm Promethium 61		
					Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		144 Ne odymium 60	238 Uranium 92	
					Cr Chromium 24	96 Mo Molybdenum 42	184 W V Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91	
					51 V Vanadium 23	93 No Niobium	181 Ta Tantalum		140 Ce Cerium 58	232 Th	
					48 Ti Titanium 22	2 r Zirconium 40	178 Hf Hafnium 72			nic mass ool nic) number	
					Scandium 21	89 ≺ Yttrium	139 La Lanthanum	227 AC Actinium 89	series eries	a = relative atomic massX = atomic symbolb = proton (atomic) number	
	=		9 Be Beryllium	24 Mg Magnesium	40 Ca Calcium	88 Strontium 38	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid serie 190-103 Actinoid series	в Х а	
	_		7 Li Lithium	23 Na Sodium	39 K Potassium 19	85 Rb Rubidium 37	133 Caesium 55	Fr Francium 87	*58-71 Lanthanoid series 190-103 Actinoid series	Key	

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

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