



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

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COMBINED SC	IENCE	
CENTRE NUMBER		
CANDIDATE NAME	l	

CANDIDATE NUMBER

0653/22

Paper 2 (Core)

May/June 2013

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 pencil for any diagrams or graphs.

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

DO **NOT** WRITE IN ANY BARCODES.

Answer all questions.

Electrical calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

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.



www.PapaCambridge.com (a) Fig. 1.1 shows some of the elements in Group 1 of the Periodic Table. Na K Fig. 1.1 (i) Name the gas which is given off when the metals in Fig. 1.1 react with water. [1] (ii) Describe how the rate of reaction between water and the metals in Fig. 1.1 changes as you go down the group. **(b)** Fig. 1.2 shows some of the elements in Group 7 of the Periodic Table. C1Br Ι Fig. 1.2 (i) Describe how the melting point of the elements in Fig. 1.2 changes as you go down the group. [1] (ii) A solution of potassium bromide is colourless and a solution of chlorine is almost colourless. Describe and explain briefly what would be seen when these solutions are mixed. what would be seen ..... explanation

(c) Phosphorus is a non-metallic, solid element.

www.PapaCambridge.com One form of phosphorus is white, has the chemical formula P4 and has to be ken under water.

Fig. 1.3 shows a bottle containing phosphorus.

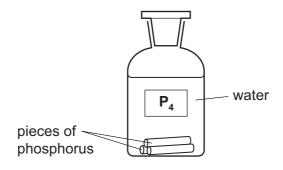


Fig. 1.3

(i)	Suggest why white phosphorus has to be stored under water.	
		•••
	Г	 21
		2]
(ii)	Explain the meaning of the chemical formula P <sub>4</sub> .	
		•••
	1	21

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2 (a) Fig. 2.1 shows a child's toy. As the ball falls, the toy elephant moves across the to

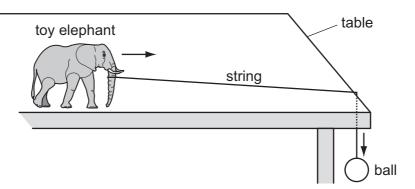
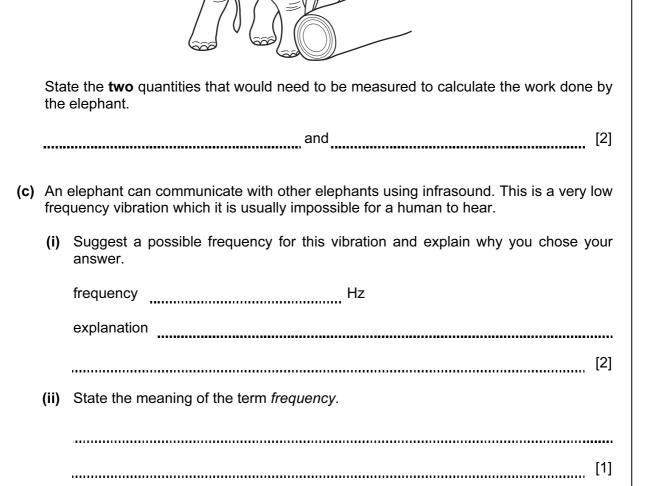


			Fig. 2.1				
(i)	Name the main	n force that opp	oses the m	otion of the toy ele	ephant.		
			•••				[1]
(ii)	State the unit u	used to measur	e forces.				
							[1]
(iii)		from the list bore than once o		mplete the senten	ces. You ma	ay use ea	ach
	chemical	electrical	gravi	tational potential	kin	etic	
	ligi	ht so	und		thermal		
	The useful ene	ergy transfer for	the toy is			energy	y
	to		ene	ergy.			
	The energy wa	asted by the toy	' is		ener	gy.	[2]
(iv)	The toy elepha	ant travels 1.2 n	netres in 3	seconds.			
	Calculate the a	average speed	of the eleph	nant.			
	State the form	ula that you use	e and show	your working.			
	formula						
	working						
	working						
						m/s	[2]
						111/3	[4]

(b) An elephant of mass 5000 kg exerts a constant force to push a tree trunk along steady speed of 1.5 m/s.

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ro soil on For iner's

3 (a) Four sets of pea seeds were placed in Petri dishes containing either damp soil on filter paper. They were left in different conditions, shown in Table 3.1.

Table 3.1

set	con	ditions	
Α	damp soil	cold	dark
В	damp filter paper	warm	light
С	damp filter paper	warm	dark
D	damp soil	cold	light

Frankin von an over

Explain your answer.

Predict which sets of seeds will germinate.

prediction	
explanation	
	[3]
	.,

**(b)** A pea seed was planted in a pot. When the seed had grown into a young plant, the pot was placed on its side in a room where light was coming from all sides.

Fig. 3.1 shows the young pea plant three days after the pot had been placed on its side.

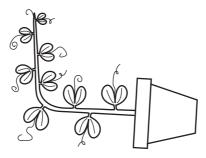


Fig. 3.1

(i) Which two terms describe the response of the plant shown in Fig. 3.1?Circle the correct answers.

geotropism	photosynthesis	phototropism	
sensi	tivity trans	piration	[2]



Fig. 4.1

- (a) Microwaves cook food by transferring energy to the food.
  - (i) Choose words from the list to complete the sentences below. You may use each word once, more than once or not at all.

chemical	conduction	convection
potential	radiation	thermal

Microwaves are absorbed by the outer layers of food.

The microwave energy is transferred to water and fat molecules in these layers,

increasing the \_\_\_\_\_ energy of these layers.

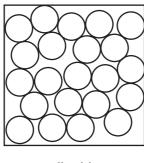
energy is mostly transferred to the centre of solid food by \_\_\_\_\_\_. [2]

(ii) State one use for microwaves other than cooking.

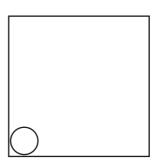
[1]

**(b)** Water can be heated in a microwave oven. The microwave oven is made of solids. The water is a liquid.

Complete Fig. 4.2 to show the arrangement of particles in a solid. The diagram for a liquid has been done for you.



liquid



solid

[2]

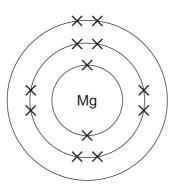
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Fig. 4.2

5	(a) (i)	Explain why hydrogen and carbon are described as elements, but hydroc such as methane and ethane are described as compounds.
		[2]
	(ii)	Name the fossil fuel found in the Earth that is the main source of methane.
		[1]
	(iii)	Name <b>one</b> type of fossil fuel that is a solid. [1]
	(iv)	Methane is used as a fuel because it reacts very quickly with oxygen, releasing heat.
		Name the <b>two</b> compounds that are formed when methane undergoes complete combustion.
		1
		2[2]
	<b>(b)</b> Ma	gnesium metal also reacts quickly with oxygen, releasing heat.
	(i)	Name the compound which is formed when magnesium reacts with oxygen.

For viner's

www.PapaCambridge.com (ii) Fig. 5.1 shows diagrams of a magnesium atom and an oxygen atom.



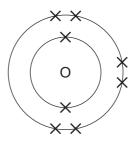


Fig. 5.1

When magnesium reacts with oxygen, the atoms shown in Fig. 5.1 first change into electrically charged atoms known as ions.

Describe what happens when these atoms change into ions.

magnesium	
ovvagon	
oxygen	
	[2]

sheep

**6** Fig. 6.1 shows a food chain. The arrows show how energy flows from one organ another, along the chain.

grass

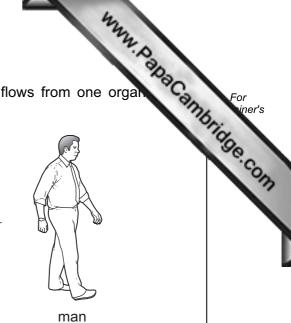


		Fig. 6.1	
(a)	Ene	ergy enters the food chain as sunlight. Plant leaves use this energy to make food.	
	(i)	Name the substance in the leaves of a plant that absorbs this energy.	
		[´	1]
	(ii)	Name the <b>two</b> raw materials that the plant uses to make food.	
		1 2 [2	2]
	(iii)	Name the gas released from plant leaves during this process.	
		[	1]
(b)		heep is a herbivore.	
	Def	fine the term <i>herbivore</i> .	
			•••
		[2	2]
(c)	Ме	at from the sheep contains protein.	
	Des	scribe the importance of protein in the diet.	

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(d)	<ul> <li>The cells in the man's body use respiration to release useful energy from nutries he has absorbed.</li> <li>(i) Tick the processes in the list below that use energy.</li> <li>the diffusion of oxygen from the lungs into the blood</li> </ul>				
	(i)	Tick the processes in the list below that use energy.		Tage	
		the diffusion of oxygen from the lungs into the blood		.com	
		the passage of nerve impulses along a nerve cell			
		muscle contraction			
		protein synthesis		[1]	
	(ii)	A person living in a very cold climate generally needs to eat living in a hot climate.	more than a pers	son	
		Explain why.			
				roı	

			and the state of t
7	(a)	The	e diagrams below show the circuit symbols for three components of an electrical shlight).
			On the line below each diagram, state the name of the component.
		-	
			[3]
		(ii)	Using <b>only</b> these symbols, draw a circuit diagram for a torch.
			[1]
			ניז
	(b)		ches are usually powered by electrical cells. They can also be powered by energy n the Sun (solar energy).
		Sol	ar energy is a renewable energy resource.
		(i)	Name <b>one</b> other renewable energy resource.
			[1]
		(ii)	Name <b>one</b> non-renewable energy resource.
			[1]
		(iii)	Energy is transferred from the Sun to the Earth by radiation.
			Explain why energy cannot be transferred from the Sun to the Earth by conduction.

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[1]

www.PapaCambridge.com (c) A ray of light from the torch is reflected by a mirror. This is shown in Fig. 7.1.

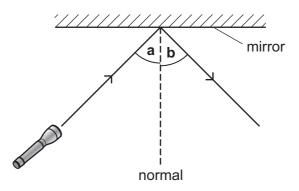


Fig. 7.1

Angle **a** has a value of 45°.

Name angle **b** and write down its value.

name	
value	۰

[2]

8 (a) A student added a solution of the same dilute acid to each of the test-tubes shown in Fig. 8.1.

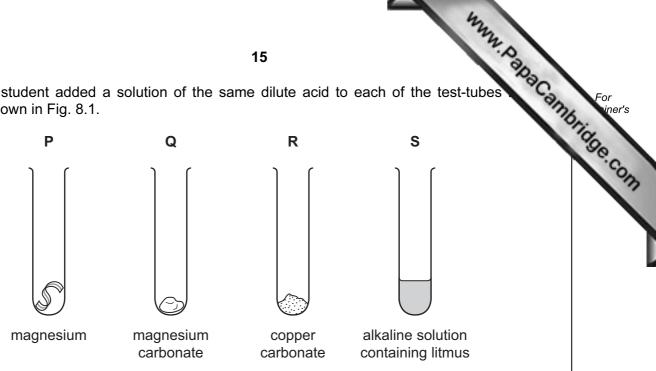


Fig. 8.1

Complete Table 8.1 by matching the test-tubes, P, Q, R and S, with the observations which are made when the dilute acid reacts with the contents.

One of the observations applies to more than one of the test-tubes. You may use each letter once, more than once or not at all.

Table 8.1

observations	test-tube(s)
Hydrogen gas is given off.	
A blue solution is formed.	
Carbon dioxide gas is given off.	

[3]

(b) The student used the apparatus shown in Fig. 8.2 to investigate neutral reactions involving three acids, A, B and C.

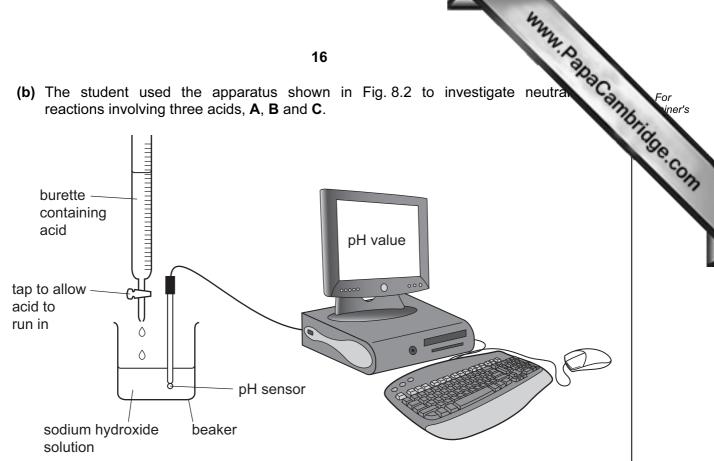


Fig. 8.2

25.0 cm<sup>3</sup> of the same solution of the alkali, sodium hydroxide, were placed into each of three beakers.

Acid was slowly added to each of the beakers in turn, and the pH values of the mixtures were displayed on the computer screen.

Some of the measurements from the three experiments are shown in Table 8.2.

Table 8.2

acid	source of acid	volume required to neutralise the alkali/cm <sup>3</sup>
Α	sample taken from an acidic lake	42.0
В	sample taken from a car battery	15.0
С	acid from a chemical laboratory	60.0

(i)	Suggest a possible pH value of the alkali before any acid was added.
	[1]
(ii)	Describe briefly what the student would observe when the acid had neutralised the alkali.
	[1]

	State, with a reason, which acid, <b>A</b> , <b>B</b> or <b>C</b> , had the highest concentration.  acid reason	
(iii)	State, with a reason, which acid, A, B or C, had the highest concentration.	Fo
	acid	Orida
	reason	00
	[1]	
(iv)	The student noticed that, in all three experiments, the temperature of the mixture increased as the acid was added.	
(iv)		
(iv)	increased as the acid was added.	
(iv)	increased as the acid was added.	
(iv) (v)	increased as the acid was added.  Suggest why the temperature increased.  [1]	

[2]

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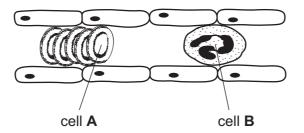


Fig. 9.1

(a)	Cel	A is a red blood cell.	
	(i)	Outline <b>two</b> ways in which this cell differs from a liver cell.	
		1	
		2	[2]
	(ii)	Describe the function of a red blood cell.	
			[2]
(b)	Des	scribe the function of cell <b>B</b> .	
			•••••
			[2]

(c) Complete the sentences about the functions of blood plasma, using words from You may use each word once, more than once, or not at all.

enzymes

adrenaline

using words from For iner's small intestine

soluble	stomach	starch	vitamins	
Blood plasma transp	oorts		nutrients such as sugars.	
These nutrients ente	er the blood in the		·	
Blood plasma also ti	ransports hormones	such as		[3]

insoluble

The Periodic Table of the Elements DATA SHEET

						0				my	Papa Cambridge Com
						U	T	1			Phase State
	0	Heium 4	20 <b>Ne</b> Neon 10	40 <b>Ar</b> Argon	84 <b>Kr</b> ypton 36	131 <b>Xe</b> Xenon 54	Radon 86		Lu Lutetium	Lr Lawrencium 103	SAMA
			19 Fluorine	35.5 <b>C1</b> Chlorine	80 <b>Br</b> Bromine 35	127 <b>T</b> lodine	At Astatine 85		Yb Ytterbium 70	Nobelium 102	Se con
	>		16 Oxygen 8	32 <b>S</b> Sulfur 16	79 Selenium	Tellurium	Po Polonium 84		169 <b>Tm</b> Thulium	Md Mendelevium 101	
	>		14 <b>N</b> itrogen 7	31 Phosphorus 15	75 <b>AS</b> Arsenic 33	122 <b>Sb</b> Antimony 51	209 <b>Bi</b> Bismuth		167 <b>Er</b> Erbium 68	Fm Fermium 100	
	2		12 Carbon 6	28 <b>Si</b> Silicon	73 <b>Ge</b> Germanium 32	Sn Tin 50	207 <b>Pb</b> Lead		165 <b>Ho</b> Holmium 67	<b>ES</b> Einsteinium 99	(r.t.p.).
	=		11 Boron 5	27 <b>A1</b> Aluminium 13	70 <b>Ga</b> Gallium	115 <b>In</b> Indium	204 <b>T 1</b> Thallium		162 <b>Dy</b> Dysprosium 66	1	The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).
		·			65 <b>Zn</b> Zinc 30	112 <b>Cd</b> Cadmium 48	201 <b>Hg</b> Mercury 80		159 <b>Tb</b> Terbium 65	<b>Bk</b> Berkelium 97	ture and I
					64 <b>Cu</b> Copper	108 <b>Ag</b> Silver 47	197 <b>Au</b> Gold		Gd Gadolinium 64	Cm Curium 96	tempera
dn					59 <b>Ni</b> Nickel 28	106 <b>Pd</b> Palladium 46	195 <b>Pt</b> Platinum 78		152 <b>Eu</b> Europium 63	Am Americium 95	13 at room
Group					59 <b>Co</b> Cobalt	103 <b>Rh</b> Rhodium 45	192 <b>Ir</b> Iridium		Sm Samarium 62		s is 24 dm
		Hydrogen			56 <b>Fe</b> Iron	Ruthenium 44	190 <b>Os</b> Osmium 76		Pm Promethium 61	Np	of any gas
					Manganese	Tc Technetium 43	186 <b>Re</b> Rhenium 75		Neodymium 60	238 <b>U</b> Uranium 92	ne mole c
					52 <b>Cr</b> Chromium 24	96 <b>Mo</b> Molybdenum 42	184 <b>W</b> Tungsten 74		141 Pr Praseodymium 59		lume of o
					51 V Vanadium 23	93 <b>Nb</b> Niobium	181 <b>Ta</b> Tarantalum		140 <b>Ce</b> Cerium 58	Z32 Th horium	The vo
					48 <b>Ti</b> Titanium	91 Zr Zirconium 40	178 <b>Hf</b> tafnium			nass	1
					Scandium 21	89 <b>&lt;</b> Yttrium 39	139 <b>La</b> Lanthanum 57 * 72	227 <b>Ac</b> Actinium	series ries	<ul><li>a = relative atomic mass</li><li>X = atomic symbol</li><li>b = proton (atomic) number</li></ul>	
	=		9 <b>Be</b> Beryllium	24 Mg Magnesium	40 <b>Calcium</b> 20	Sr Strontium	137 <b>Ba</b> Barium 56	226 <b>Ra</b> Radium	*58-71 Lanthanoid series 190-103 Actinoid series	a × a = c	
	_		Lithium 3	23 <b>Na</b> Sodium	39 Potassium	Rubidium 37	133 <b>Cs</b> Caesium 55	Francium 87	58-71 Lai 90-103 At	Key	

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