

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice

October/November 2013

45 minutes

Additional Materials: Multiple Choice Answer Sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

DO NOT WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

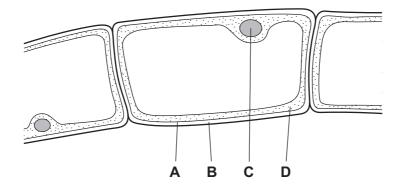
This document consists of **18** printed pages and **2** blank pages.

UNIVERSITY of CAMBRIDGE International Examinations

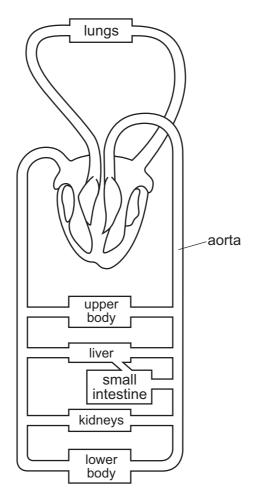
[Turn over

IB13 11_0654_12/RP © UCLES 2013 1 The diagram shows part of an organism that lives in water, magnified by a microscope.

Which part shows that the organism must be a plant?



2 The diagram shows the blood circulatory system of a human.



How many times must a blood cell pass through the heart on its way from the kidneys to the aorta?

- A once only
- B twice only
- C four times
- D more than four times

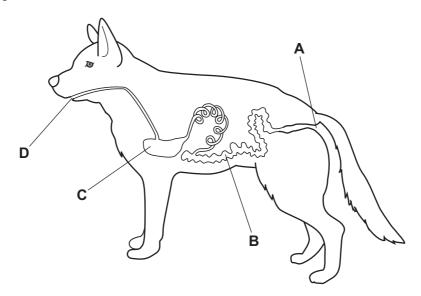
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- 3 Which statement about blood components is correct?
 - A Platelets make antibodies.
 - **B** Platelets transport oxygen.
 - C White blood cells carry out phagocytosis.
 - **D** White blood cells transport carbon dioxide.
- 4 Which row shows a chemical molecule and the basic unit from which it is made?

	chemical molecule	basic unit		
Α	glycogen	amino acid		
В	glycogen	simple sugar		
С	oil	amino acid		
D	oil	simple sugar		

5 The diagram shows the alimentary canal of a dog.

Where does egestion occur?



- **6** What is the meaning of homeostasis?
 - A breathing faster after exercise
 - **B** getting rid of carbon dioxide from the lungs
 - **C** keeping conditions in the body constant
 - **D** preventing the body from getting too hot

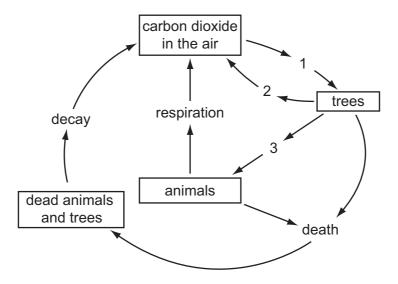
		4
7	Wh	ich is not a way that liver cells use energy?
	Α	cell division
	В	heat production
	С	movement
	D	protein synthesis
8	Wh	at does the central nervous system consist of?
	A	brain and peripheral nerves
	В	brain and spinal cord
	С	brain only
	D	spinal cord only
9	In r	mice, the allele for black fur is dominant to the allele for white fur. Two heterozygous mice te.
	Wh	at colour are the offspring likely to be?
	Α	all black
	В	some black and some white
	С	all grey
	D	all white
10	In a	a plant, what leads to offspring that are identical to the parent?
	Α	asexual reproduction
	В	insect-pollination
	С	seed germination
	D	sexual reproduction
11	Pol	lination is the transfer of pollen
	Α	from anther to sepal.
	В	from anther to stigma.

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C from sepal to anther.

D from stigma to anther.

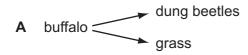
12 The diagram shows part of the carbon cycle in a forest. The numbers represent different processes.



Which of these processes is reduced as a result of deforestation?

- A 1 only
- **B** 1 and 2 only
- C 2 and 3 only
- **D** 1, 2 and 3
- 13 Dung beetles lay their eggs in the faeces of plant-eating mammals like buffalo. Both the adult beetles and their young stages eat the **undigested** food in the faeces.

Which shows this food relationship?



- B dung beetles → grass → buffalo
- C grass → dung beetles → buffalo
- D grass dung beetles

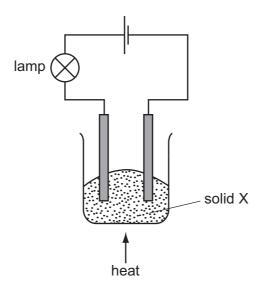
14 Substance Q is used to make a cooking pan.



What are the properties of substance Q?

	melting point	thermal conductivity			
Α	high	high			
В	high	low			
С	low	high			
D	low	low			

15 The experiment shown is used to investigate the properties of solid X.



At first, the lamp does not light.

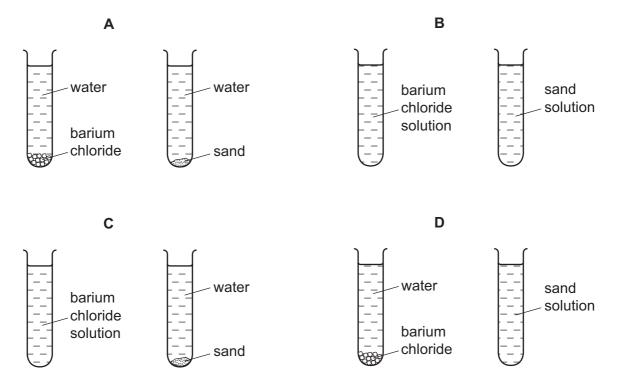
On heating, solid X melts and the lamp lights.

What type of substance is X?

- **A** a compound of a metal and a non-metal
- **B** a compound of two non-metals
- C a metallic element
- **D** a non-metallic element

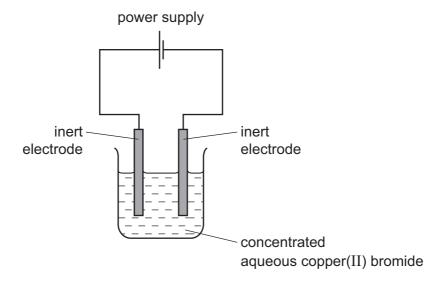
16 Small amounts of barium chloride and sand are shaken with separate samples of water in two test-tubes. The test-tubes are left to stand for 24 hours.

Which diagram shows how the test-tubes appear at the end?



17 The diagram shows the circuit for electrolysing concentrated aqueous copper(II) bromide.

Copper(II) bromide is similar to copper(II) chloride.



Which row describes the products at each electrode?

	cathode	anode			
Α	bromine	copper			
В	copper	bromine			
С	copper	er oxygen			
D	hydrogen	bromine			

18 Hydrogen can occur as an atom, an ion and a molecule.

Which row represents these particles?

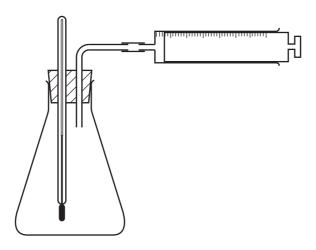
	atom	ion	molecule
Α	Н	H⁺	H ₂
В	Н	H ₂	H⁺
С	H⁺	Н	H ₂
D	H_2	H⁺	Н

19 The table shows the temperature of some water before and after a solid is dissolved in it.

Which change is the most exothermic?

	temperature before /°C	temperature after /°C
Α	20	18
В	20	40
С	25	18
D	25	42

20 The apparatus below is used to investigate the speed of a chemical reaction.



For which reaction is the apparatus suitable?

A gas E + gas F \rightarrow liquid G only

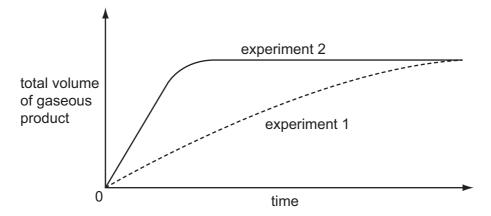
B solid H + solution I \rightarrow solution J only

 \mathbf{C} solid K + solution L \rightarrow solution M + gas N

D solution P + solution Q \rightarrow solid R + solution Q

21 Substance X does not react with dilute acid. Substance Y reacts with dilute acid, forming a gas.

The graph shows the results of two experiments.



What do these results show?

	X is a catalyst	X is quickly used up	
Α	✓	✓	key
В	✓	×	✓= true
С	x	✓	x = false
D	X	X	

22 The elements in a Group of the Periodic Table are solid at 20 °C.

The reactivity of the elements increases down the group.

Which statements about this group of elements and their oxides are correct?

	the elements are in	their oxides are		
Α	Group I	acidic		
В	Group I	basic		
С	Group VII	acidic		
D	Group VII	basic		

23 A label from a packet of indigestion tablets is shown.

Each tablet contains:						
magnesium carbonate	120 mg					
magnesium hydroxide	15 mg					
magnesium oxide	62 mg					
magnesium sulfate	47 mg					

Which substance does **not** neutralise stomach acid?

- A magnesium carbonate
- B magnesium hydroxide
- C magnesium oxide
- D magnesium sulfate
- 24 The elements from sodium to sulfur are in the same period of the Periodic Table.

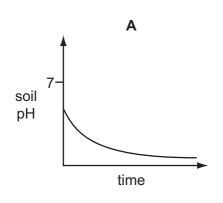
Na Mg	Αl	Si	Р	S
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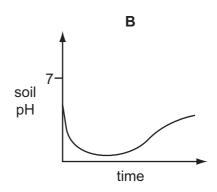
Which trend does not occur across the Periodic Table from sodium to sulfur?

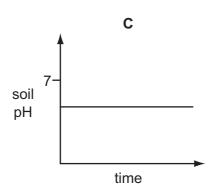
- **A** The chlorides of the elements change from covalent to ionic.
- **B** The elements change from good to poor electrical conductors.
- **C** The oxides of the elements change from basic to acidic.
- **D** The solid elements change from malleable to brittle.
- 25 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

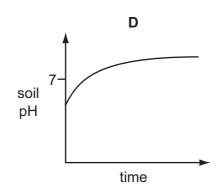
	type of reaction	temperature change
Α	endothermic	decrease
В	endothermic	increase
С	exothermic	decrease
D	exothermic	increase

26 Which graph shows how the pH of the soil changes when lime is added?







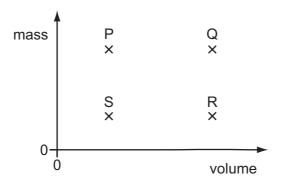


27 Ethanol can be made by reacting steam with a hydrocarbon.

What is the name of the hydrocarbon?

- A ethane
- **B** ethene
- **C** methane
- **D** propene

28 The diagram shows a graph with values of mass against volume for four different objects P, Q, R and S.



Which two objects have the same density?

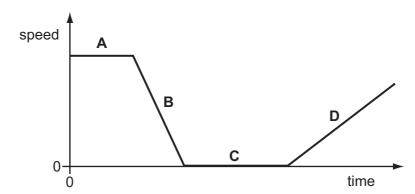
- A P and Q
- **B** P and R
- C R and S
- **D** S and Q

29 An aeroplane flies at a constant speed and height for several hours.

Which type of energy **must** change during this part of the flight?

- A the gravitational energy of the aeroplane
- **B** the kinetic energy of the aeroplane
- **C** the store of chemical energy in the fuel tank of the aeroplane
- **D** the thermal energy of the aeroplane
- **30** The graph shows the motion of a train during part of a journey.

At which labelled point on the graph could the train be waiting at a station?



31 A sample of liquid is allowed to cool for 20 minutes. Its temperature is recorded every two minutes.

The results are shown in the table.

time/minutes	0	2	4	6	8	10	12	14	16	18	20
temperature/°C	90.8	80.9	74.1	67.4	61.9	57.0	53.0	50.2	48.5	47.3	46.1

How should the sample be described at the end of the 20 minutes?

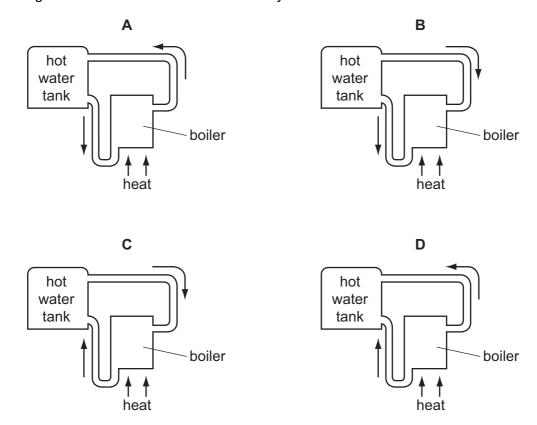
- A all liquid
- B all solid
- **C** in the process of boiling
- D in the process of solidifying
- 32 Liquid in a beaker evaporates quickly.

Which row shows what happens to the mass and to the temperature of the liquid in the beaker?

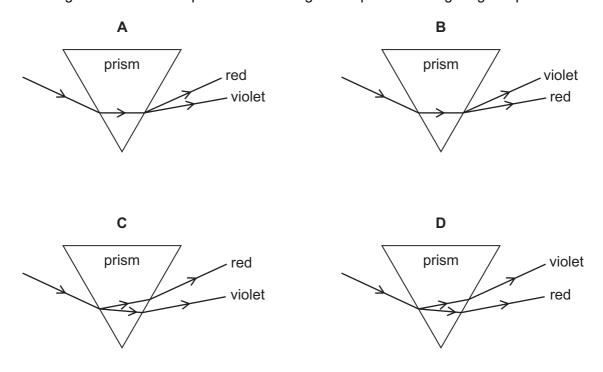
	mass	temperature
Α	decreases	decreases
В	decreases	increases
С	increases	decreases
D	increases	increases

33 The diagrams show part of a water-heating system which is working by convection.

Which diagram shows the flow of water in the system?



34 Which diagram shows the dispersion of white light as it passes through a glass prism?



35 A student counts how many waves pass point P in 30 seconds.

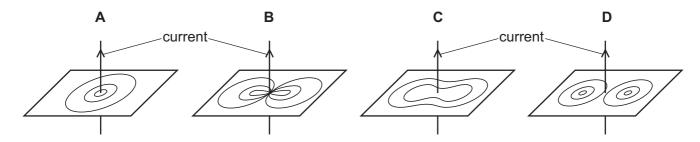


Using only this information, what can the student calculate?

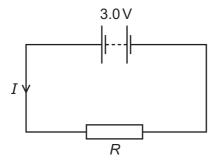
- A the amplitude of the wave
- B the frequency of the wave
- **C** the speed of the wave
- **D** the wavelength of the wave
- **36** What is the approximate value of the frequency of the highest-pitched sound that can be heard by a young person?
 - **A** 20 Hz
- **B** 200 Hz
- C 2000 Hz
- **D** 20 000 Hz
- 37 Which row shows how the speed and the wavelength of microwaves compare with those of γ (gamma)-rays?

	speed	wavelength
Α	less than γ-rays	greater than γ-rays
В	less than γ -rays	less than γ-rays
С	the same as γ -rays	greater than γ-rays
D	the same as γ -rays	less than γ-rays

38 Which diagram shows the magnetic field pattern around a straight wire carrying a current?



39 The circuit shows a current I in a resistor of resistance R.



Which row gives possible values of *I* and of *R*?

	I/A	R/Ω
Α	1.5	1.5
В	1.5	2.0
С	6.0	2.0
D	4.0	12.0

40 A proton has charge q and mass m. A neutron has no charge and mass m.

Which row shows the charge and mass of an α -particle?

	charge	mass
Α	2 <i>q</i>	2 <i>m</i>
В	2 <i>q</i>	4 <i>m</i>
С	4 <i>q</i>	2 <i>m</i>
D	4 <i>q</i>	4 <i>m</i>

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DATA SHEET
The Periodic Table of the Elements

	0	4 Helium	20 Ne Neon	40 Ar Argon	⁸ ₹	Krypton 36	131	×	Xenon 54		Ru	Radon 86			175	Lutetium 71		۲	Lawrencium
	II/		19 Fluorine	35.5 C1 Chlorine	8 a	Bromine 35	127	H	lodine 53		¥	Astatine 85			173	E		%	_
			16 Oxygen	32 S Sulfur 16	% 39	Selenium 34	128	e Te	52 E			Polonium 84 8			169	_		Md	Mendelevium
	>		Nitrogen 8	31 P Phosphorus		Arsenic 3	122	Sb	Antimony 51	209	Ξ	Bismuth 83			167	_		Fm	Fermium
	2		12 Carbon 6	28 Si Silicon		Germanium 32		Sn		207	Pp	Lead 82			165	Holmium 67		Es	E
	=	=	11 Boron 6	27 A1 Auminium 13		Gallium 31	115	u i	49	204	11	Thallium 81			162	Ę		ర	Californium
					65 Zn	30 Zinc	112	පි	48	201	Нg	Mercury 80			159	Tb Terbium 65		Ř	Berkelium
					²⁰ O	Copper 29	108	Ag		197	Αn				157	Gd Gadolinium 64			
dn					2 3	Nickel 28	106	Pd	Palladium 46	195	₹	Platinum 78			152	Eu Europium 63		Am	Americium
Group					S 99	Cobalt 27	103	돈	Knodium 45	192	i	Iridium 77			150	Samarium 62		Pu	E
		1 Hydrogen			56 Fe	lron 26	101	Ru	Kumenium 44	190	Os	Osmium 76			1	Pm Promethium 61		ď	Neptunium
			1		Mn	Manganese 25			lecnnetium 43	186	Re	Rhenium 75			144	Neodymium 60	238	n	Uranium
						Chromium 24	96		Molybaenum 42	184	>	Tungsten 74			141	mium		Ра	Protactinium
					5 > 1	Vanadium 23	93	Q P	Niobium 41	181	Та	Tantalum 73			140	Cerium 58	232	Т	Thorium
					48	Titanium 22	91	Zr	Zirconium 40	178	Ξ	Hafnium 72					nic mass	loc	iic) number
					Sc	Scandium 21	88	> ;	39 rtmum	139	Гa	Lanthanum 57 *	227 Ac	Actinium 89	series	eries	a = relative atomic mass	X = atomic symbol	b = proton (atomic) number
	=		Beryllium	24 Mg Magnesium	O 40	Calcium 20	88	ັດ	Strontium 38	137	Ba	Barium 56	226 Ra	Radium 88	*58-71 Lanthanoid series	190-103 Actinoid series	a a	× ×	Р
	_		7 Li Lithium	23 Na Sodium	® ¥	Potassium 19	85	&	Rubidium 37	133	S	Caesium 55	Ļ	Francium 87	*58-71 L	190-103,		Key	٩

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