



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education



CHEMISTRY

0620/11

Paper 1 Multiple Choice

October/November 2012

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.

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.

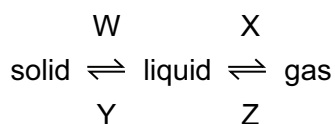
A copy of the Periodic Table is printed on page 16.

You may use a calculator.

This document consists of **15** printed pages and **1** blank page.



- 1 What are the processes W, X, Y and Z in the following diagram?



	W	X	Y	Z
A	condensing	boiling	freezing	melting
B	condensing	freezing	melting	boiling
C	melting	boiling	freezing	condensing
D	melting	freezing	condensing	boiling

- 2 A mixture of sulfur and iron filings needs to be separated. The solubilities of sulfur and iron filings in water and carbon disulfide are shown in the table below.

	solubility in water	solubility in carbon disulfide
sulfur	x	✓
iron filings	x	x

What are possible methods of separating the sulfur and iron filings?

	using water	using carbon disulfide	using a magnet
A	✓	✓	x
B	x	✓	✓
C	✓	x	✓
D	x	✓	x

- 3 Part of the instructions in an experiment reads as follows.

Quickly add 50 cm³ of acid.

What is the best piece of apparatus to use?

- A** a burette
- B** a conical flask
- C** a measuring cylinder
- D** a pipette

4 Which statements comparing the properties of electrons, neutrons and protons are correct?

	neutrons and protons are both heavier than electrons	only electrons and neutrons are charged
A	✓	✓
B	✓	x
C	x	✓
D	x	x

5 Which row gives the number of electrons in the outer electron shell of fluorine and of neon?

	${}^{19}_{9}\text{F}$	${}^{20}_{10}\text{Ne}$
A	7	8
B	7	10
C	9	8
D	9	10

6 In the molecules CH_4 , HCl and H_2O , which atoms use **all** of their outer shell electrons in bonding?

- A** C and Cl **B** C and H **C** Cl and H **D** H and O

7 The table shows the electronic structures of four atoms.

atom	electronic structure
W	2,1
X	2,7
Y	2,8,4
Z	2,8,8

Which two atoms combine to form an ionic compound?

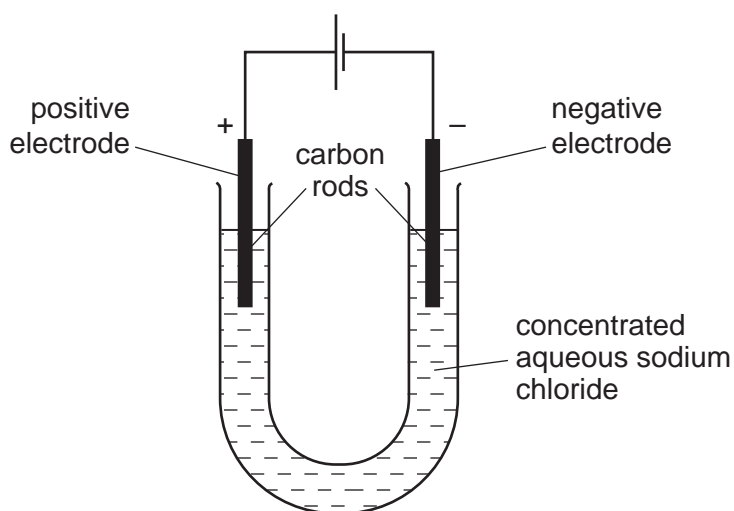
- A** W and X **B** W and Y **C** X and Y **D** X and Z

8 A compound has the formula $\text{CH}_3\text{CO}_2\text{H}$.

How should the relative molecular mass, M_r , of this compound be calculated?

- A $12 + 1 + 16$
- B $3(12 + 1) + 2(12 + 16) + 1$
- C $(4 \times 12) + (2 \times 1) + 16$
- D $(2 \times 12) + (4 \times 1) + (2 \times 16)$

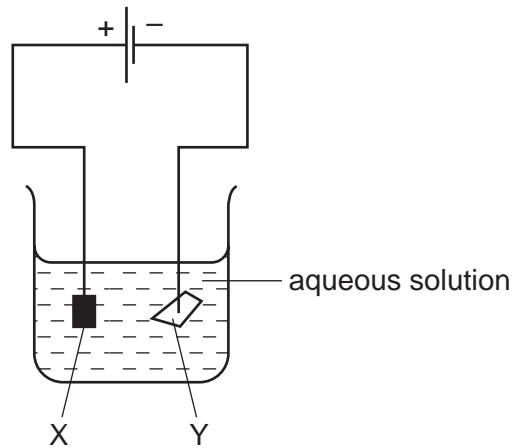
9 The diagram shows the electrolysis of concentrated aqueous sodium chloride.



What is produced at each of the electrodes?

	product at cathode	product at anode
A	hydrogen	chlorine
B	hydrogen	oxygen
C	sodium	chlorine
D	sodium	oxygen

- 10 The diagram shows an electrolysis experiment using metals X and Y as electrodes.

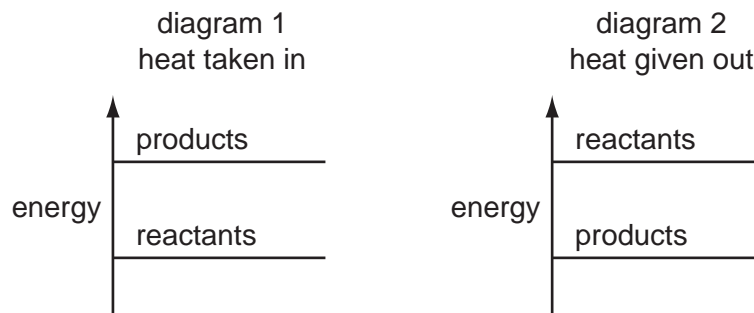


One of the metals becomes coated with copper.

Which metal becomes coated and which aqueous solution is used?

	metal	aqueous solution
A	X	CrCl_3
B	X	CuCl_2
C	Y	CrCl_3
D	Y	CuCl_2

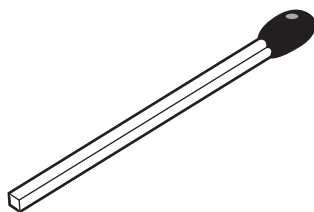
- 11 The diagrams show the difference in energies of the reactants and products in two types of reaction.



Which diagram and which type of energy change apply to a fuel burning in air?

	diagram	type of energy change
A	1	endothermic
B	1	exothermic
C	2	endothermic
D	2	exothermic

12 The diagram shows a match.



By striking the match, a chemical reaction takes place.

Which statements about the chemical reaction are correct?

	type of reaction	reason
A	endothermic	because energy is used to strike the match
B	endothermic	because energy is given out as the match burns
C	exothermic	because energy is used to strike the match
D	exothermic	because energy is given out as the match burns

13 Separate samples of anhydrous and hydrated copper(II) sulfate are heated.



Which shows the correct colour changes?

	anhydrous copper(II) sulfate	hydrated copper(II) sulfate
A	blue to white	white to blue
B	no change	blue to white
C	white to blue	blue to white
D	white to blue	no change

14 Which change is an oxidation?

- A** FeO to Fe₂O₃
- B** Fe₂O₃ to FeO
- C** H₂O₂ to H₂O
- D** H₂O to H₂

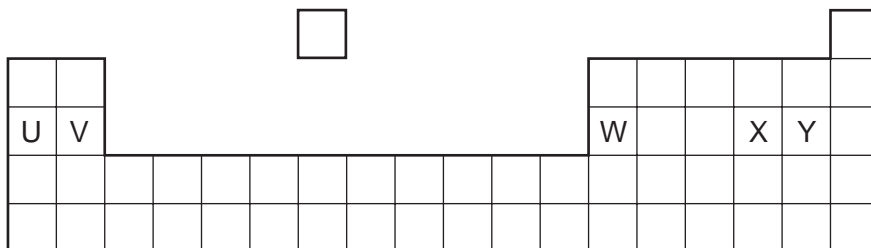
- 15 Which change does **not** increase the speed of reaction between zinc and hydrochloric acid?
- A adding a catalyst
 B decreasing the particle size of the zinc
 C decreasing the temperature
 D using more concentrated acid
- 16 Which of these pairs of aqueous ions **both** react with dilute sulfuric acid to give a visible result?
- A Ba^{2+} and Cl^-
 B Ba^{2+} and CO_3^{2-}
 C NH_4^+ and Cl^-
 D NH_4^+ and CO_3^{2-}
- 17 Element X forms an acidic, covalent oxide.

Which row shows how many electrons there could be in the outer shell of an atom of X?

	1	2	6	7
A	✓	✓	x	x
B	✓	x	✓	x
C	x	x	✓	✓
D	x	✓	x	✓

- 18 Barium hydroxide is an alkali. It reacts with hydrochloric acid.
- How does the pH of the hydrochloric acid change as an excess of aqueous barium hydroxide is added?
- A The pH decreases from 14 and becomes constant at 7.
 B The pH decreases from 14 to about 1.
 C The pH increases from 1 and becomes constant at 7.
 D The pH increases from 1 to about 14.
- 19 A compound is a salt if it
- A can neutralise an acid.
 B contains more than one element.
 C dissolves in water.
 D is formed when an acid reacts with a base.

20 The diagram shows an outline of the Periodic Table.



Which of the elements U, V, W, X and Y would react together in the ratio of 1 : 1?

- A** U and X **B** U and Y **C** V and Y **D** W and X

21 The element rubidium, Rb, is immediately below potassium in the Periodic Table.

It reacts with bromine to form the compound rubidium bromide.

Which descriptions of this compound are correct?

	type of bond	formula	colour
A	covalent	RbBr	brown
B	covalent	RbBr ₂	white
C	ionic	RbBr	white
D	ionic	RbBr ₂	brown

22 The table gives information about four elements.

Which element is a transition metal?

	colour of element	electrical conductivity of element	colour of oxide
A	black	high	colourless
B	colourless	low	white
C	grey	high	red
D	yellow	low	colourless

23 Why are weather balloons filled with helium rather than hydrogen?

- A Helium is found in air.
- B Helium is less dense than hydrogen.
- C Helium is more dense than hydrogen.
- D Helium is unreactive.

24 Some properties of aluminium are listed.

- 1 It has mechanical strength.
- 2 It conducts heat.
- 3 It is resistant to corrosion.
- 4 It has a low density.

Which properties make aluminium useful for making the bodies of aircraft?

- A 1, 2 and 3 B 1, 2 and 4 C 1, 3 and 4 D 2, 3 and 4

25 Brass is used in electrical equipment.

It contains two1..... elements. Together they form2..... .

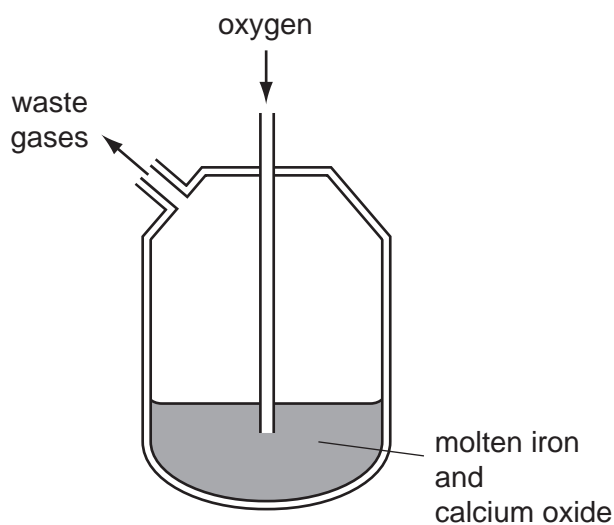
Which words correctly complete gaps 1 and 2?

	1	2
A	metallic	a covalent compound
B	metallic	an alloy
C	non-metallic	a covalent compound
D	non-metallic	an alloy

26 The Basic Oxygen Process converts iron into steel.

In step 1, oxygen is blown into impure molten iron.

In step 2, oxides are removed by reaction with calcium oxide.

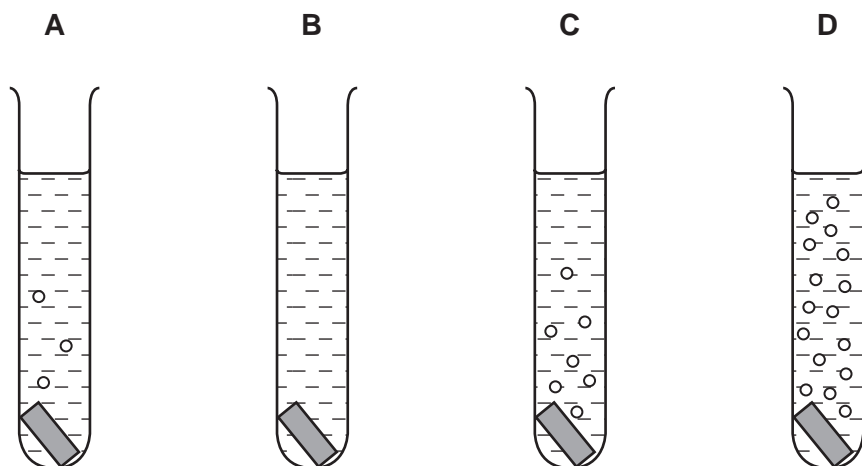


Which chemical reaction takes place in step 1 and which type of oxides are removed in step 2?

	chemical reaction in step 1	type of oxides removed in step 2
A	carbon is converted to carbon dioxide	acidic
B	carbon is converted to carbon dioxide	basic
C	iron is converted to iron(III) oxide	acidic
D	iron is converted to iron(III) oxide	basic

27 Pieces of copper, iron, magnesium and zinc are added to separate test-tubes containing dilute hydrochloric acid.

Which test-tube contains iron and dilute hydrochloric acid?



28 Which processes are used in the treatment of water?

- A filtration and chlorination
- B filtration and reduction
- C neutralisation and chlorination
- D neutralisation and reduction

29 A factory burns coal with a high sulfur content.

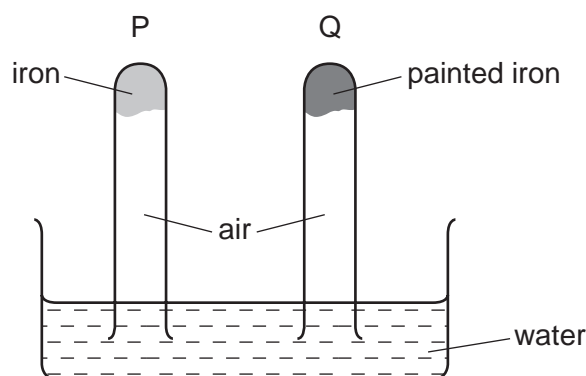
Which pollutant is **most** likely to lead to the death of trees?

- A carbon dioxide
- B carbon monoxide
- C lead compounds
- D sulfur dioxide

30 What is the correct order of abundance of the gases in the air?

- A nitrogen → oxygen → argon → carbon dioxide
- B nitrogen → oxygen → carbon dioxide → argon
- C oxygen → nitrogen → argon → carbon dioxide
- D oxygen → nitrogen → carbon dioxide → argon

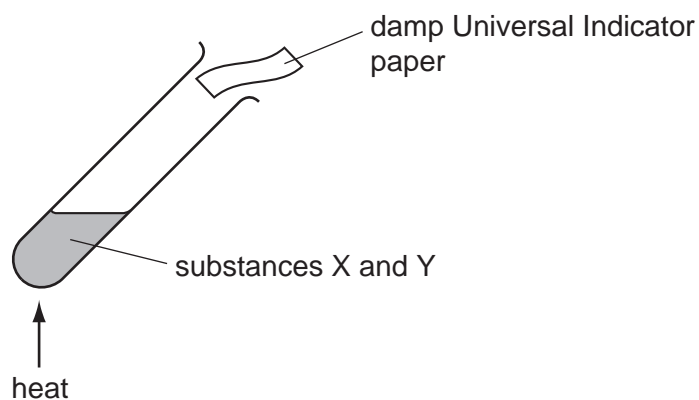
31 The diagram shows an experiment to investigate how paint affects the rusting of iron.



What happens to the water level in tubes P and Q?

	tube P	tube Q
A	falls	rises
B	no change	rises
C	rises	falls
D	rises	no change

32 The diagram shows two substances, X and Y, being heated together.

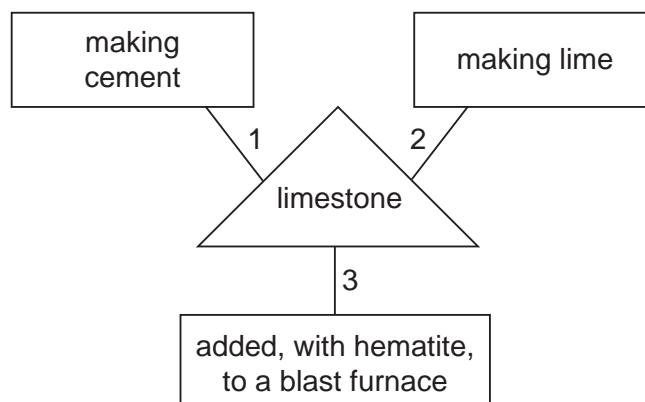


The Universal Indicator paper turns blue during the experiment.

What are substances X and Y?

- A ammonium nitrate and hydrochloric acid
 - B ammonium nitrate and sodium hydroxide
 - C sodium carbonate and hydrochloric acid
 - D sodium carbonate and sodium hydroxide
- 33 Carbon dioxide is produced when dilute hydrochloric acid reacts with
- A calcium sulfate.
 - B carbon.
 - C copper(II) carbonate.
 - D limewater.

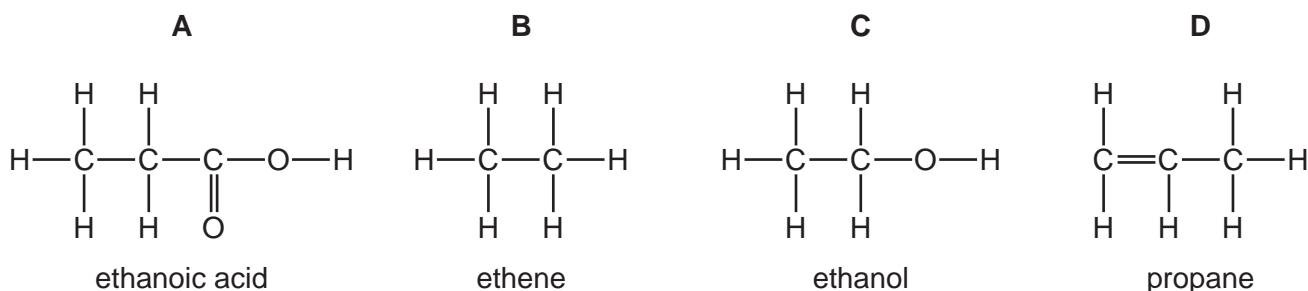
34 A student is asked to draw a diagram showing the uses of limestone.



Which numbered lines show a correct use of limestone?

- A 1 and 2 only
- B 1 and 3 only
- C 2 and 3 only
- D 1, 2 and 3

35 Which structure is correctly named?



36 Which properties of the different compounds in petroleum enable its separation into fractions?

- 1 boiling point
- 2 chain length
- 3 chemical reactivity
- 4 solubility in water

- A 1 and 2
- B 1 and 3
- C 2 and 4
- D 3 and 4

37 Alkenes have the general formula C_nH_{2n} .

Which of the following is an alkene?

- A CH_2
- B CH_4
- C C_3H_6
- D C_6H_6

38 Bitumen is a substance obtained from the fractional distillation of petroleum.

Which row describes its boiling point and the size of its molecules?

	boiling point	size of molecules
A	high	large
B	high	small
C	low	large
D	low	small

39 A hydrocarbon X is cracked to make Y and hydrogen.

Compound Z is formed by the addition polymerisation of Y.

To which homologous series do X, Y and Z belong?

	alkane	alkene
A	X, Y and Z	–
B	X and Y	Z
C	X and Z	Y
D	Y and Z	X

40 Which row is correct for ethanol?

	burns	made by fermentation
A	✓	✓
B	✓	x
C	x	✓
D	x	x

DATA SHEET
The Periodic Table of the Elements

Group		I - II										III	IV	V	VI	VII	0													
												5	6	7	8	9	10													
		1 H Hydrogen 1																	4 He Helium 2											
												11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulfur 16	17 Cl Chlorine 17	18 Ar Argon 18											
												27 Co Cobalt 27	28 Fe Iron 26	29 Ni Nickel 28	30 Cu Copper 29	31 Zn Zinc 30	32 Ga Gallium 31	33 Ge Germanium 32	34 As Arsenic 33	35 Se Selenium 34	36 Br Bromine 35	37 Kr Krypton 36								
												41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54					
												51 V Vanadium 23	52 Cr Chromium 24	53 Mn Manganese 25	54 Fe Iron 26	55 Cu Copper 27	56 Ni Nickel 28	57 Zn Zinc 29	58 Ga Gallium 30	59 Ge Germanium 31	60 As Arsenic 32	61 Se Selenium 33	62 Br Bromine 34	63 Kr Krypton 35	64 Rn Radon 36					
												89 Y Yttrium 39	90 Zr Zirconium 40	91 Nb Niobium 41	92 Mo Molybdenum 42	93 Tc Technetium 43	94 Ru Ruthenium 44	95 Rh Rhodium 45	96 Pd Palladium 46	97 Ag Silver 47	98 Cd Cadmium 48	99 In Indium 49	100 Sb Antimony 51	101 Te Tellurium 52	102 I Iodine 53	103 Xe Xenon 54				
												137 Ba Barium 56	138 La Lanthanum 57	139 Ce Cerium 58	140 Pr Praseodymium 59	141 Nd Neodymium 60	142 Pm Promethium 61	143 Sm Samarium 62	144 Eu Europium 63	145 Gd Gadolinium 64	146 Tb Terbium 65	147 Dy Dysprosium 66	148 Ho Holmium 67	149 Er Erbium 68	150 Tm Thulium 69	151 Yb Ytterbium 70	152 Lu Lutetium 71			
												87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	*58-71 Lanthanoid series †90-103 Actinoid series															
Key		<table style="border: 1px solid black; padding: 5px;"> <tr> <td>a</td> <td rowspan="2" style="font-size: 2em;">X</td> <td>a = relative atomic mass</td> </tr> <tr> <td>b</td> <td>b = proton (atomic) number</td> </tr> </table>										a	X	a = relative atomic mass	b	b = proton (atomic) number														
a	X	a = relative atomic mass																												
b		b = proton (atomic) number																												
												232 Th Thorium 90	233 Pa Protactinium 91	234 U Uranium 92	235 Np Neptunium 93	236 Pu Plutonium 94	237 Am Americium 95	238 Cm Curium 96	239 Bk Berkelium 97	240 Cf Californium 98	241 Bk Berkelium 97	242 Es Einsteinium 99	243 Fm Fermium 100	244 Md Mendelevium 101	245 No Nobelium 102	246 Lr Lawrencium 103				

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.