



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice

May/June 2010

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 8 7 8 8 4 1 6 6 2 0 *

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.

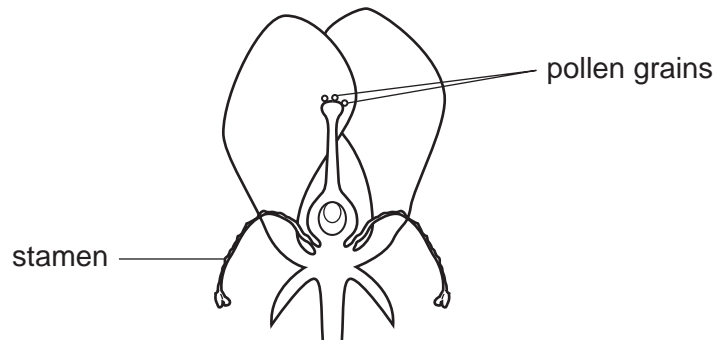
Any rough working should be done in this booklet.

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

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



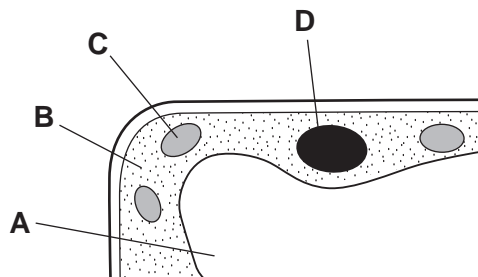
- 1 The diagram shows a flower whose stamens are dying.



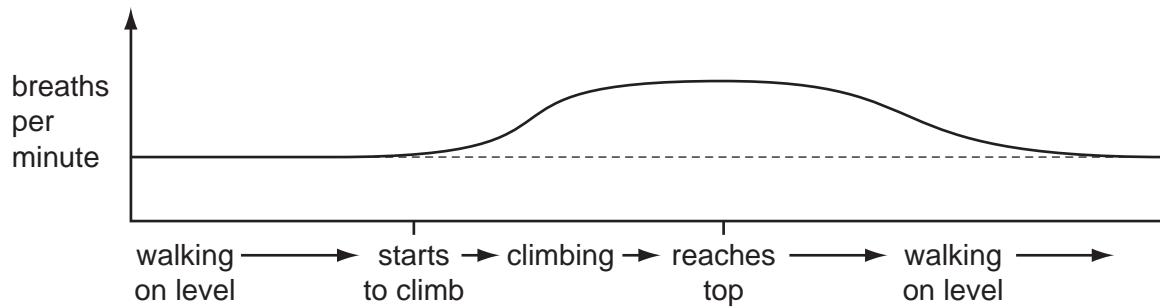
Which process has occurred in this flower?

- A fruit formation
 - B pollination
 - C seed formation
 - D wind dispersal
- 2 Which part of the gut is in the form of a coiled tube?
- A large intestine
 - B oesophagus
 - C rectum
 - D small intestine
- 3 The diagram shows part of a plant cell.

In which region does most of the cell's respiration occur?



- 4 The graph shows changes in his rate of breathing as a boy first walks on the level then climbs a long stair and then walks on the level again.



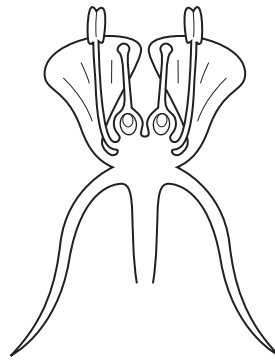
Why does his breathing continue for a while at the higher rate after he reaches the top of the stairs?

- A He is oxidising lactic acid.
 - B He still needs more energy.
 - C His breathing muscles respond slowly.
 - D More glucose is being used up.
- 5 The allele for red hair is recessive.

If a girl has red hair, which statement about her parents must be correct?

- A Both parents must carry a recessive allele.
- B Both parents must have red hair.
- C One parent must carry a dominant allele.
- D The father must have red hair.

6 The diagram shows a section through a flower.

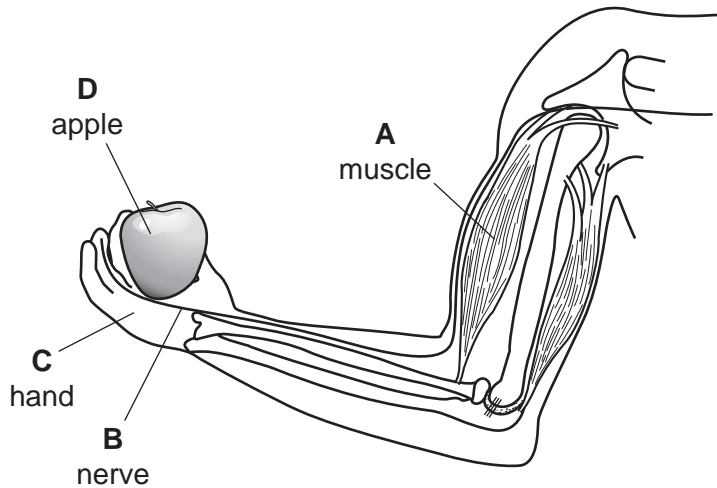


Use the key to identify the flower.

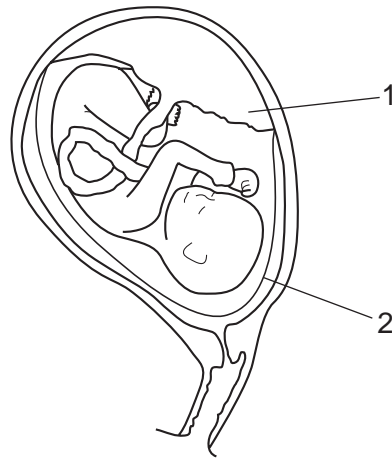
- 1 flower with many ovules in each ovary go to 2
- flower with one ovule in each ovary go to 3
- 2 filaments longer than styles **A**
- filaments shorter than styles **B**
- 3 petals shorter than sepals **C**
- petals longer than sepals **D**

7 The diagram shows a person holding an apple.

If the person decides to lift the apple, which labelled part is the effector?



8 The diagram shows a human embryo inside a uterus.



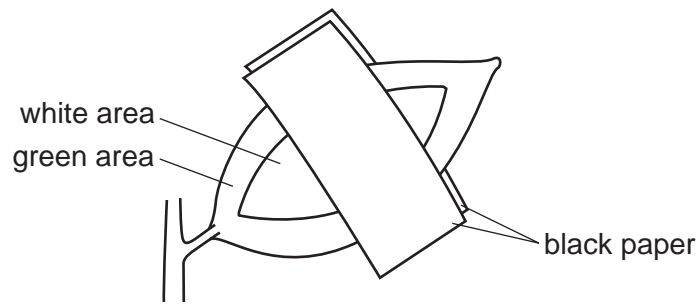
What are the functions of the numbered parts?

	1	2
A	hold the embryo in place	make blood for the embryo
B	protect the embryo	remove waste
C	provide food	provide food
D	remove waste	protect the embryo

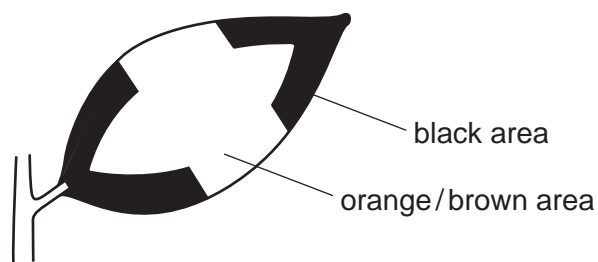
9 What would be the effect on the blood of an over-secretion of insulin?

- A** high levels of glucose
- B** high levels of urea
- C** low levels of glucose
- D** low levels of urea

- 10 A plant, each leaf of which is green and white, is destarched. It is then placed in light with black paper over part of one leaf as shown.



After 12 hours, the leaf is tested for starch using iodine solution. The diagram below shows the leaf after this test.

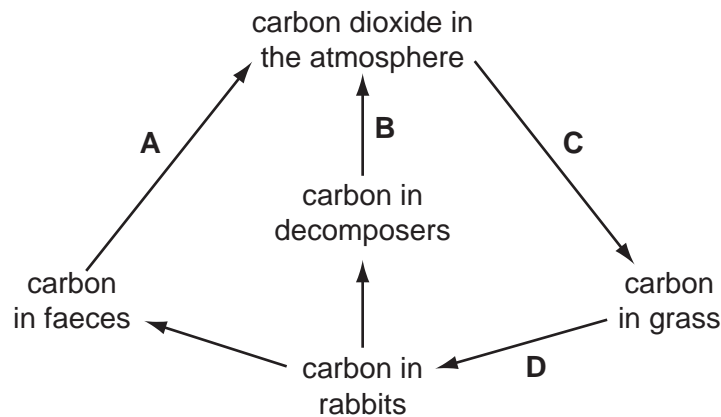


Where has photosynthesis occurred?

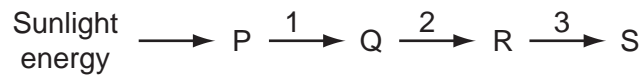
- A all areas covered by black paper
 - B all areas not covered by black paper
 - C green areas covered by black paper
 - D green areas not covered by black paper
- 11 In a balanced diet, which constituents provide most energy?
- A carbohydrate and protein
 - B fat and carbohydrate
 - C fat and fibre
 - D vitamins and protein

12 The diagram shows a simple carbon cycle.

Which line should have an arrowhead at both ends?



13 The diagram shows a food chain.



Where do energy losses occur?

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

14 During the weathering of rocks, which process does **not** take place?

- A** chemical change
B fixation of nitrogen
C physical change
D release of salts into the soil

15 When element X reacts with element Y, X donates an electron to Y.

Which row correctly shows the type of ion that Y forms and how its position in the Periodic Table changes?

	type of ion	effect on position of element Y in Periodic Table
A	negative	moves one place to the right
B	negative	no change
C	positive	moves one place to the right
D	positive	no change

16 An aqueous solution of a compound of metal M is tested.

- It does not give a characteristic flame colour.
- It forms a precipitate with aqueous ammonia; the precipitate is soluble in excess ammonia.

What is metal M?

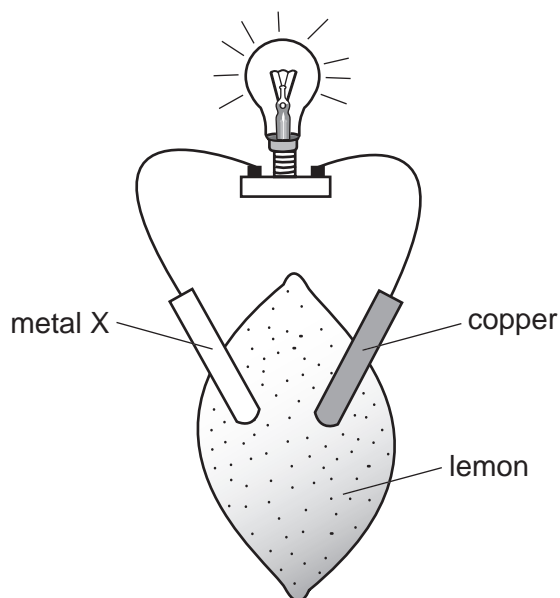
- A** copper
- B** iron
- C** potassium
- D** zinc

17 Nitrogen oxides are formed when car engines burn fossil fuels.

Which row shows why nitrogen oxides are unwanted products?

	acidic	pollutant
A	no	no
B	no	yes
C	yes	no
D	yes	yes

18 The diagram shows an experiment using a lemon.



Which statements are correct?

	lemon juice is an electrolyte	X could be copper	X could be zinc
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

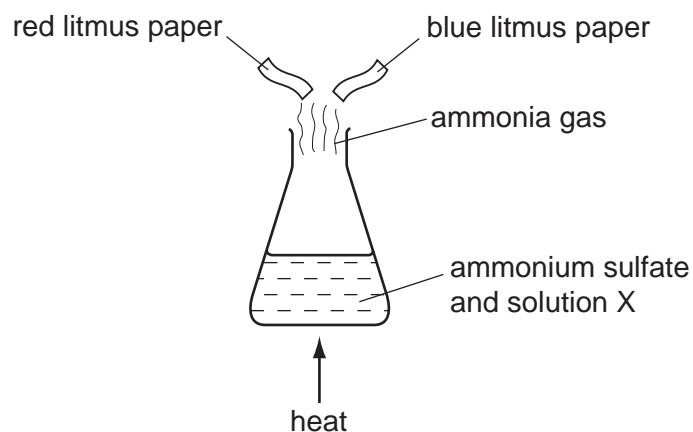
19 Chlorophyll is extracted from green plants.

Which method should be used to separate chlorophyll from other coloured substances?

- A** chromatography
- B** cracking
- C** distillation
- D** neutralisation

20 Ammonium sulfate is heated with solution X and ammonia gas is given off.

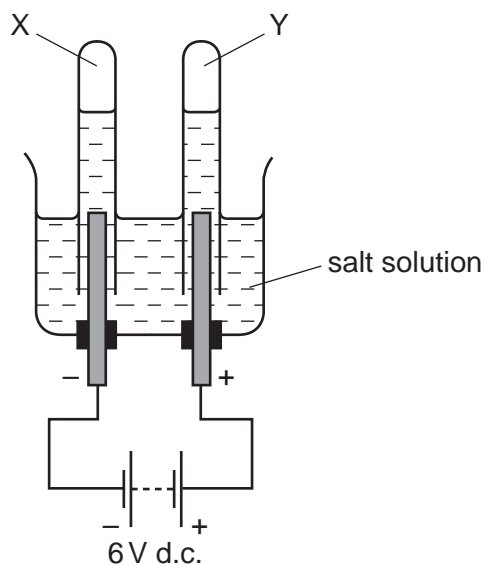
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas.



What is solution X and what will be the colour change of the litmus paper?

	solution X	colour change of litmus paper
A	hydrochloric acid	blue to red
B	hydrochloric acid	red to blue
C	sodium hydroxide	blue to red
D	sodium hydroxide	red to blue

21 When concentrated salt solution is electrolysed, two gases X and Y are formed.



One of the gases explodes when tested with a burning splint and the other turns moist Universal Indicator paper red then white.

What are X and Y?

	X	Y
A	chlorine	hydrogen
B	hydrogen	chlorine
C	hydrogen	oxygen
D	oxygen	chlorine

22 The contents of a beaker scatter a beam of light.

What does the beaker contain?

- A** aqueous copper(II) sulfate
- B** ethanol
- C** milk
- D** water

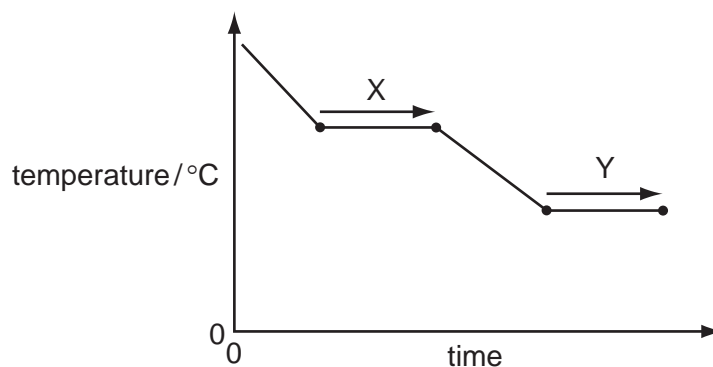
23 The table shows the name and formula of four metal ores.

	name	formula
1	chalcopyrite	CuFeS_2
2	ilmenite	FeTiO_3
3	malachite	$\text{Cu}_2\text{CO}_3(\text{OH})_2$
4	wolframite	FeWO_4

Which metal ores contain two different metals?

- A 1 and 3 only
 - B 2 and 4 only
 - C 1, 2 and 4 only
 - D 2, 3 and 4 only
- 24 Which property of an element suggests that it is a metal?
- A It conducts electricity.
 - B It forms covalent compounds.
 - C It has a low density.
 - D It has a low melting point.
- 25 What is an important use of the diesel fraction obtained from crude oil?
- A fuel for lorries and buses
 - B lubricant for door hinges
 - C propellant gas for spray cans
 - D wax for waterproofing car bodies

26 The graph shows the changes in temperature when a substance is cooled.



Which row in the table describes X and Y?

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

27 Which material is combined with a metal oxide to make glass?

- A** carbon
- B** carbon dioxide
- C** silicon
- D** silicon(IV) oxide

28 The table gives four pairs of values of force and the surface area on which the force acts.

Which pair of values gives the largest pressure on the surface?

	force / N	area / m ²
A	20	2
B	40	2
C	20	4
D	40	4

29 Which is the correct equation for resistance?

- A resistance = current \div voltage
- B resistance = power \div current
- C resistance = power \div voltage
- D resistance = voltage \div current

30 The winner of a 1500 m race takes 4 minutes to run the race.

What is his average speed in m/s?

- A $1500 \times \frac{60}{4}$
- B $1500 \times 4 \times 60$
- C $\frac{1500}{4 \times 60}$
- D $\frac{1500 \times 4}{60}$

31 A sample of radioactive material has a mass of 64 mg and a half-life of 16 years.

What is the time taken for the mass of the sample to decrease to 8 mg?

- A 2 years
- B 4 years
- C 48 years
- D 128 years

32 A magnet and a charged plastic rod are held near each other.



magnet

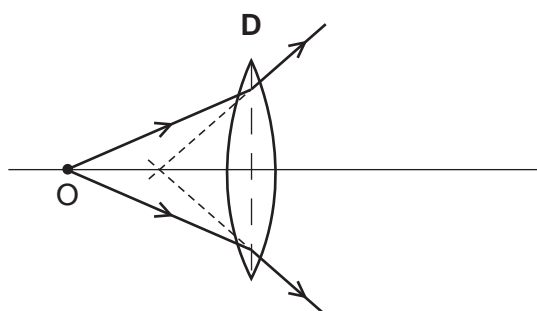
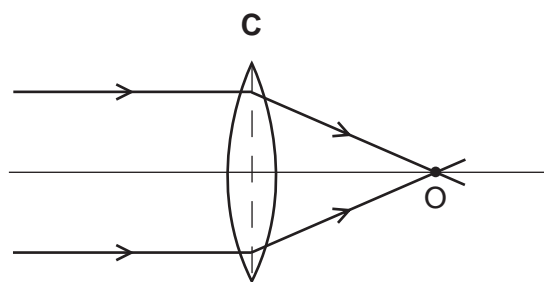
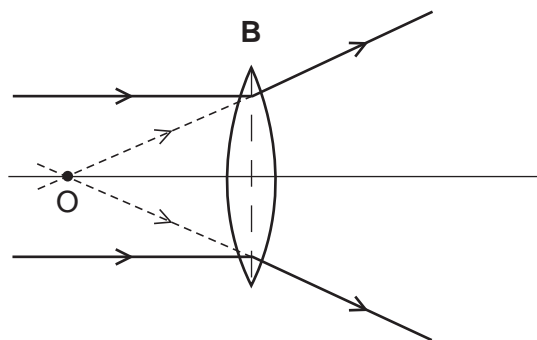
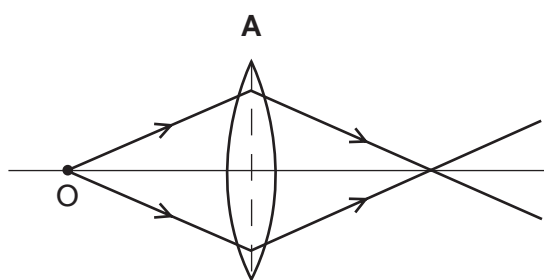


charged plastic rod

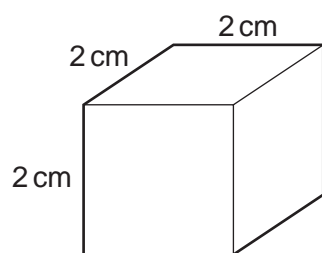
What happens?

- A Both poles of the magnet attract both ends of the plastic rod.
- B Neither pole of the magnet attracts either end of the plastic rod.
- C Only the north pole of the magnet attracts the positive end of the plastic rod.
- D Only the south pole of the magnet attracts the positive end of the plastic rod.

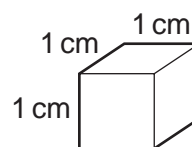
33 Which ray diagram shows a converging lens producing a real image of object O?



34 The cubes shown are made of different materials, but they have the same mass.



material X



material Y

The density of material X is 1 g/cm^3 .

What is the density of material Y?

- A** $\frac{1}{8} \text{ g/cm}^3$ **B** $\frac{1}{2} \text{ g/cm}^3$ **C** 2 g/cm^3 **D** 8 g/cm^3

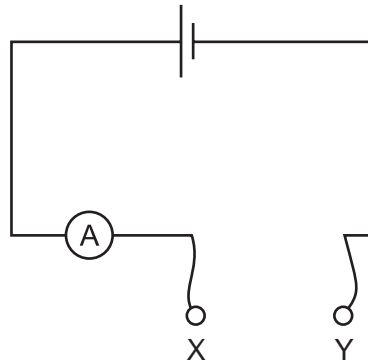
35 A rod is acted upon by two forces as shown in the diagram.



Which effect will be produced by these two forces?

- A both rotation and movement in a straight line
 - B rotation only
 - C no effect, because the forces are balanced
 - D movement in a straight line only
- 36 Liquid X has a higher specific heat capacity than liquid Y.
- What does this mean?
- A 1 kg of liquid X needs to be given more energy than 1 kg of liquid Y to make it evaporate.
 - B 1 kg of liquid X releases more energy than 1 kg of liquid Y when it freezes.
 - C More energy needs to be supplied to 1 kg of liquid X than to 1 kg of liquid Y for their temperatures to rise by the same amount.
 - D The temperature of 1 kg of liquid X rises more than the temperature of 1 kg of liquid Y when they are given the same amount of energy.

- 37 A student has four pieces of resistance wire made of the same material. Each piece is connected in turn between the terminals X and Y in the circuit.



In which wire will the current be the smallest?

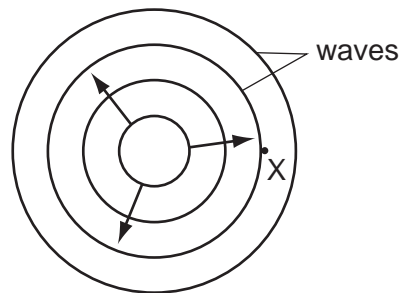
	length / m	diameter / mm
A	0.5	0.5
B	0.5	1.0
C	1.0	0.5
D	1.0	1.0

- 38 A householder asks an electrician to install a mains electrical socket in her bathroom so that she may use a hairdryer there. The electrician refuses to do this because it would be dangerous.

Why would installing the socket be dangerous?

- A** The current drawn by the hairdryer would cause overheating in the cables.
- B** The handling of electrical equipment in damp conditions could cause an electric shock.
- C** The hot air produced by the hairdryer would cause the fuse to melt.
- D** The temperature in the bathroom would damage the insulation.

39 A stone is thrown into a pool and waves spread out from where it hits the water.



What is the name given to the number of waves passing point X per second?

- A the amplitude
 - B the frequency
 - C the wavelength
 - D the wave speed
- 40 Which statement about radioactive emissions is correct?
- A Alpha-particles are the least penetrating and are positively charged.
 - B Alpha-particles are the most penetrating and are positively charged.
 - C Gamma-rays are the least penetrating and are positively charged.
 - D Gamma-rays are the most penetrating and are positively charged.

DATA SHEET The Periodic Table of the Elements

		Group										
		I	II	III	IV	V	VI	VII	VIII	IX	X	
		1 H Hydrogen 1										
7 Li Lithium 3	9 Be Beryllium 4											2 He Helium 2
23 Na Sodium 11	24 Mg Magnesium 12	5 B Boron 5	6 C Carbon 6	7 N Nitrogen 7	8 O Oxygen 8	9 F Fluorine 9	10 Ne Neon 10					
39 K Potassium 19	40 Ca Calcium 20	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			
85 Rb Rubidium 37	88 Sr Strontium 38	65 Zn Zinc 30	64 Cu Copper 29	59 Ni Nickel 28	58 Co Cobalt 27	56 Fe Iron 26	55 Mn Manganese 25	54 Cr Chromium 24	53 V Vanadium 23	52 Cr Chromium 24	51 V Vanadium 23	50 Ti Titanium 22
133 Cs Caesium 55	137 Ba Barium 56	89 Y Yttrium 39	88 Sr Strontium 38	91 Zr Zirconium 40	92 Nb Niobium 41	93 Mo Molybdenum 42	94 Tc Technetium 43	95 Ru Ruthenium 44	96 Rh Rhodium 45	97 Pd Palladium 46	98 Ag Silver 47	99 Cd Cadmium 48
226 Ra Radium 88	227 Ac Actinium 89	139 La Lanthanum 57	137 Ba Barium 56	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80
103 Fr Francium 87	104 Ra Radium 88	140 Ce Cerium 58	141 Pr Praseodymium 59	142 Nd Neodymium 60	143 Pm Promethium 61	144 Pm Promethium 61	145 Sm Samarium 62	146 Eu Europium 63	147 Gd Gadolinium 64	148 Tb Terbium 65	149 Dy Dysprosium 66	150 Ho Holmium 67
		169 Er Erbium 68	170 Tm Thulium 69	171 Yb Ytterbium 70	172 Lu Lutetium 71	173 Hf Hafnium 72	174 Ta Tantalum 73	175 W Tungsten 74	176 Re Rhenium 75	177 Os Osmium 76	178 Ir Iridium 77	179 Pt Platinum 78
		183 Bi Bismuth 83	184 Po Polonium 84	185 At Astatine 85	186 Rn Radon 86	187 Pb Lead 82	188 Tl Thallium 81	189 Pb Lead 82	190 Bi Bismuth 83	191 Po Polonium 84	192 At Astatine 85	193 Rn Radon 86
		209 Po Polonium 84	210 At Astatine 85	211 Rn Radon 86	212 Fr Francium 87	213 Ac Actinium 89	214 Th Thorium 90	215 Pa Protactinium 91	216 U Uranium 92	217 Np Neptunium 93	218 Pu Plutonium 94	219 Am Americium 95
		261 Lr Lawrencium 103	262 Uub Unbihexium 104	263 Uut Untrihexium 105	264 Uuq Unquadrhexium 106	265 Uuq Unquadrhexium 106	266 Uuq Unquadrhexium 106	267 Uuq Unquadrhexium 106	268 Uuq Unquadrhexium 106	269 Uuq Unquadrhexium 106	270 Uuq Unquadrhexium 106	271 Uuq Unquadrhexium 106

*58-71 Lanthanoid series
†90-103 Actinoid series

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

Key

a	X
b	

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.