



# Cambridge O Level

**COMBINED SCIENCE**

**5129/12**

Paper 1 Multiple Choice

**October/November 2025**

**1 hour**

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

## INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

## INFORMATION

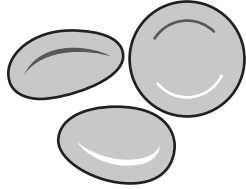
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.

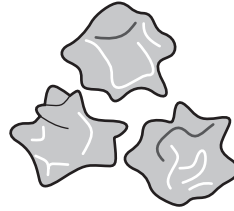


- 1 Some red blood cells are placed in concentrated salt solution for 10 minutes.

red blood cells before  
placing in concentrated  
salt solution



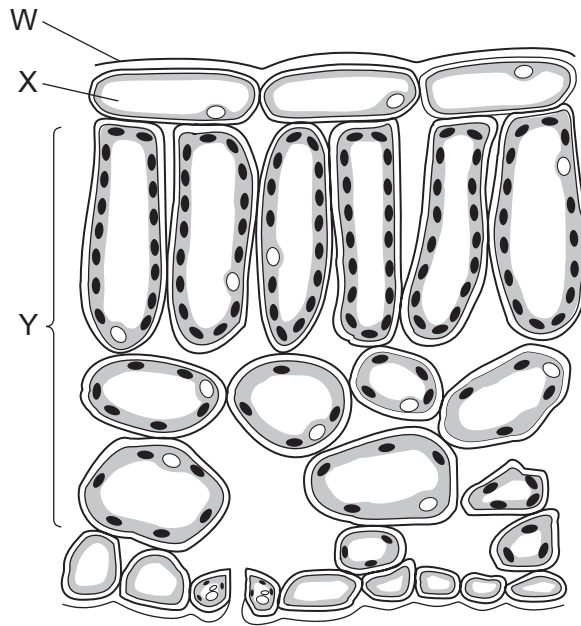
red blood cells after  
being placed in concentrated  
salt solution for 10 minutes



Which statement explains why the red blood cells change shape?

- A Water enters the red blood cells as the salt solution has a higher water potential.
  - B Water enters the red blood cells as the salt solution has a lower water potential.
  - C Water leaves the red blood cells as the salt solution has a higher water potential.
  - D Water leaves the red blood cells as the salt solution has a lower water potential.
- 2 Which statements about enzymes are correct?
- 1 They are **not** changed by the reaction.
  - 2 They slow down the rate of the reaction.
  - 3 They are made of protein.
  - 4 They are **not** affected by changes in pH.
- A 1 and 2      B 1 and 3      C 2 and 4      D 3 and 4

3 The diagram shows a cross-section of a leaf.



Which row correctly identifies layers W, X and Y?

	W	X	Y
<b>A</b>	cuticle	epidermis	mesophyll
<b>B</b>	cuticle	epidermis	vascular bundle
<b>C</b>	epidermis	cuticle	mesophyll
<b>D</b>	epidermis	cuticle	vascular bundle

4 Which statement describes translocation?

- A** the flow of sucrose and amino acids inside the phloem
- B** the loss of water vapour through stomata
- C** the movement of mineral ions in the xylem
- D** the release of energy in plant cells

- 5 A liquid is poured into a test-tube and shaken with ethanol.

The contents of the test-tube become cloudy.

An enzyme is then added to the contents of the test-tube and the liquid becomes colourless.

Which small molecules are now present in the test-tube?

- A** amino acid  
**B** fatty acids and glycerol  
**C** glucose  
**D** maltose
- 6 What is the function of the villi?
- A** Villi absorb proteins.  
**B** Villi break down large molecules into smaller ones.  
**C** Villi increase the internal surface area of the ileum.  
**D** Villi kill ingested bacteria.
- 7 The composition of inspired air and expired air is different.

Which row identifies a difference between inspired air and expired air?

	inspired air	expired air
<b>A</b>	more carbon dioxide	less carbon dioxide
<b>B</b>	more nitrogen	less nitrogen
<b>C</b>	more oxygen	less oxygen
<b>D</b>	more water vapour	less water vapour

- 8 Which statements about anaerobic respiration are correct?

- 1 It produces carbon dioxide.
- 2 It produces lactic acid.
- 3 It releases more energy than aerobic respiration.
- 4 It takes place in the absence of oxygen.

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

9 Blood flows through the pulmonary vein.

Which blood vessel will the blood flow through next?

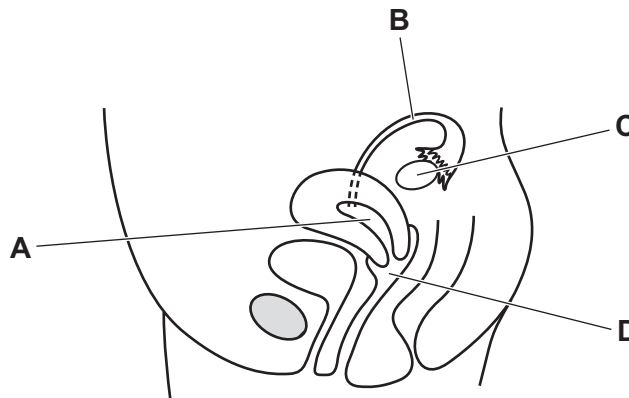
- A aorta
- B hepatic vein
- C pulmonary artery
- D vena cava

10 Which chemical substance is produced by a gland and can alter the activity of a target organ?

- A antibody
- B glycogen
- C hormone
- D plasma

11 The diagram shows the human female reproductive system.

Which structure releases eggs?



12 Crop plants can be genetically modified so that they become resistant to herbicides.

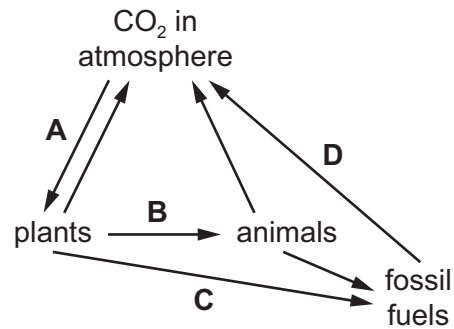
What would be the benefits to the farmer of genetically modifying the crop plants?

- 1 Farmers can use herbicides more effectively.
- 2 Farmers can increase their crop yield.
- 3 Crop plants are resistant to insect pests.
- 4 Crop plants can produce additional vitamins.

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

13 The diagram shows the carbon cycle.

Which arrow represents photosynthesis?



14 Which row describes the bunching and movement of particles in a gas?

	bunching	movement
<b>A</b>	close together	random
<b>B</b>	compact	<b>not</b> able to move about
<b>C</b>	<b>not</b> touching each other	moving freely
<b>D</b>	spaced far apart	vibrate about a fixed point

15 Which row about air, argon and methane is correct?

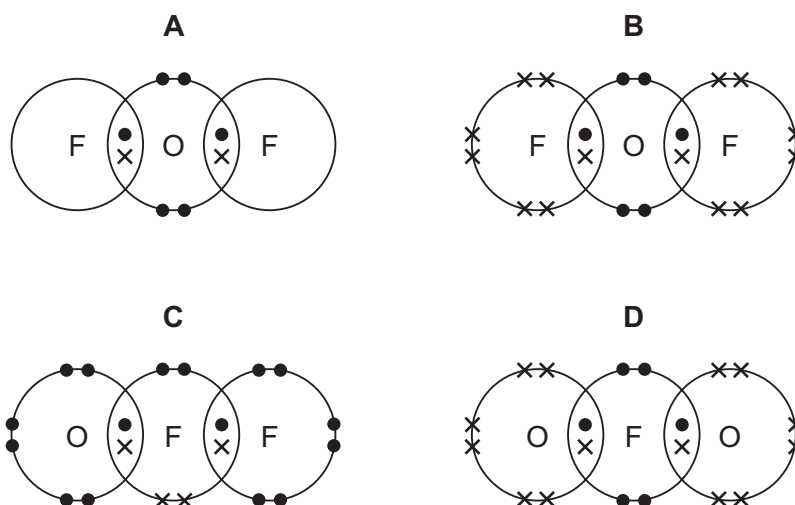
	air	argon	methane
<b>A</b>	element	mixture	mixture
<b>B</b>	compound	element	mixture
<b>C</b>	mixture	element	element
<b>D</b>	mixture	element	compound

16 The nucleon number of an atom of copper is 64 and the atomic number is 29.

How many electrons are there in this atom of copper?

- A** 29                      **B** 35                      **C** 64                      **D** 93

- 17 Which dot-and-cross diagram shows the outer electron configuration in a molecule of oxygen difluoride, OF<sub>2</sub>?



- 18 An ionic compound contains the ions shown.

potassium ions, K<sup>+</sup>

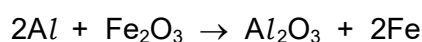
aluminium ions, Al<sup>3+</sup>

sulfate ions, SO<sub>4</sub><sup>2-</sup>

What is the formula of the compound?

- A** KAlSO<sub>4</sub>      **B** KAl(SO<sub>4</sub>)<sub>2</sub>      **C** KAl(SO<sub>4</sub>)<sub>3</sub>      **D** KAl(SO<sub>4</sub>)<sub>4</sub>

- 19 The equation for the reaction between aluminium and iron(III) oxide is shown.



What is the mass of iron produced when 16.2 g of aluminium react with excess iron(III) oxide?

- A** 3.91 g      **B** 7.81 g      **C** 15.6 g      **D** 33.6 g

- 20 Which statement about the reaction of hydrochloric acid with aqueous sodium hydroxide is correct?

- A** The reaction is endothermic, and the temperature of the mixture increases.  
**B** The reaction is endothermic, and the temperature of the mixture decreases.  
**C** The reaction is exothermic, and the temperature of the mixture increases.  
**D** The reaction is exothermic, and the temperature of the mixture decreases.

21 Which process is a chemical change?

- A An electric current is passed through a copper wire.
- B Ethene is polymerised to poly(ethene).
- C Liquid sodium chloride turns into a solid.
- D Petroleum is separated into different hydrocarbon mixtures in a fractionating column.

22 Acid X reacts with alkali Y to form sodium chloride, NaCl.

Which ions cause X to be acidic and Y to be alkaline?

	acidic ion	alkaline ion
A	$Cl^-$	$OH^-$
B	$H^+$	$Na^+$
C	$H^+$	$OH^-$
D	$OH^-$	$H^+$

23 Fluorine is a Group VII element and is above chlorine in the Periodic Table.

Which statement about fluorine is correct?

- A It has a higher boiling point than chlorine.
- B It is darker in colour than iodine.
- C It is displaced from aqueous potassium fluoride by reaction with bromine.
- D It is more reactive than chlorine.

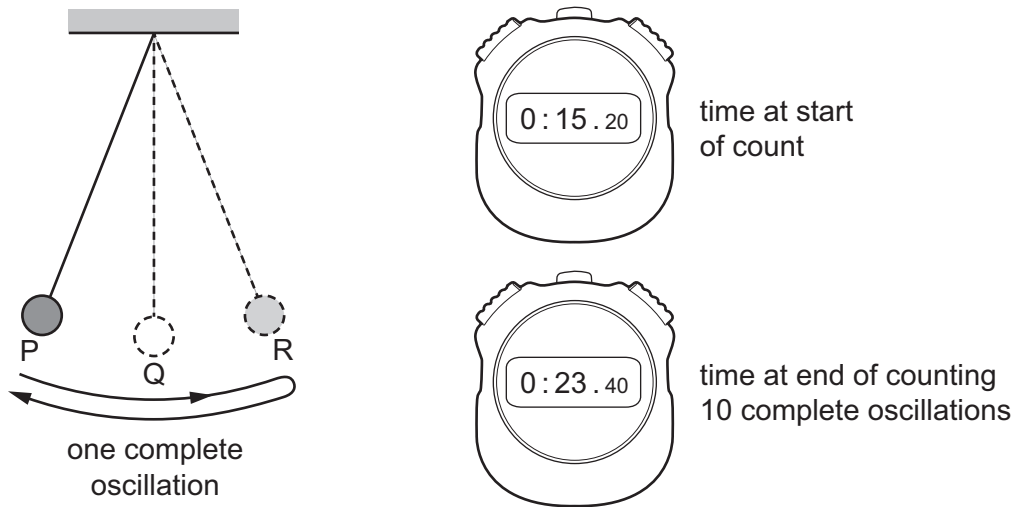
24 Which row describes the properties of a metal?

	malleable	electrical conductor
A	no	no
B	no	yes
C	yes	no
D	yes	yes

- 25 What is the correct order for the treatment of the domestic water supply?
- A chlorination, sedimentation, filtration
  - B sedimentation, chlorination, filtration
  - C sedimentation, filtration, chlorination
  - D filtration, chlorination, sedimentation
- 26 Petroleum is separated using a fractionating column. The boiling temperature of each fraction is different.
- Which statement is **not** correct?
- A Fractions with larger molecules condense at the bottom.
  - B Fractions which condense at the top are used as fuels.
  - C Fractions with lower boiling points condense nearer the top.
  - D The column is hotter at the top than the bottom.
- 27 Which statement about alkenes is correct?
- A They are unsaturated hydrocarbons.
  - B They burn in air to form carbon dioxide, sulfur dioxide and water.
  - C They turn aqueous bromine orange.
  - D They undergo addition reactions with oxygen to form alkanes.

28 A student wants to find the time taken for one complete oscillation of a pendulum.

A stop-watch is used to time 10 complete oscillations.

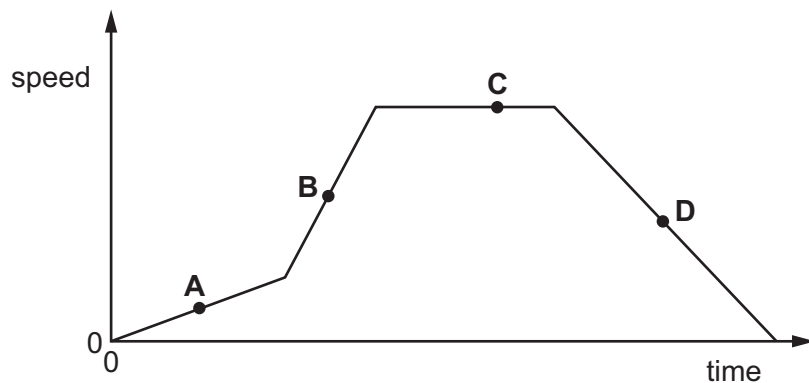


Which calculation is used to determine the time for one complete oscillation?

- A  $\frac{23.4}{10}$
- B  $23.4 - 15.2$
- C  $\frac{23.4 - 15.2}{10}$
- D  $\frac{23.4 + 15.2}{10}$

29 The speed–time graph shows the journey of a train.

At which point does the acceleration have its highest value?



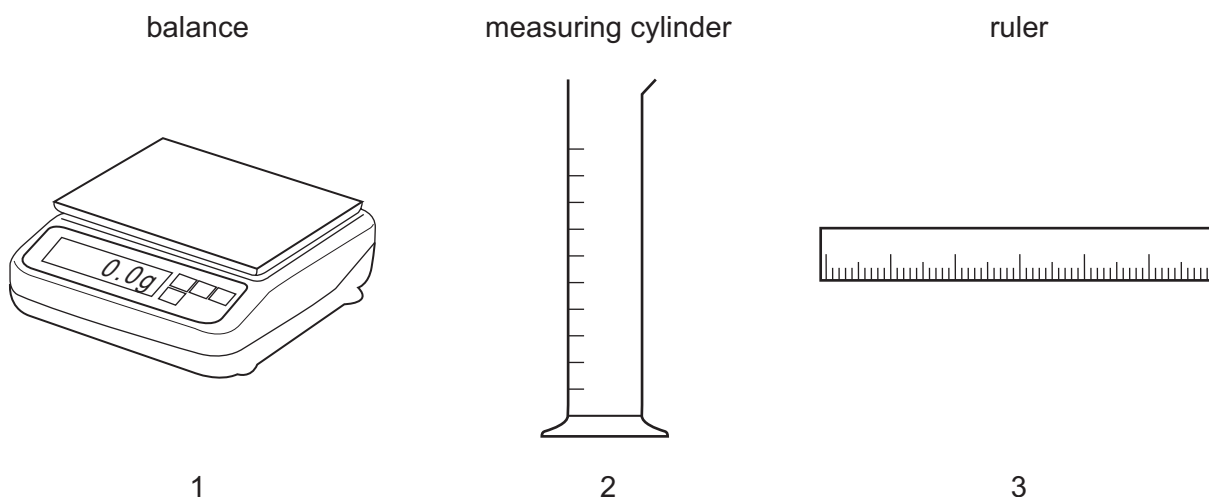
- 30 An astronaut has a mass of 80 kg and is on a journey from the Earth to Mars.

The gravitational field strength on the Earth is 9.8 N/kg, on Mars is 3.7 N/kg and in deep space is 0 N/kg.

What is the weight of the astronaut in deep space?

- A 0 N                      B 80 N                      C 300 N                      D 780 N

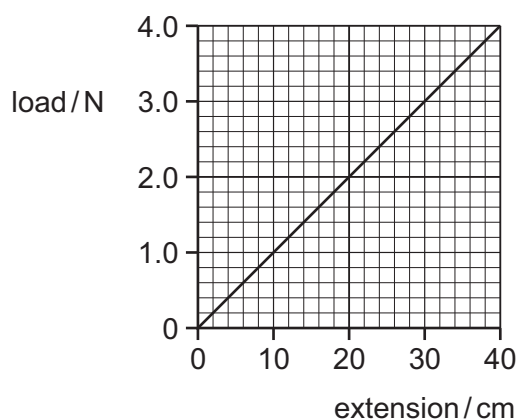
- 31 The diagram shows three pieces of apparatus.



Which instruments are required to measure the density of an irregular piece of rock?

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

- 32 The diagram shows a load–extension graph for a spring.

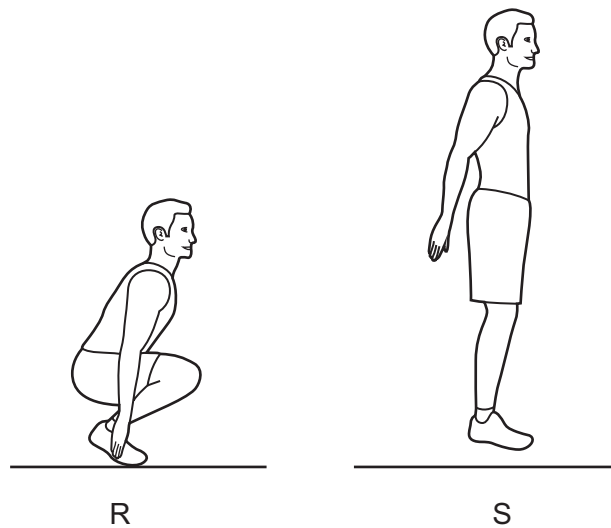


The total length of the spring is 56 cm when the load is 2.6 N.

What is the unstretched length of the spring?

- A 26 cm                      B 30 cm                      C 33 cm                      D 56 cm

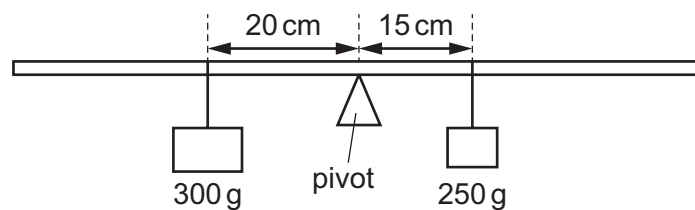
- 33 A man is initially at rest in position R. He then jumps vertically upwards and is still moving when he reaches position S.



His gravitational potential energy increases by  $E_P$  and his kinetic energy increases by  $E_K$  as he moves from position R to position S.

What is the work done by the man?

- A  $E_P$                       B  $E_K$                       C  $E_P - E_K$                       D  $E_P + E_K$
- 34 A uniform beam is placed with its centre over a pivot. Masses are suspended on each side of the pivot at the positions shown.



The beam is **not** balanced.

Which action will balance the beam?

- A Move the 250 g mass 9 cm closer to the pivot.  
 B Move the 250 g mass 9 cm further away from the pivot.  
 C Move the 300 g mass 9 cm closer to the pivot.  
 D Move the 300 g mass 9 cm further away from the pivot.

35 A smart charger is used to charge a battery.

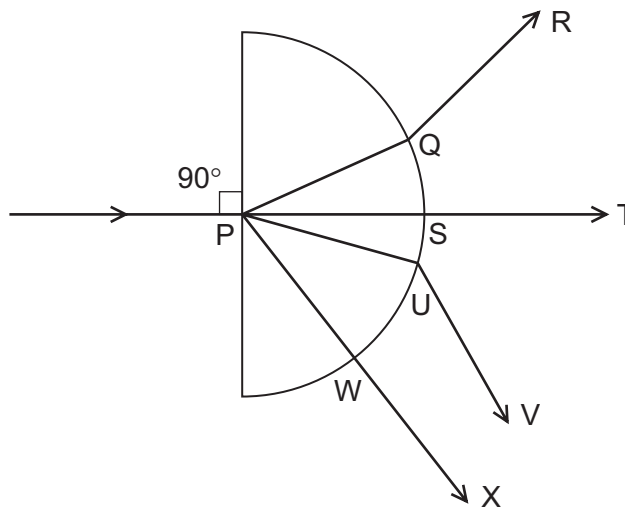
A current of 1.2 A charges the battery for 8 hours.

After 8 hours, the charger changes the current to 20 mA and charges the battery for a further 10 hours.

What is the total charge delivered by the charger?

- A** 210 C      **B** 696 C      **C** 35 kC      **D** 42 kC

36 A ray of light enters a semicircular glass block at P as shown.



What is the path taken by the ray?

- A** PQR      **B** PST      **C** PUV      **D** PWX

37 A student believes that the higher the frequency of an electromagnetic wave, the more hazardous it is.

Which statement uses the student's theory?

- A** Infrared waves are more hazardous than ultraviolet waves.  
**B** Microwaves are more hazardous than visible light.  
**C** Ultraviolet rays are more hazardous than X-rays.  
**D** Visible light is more hazardous than radio waves.

- 38 Two electromagnetic waves travel through a vacuum. Each wave has a different number of vibrations per unit time.

A student makes three statements about the two waves.

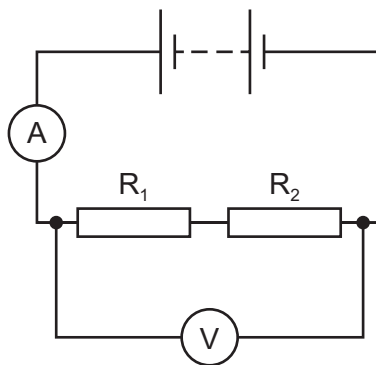
- 1 The frequency of the two waves is the same.
- 2 The speed of the two waves is the same.
- 3 The wavelength of the two waves is the same.

Which statements are correct?

- A** 1 and 2      **B** 2 and 3      **C** 2 only      **D** 3 only
- 39 Which row correctly describes what happens when two electrostatic charges are brought nearer to one another?

	like charges	unlike charges
<b>A</b>	attract	attract
<b>B</b>	attract	repel
<b>C</b>	repel	attract
<b>D</b>	repel	repel

- 40 Two resistors are connected in the circuit shown.



The reading on the voltmeter is 6.0 V.

The reading on the ammeter is 0.3 A.

The resistance of  $R_1$  is  $12\ \Omega$ .

What is the resistance of  $R_2$ ?

- A**  $8.0\ \Omega$       **B**  $10\ \Omega$       **C**  $20\ \Omega$       **D**  $40\ \Omega$

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The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII					VIII					
3 Li lithium 7	4 Be beryllium 9	1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20					18 Ar argon 40				
11 Na sodium 23	12 Mg magnesium 24	<p><b>Key</b></p> <p>atomic number</p> <p>atomic symbol</p> <p>name</p> <p>relative atomic mass</p>										16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40			
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium —	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —
87 Fr francium —	88 Ra radium —	89–103 actinoids	104 Rf rutherfordium —	105 Db dubnium —	106 Sg seaborgium —	107 Bh bohrium —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganeson —

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).