



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**COMBINED SCIENCE**

**0653/11**

Paper 1 Multiple Choice (Core)

**October/November 2017**

**45 minutes**

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



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**READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

Do not use staples, paper clips, 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 16.

Electronic calculators may be used.

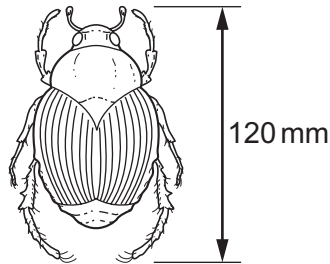
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This document consists of **16** printed pages.

1 Which characteristics help to define a living organism?

- A diffusion, movement, respiration
- B excretion, nutrition, sensitivity
- C excretion, reproduction, transpiration
- D growth, inspiration, nutrition

2 The diagram shows an image of an insect that has been magnified.

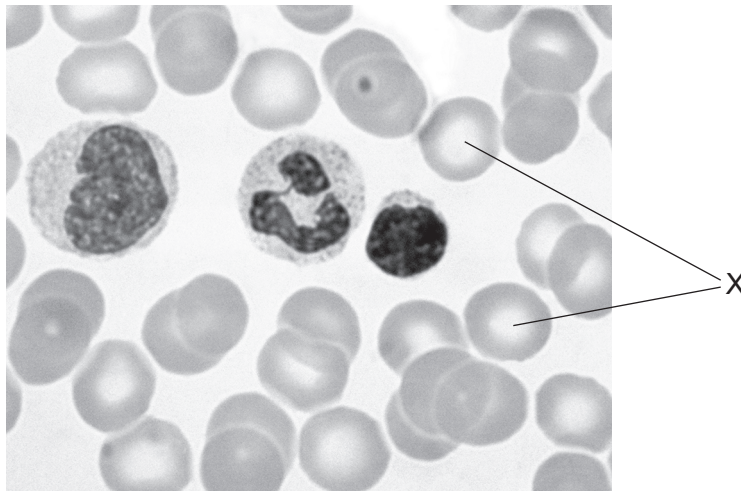


The magnification is  $\times 5$ .

What is the actual length of the insect?

- A 0.04 mm
  - B 24 mm
  - C 115 mm
  - D 600 mm
- 3 What are enzymes made from?
- A fat
  - B hormones
  - C protein
  - D starch
- 4 Which chemical is used to test for a food substance that contains the elements carbon, hydrogen, nitrogen and oxygen?
- A Benedict's solution
  - B biuret solution
  - C ethanol
  - D iodine solution

- 5 Where are guard cells found in a leaf?
- A in the cuticle
  - B in the epidermis
  - C in the palisade layer
  - D in the spongy mesophyll
- 6 In which order does food pass through parts of the alimentary canal?
- A oesophagus → colon → small intestine
  - B small intestine → oesophagus → rectum
  - C small intestine → rectum → anus
  - D stomach → colon → small intestine
- 7 The photomicrograph shows a sample of human blood.



What is the function of the cells marked X?

- A antibody formation
- B clotting of blood
- C phagocytosis
- D transport of oxygen

8 Which word equation represents aerobic respiration?

- A carbon dioxide + oxygen  $\rightarrow$  glucose + water
- B carbon dioxide + water  $\rightarrow$  glucose + oxygen
- C glucose + oxygen  $\rightarrow$  carbon dioxide + water
- D glucose + water  $\rightarrow$  carbon dioxide + oxygen

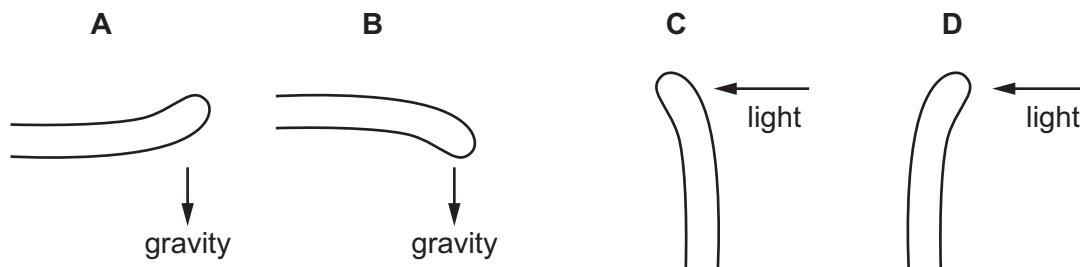
9 When someone is scared, adrenaline is released into their bloodstream.

What is the effect of adrenaline on their blood glucose concentration and pulse rate?

	blood glucose concentration	pulse rate
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

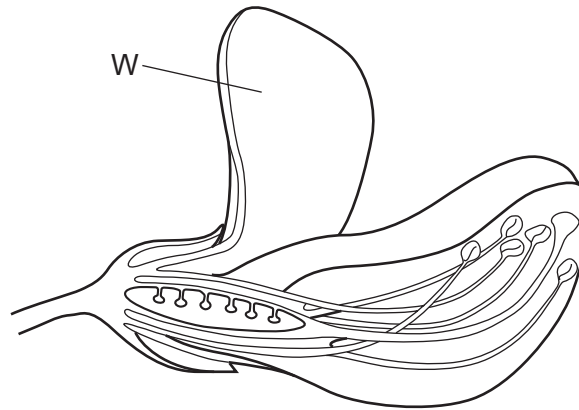
10 The diagrams show shoots of maize seedlings.

Which shoot shows a geotropic response in which it grows away from the stimulus?



5

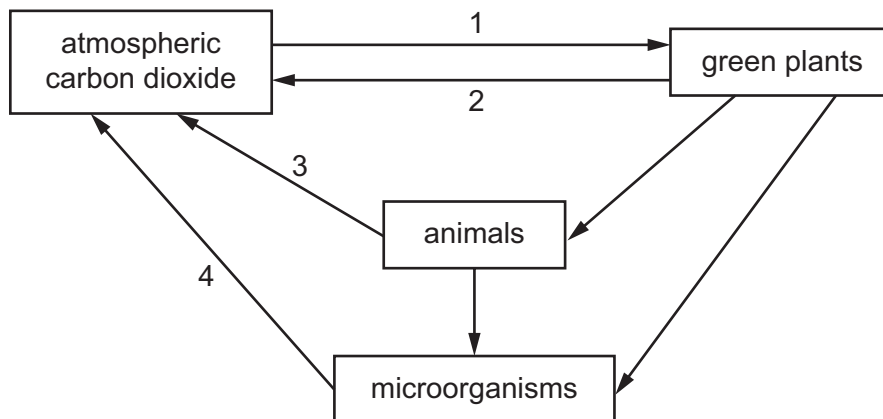
11 The diagram shows a flower.



What is the function of part W?

- A attracts insects
- B produces pollen
- C protects bud
- D receives pollen

12 The diagram represents part of the carbon cycle.



Which arrows show where respiration takes place?

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

13 Large-scale deforestation of a rain forest occurs in one country.

This can have many undesirable effects on the local environment.

Which undesirable effect could also directly affect the environment of a country on the other side of the world?

- A extinction of animal species native to the rain forest
- B increased carbon dioxide concentration in the air
- C increased soil erosion on hillsides
- D reduced drainage leading to flooding

14 The formulae of three substances are shown.

substance	formula
methane	CH <sub>4</sub>
water	H <sub>2</sub> O
oxygen	O <sub>2</sub>

Which statement is correct?

- A Methane is made from five different types of atom.
- B Methane, water and oxygen are molecules.
- C Only methane and water are molecules.
- D Oxygen is made from two different types of atom.

15 Which process is used to separate petroleum?

- A crystallisation
- B distillation
- C filtration
- D fractional distillation

16 Which row describes chemical changes and physical changes?

	chemical changes	physical changes
<b>A</b>	the mass of the products is always the same as the mass of the reactants	new substances are made
<b>B</b>	the mass of the products is always the same as the mass of the reactants	there is no mass change
<b>C</b>	the mass of the products is sometimes more or less than the mass of the reactants	new substances are made
<b>D</b>	the mass of the products is sometimes more or less than the mass of the reactants	there is no mass change

17 A compound contains three times as many oxygen atoms as nitrogen atoms.

It contains the same number of sodium atoms as nitrogen atoms.

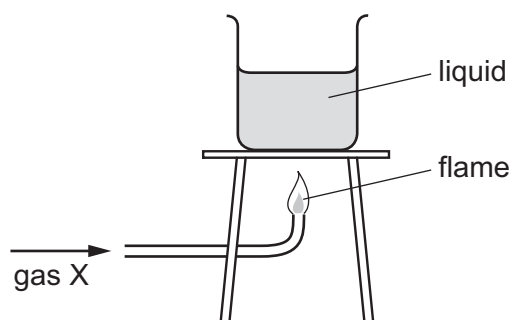
What is its formula?

- A**  $\text{NaNO}_3$       **B**  $\text{Na}(\text{NO})_3$       **C**  $\text{Na}_3(\text{NO})_3$       **D**  $\text{Na}_3\text{N}_3\text{O}$

18 What is produced at the anode during the electrolysis of molten lead(II) bromide?

- A** bromide ions  
**B** bromine  
**C** lead  
**D** lead(II) ions

19 The diagram shows gas X burning and heating a liquid.



Which row is correct?

	gas X	the burning of gas X is exothermic
<b>A</b>	hydrogen	✓
<b>B</b>	hydrogen	x
<b>C</b>	oxygen	✓
<b>D</b>	oxygen	x

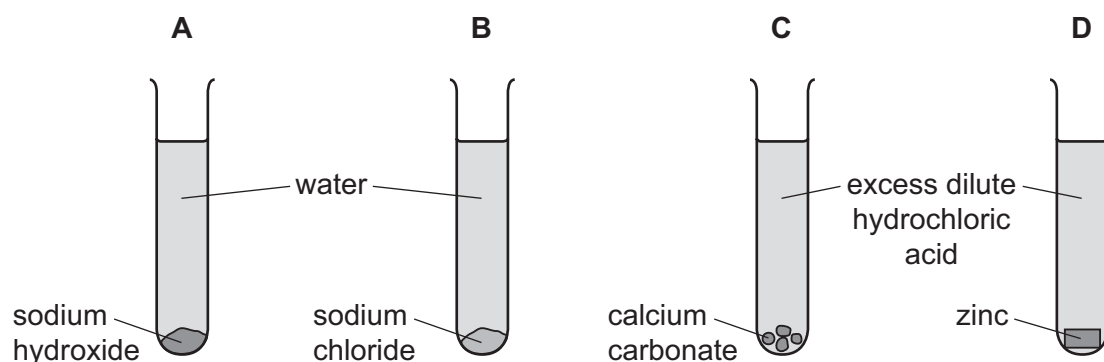
20 Carbon reacts with carbon dioxide at high temperatures.



Which statement about the reaction is correct?

- A** Both carbon and carbon dioxide are oxidised.
- B** Both carbon and carbon dioxide are reduced.
- C** The carbon is oxidised and the carbon dioxide is reduced.
- D** The carbon is reduced and the carbon dioxide is oxidised.

21 In which test-tube is an alkaline solution formed?





22 Excess magnesium is added to dilute hydrochloric acid containing Universal Indicator.

The indicator changes colour and a gas is given off.

The gas is tested with limewater.

Which row describes the colour change and the result of the limewater test?

	colour change	result of the limewater test
<b>A</b>	blue to green	limewater becomes cloudy
<b>B</b>	blue to green	no change
<b>C</b>	red to green	limewater becomes cloudy
<b>D</b>	red to green	no change

23 Which statement describes the elements across the Periodic Table from left to right?

- A** Their atoms contain fewer protons.
- B** Their atoms contain the same number of electrons.
- C** They change from gases to solids.
- D** They change from metals to non-metals.

24 Lithium and potassium are in Group I of the Periodic Table.

Which statement is **not** correct?

- A** Lithium has a higher melting point than potassium.
- B** Lithium is harder than potassium.
- C** Potassium conducts electricity but lithium does not.
- D** Potassium is more reactive than lithium.

25 Platinite is made by melting and mixing iron and nickel.

Which type of substance is platinite?

- A** alloy
- B** hydrocarbon
- C** ionic compound
- D** transition metal

26 P, Q, R and S are four gases found in clean air.

P is very unreactive.

Q makes up 21% of the air.

R makes up 78% of the air.

S is formed when fossil fuels are burned.

Which row is correct?

	P	Q	R	S
<b>A</b>	argon	nitrogen	oxygen	carbon dioxide
<b>B</b>	argon	oxygen	nitrogen	carbon dioxide
<b>C</b>	carbon dioxide	oxygen	nitrogen	argon
<b>D</b>	carbon dioxide	nitrogen	oxygen	argon

27 Which power stations burn fossil fuels?

1 a coal-fired power station

2 a nuclear power station

3 an oil-fired power station

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

28 A car travels at various speeds during a short journey.

The table shows the distances travelled and the times taken during each of four stages P, Q, R and S.

stage	P	Q	R	S
distance travelled / km	1.8	3.6	2.7	2.7
time taken / minutes	2.0	2.0	4.0	3.0

During which two stages is the car travelling at the same average speed?

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

- 29 A piece of scientific equipment is taken on a space ship from Earth to a distant planet.

Which property or properties of the equipment **must** remain the same on the distant planet?

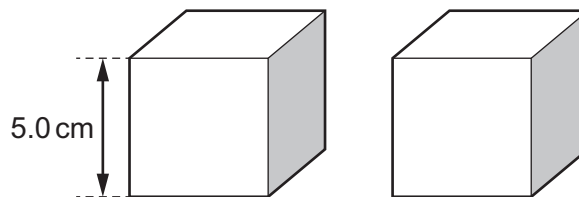
	mass	weight
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

key

✓ = must be the same

✗ = does not have to be the same

- 30 Two identical, solid cubes have sides of length 5.0 cm. The total mass of both cubes together is 2000 g.



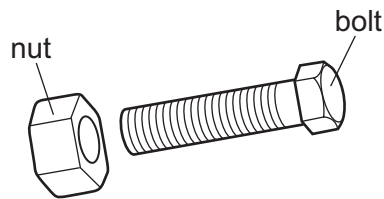
What is the density of the material from which the cubes are made?

- A** 8.0g/cm<sup>3</sup>      **B** 16g/cm<sup>3</sup>      **C** 40g/cm<sup>3</sup>      **D** 80g/cm<sup>3</sup>
- 31 Which energy resource is renewable and has the Sun as its source of energy?
- A** coal
- B** geothermal
- C** hydroelectric
- D** nuclear

- 32 When a liquid evaporates, which molecules escape and what happens, if anything, to the temperature of the remaining liquid?

	molecules escaping	temperature of remaining liquid
<b>A</b>	less energetic molecules	decreases
<b>B</b>	less energetic molecules	stays the same
<b>C</b>	more energetic molecules	decreases
<b>D</b>	more energetic molecules	stays the same

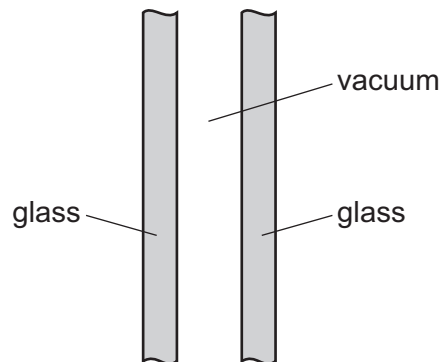
- 33 A nut and a bolt are made of the same metal. The nut is slightly too small to screw on to the bolt.



Which action is most likely to make the nut fit the bolt?

- A Cool the bolt and cool the nut to the same temperature.
  - B Cool the bolt and heat the nut.
  - C Heat the bolt and cool the nut.
  - D Heat the bolt and heat the nut to the same temperature.
- 34 A double-glazed window consists of two panes of glass with a vacuum between them.

The vacuum reduces the amount of thermal energy transferred through the window.



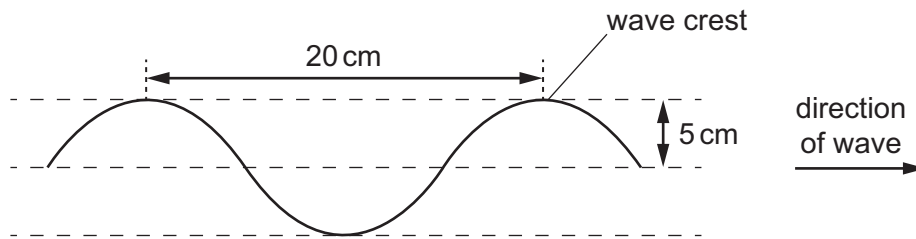
Which row shows how much thermal energy is transferred through the vacuum by conduction, by convection and by radiation?

	conduction	convection	radiation
<b>A</b>	none	none	some
<b>B</b>	none	some	some
<b>C</b>	some	none	none
<b>D</b>	some	some	none

35 The diagram shows a section of a rope.

Four wave crests pass a point on the rope every second.

Each wave crest travels 80 cm in one second.

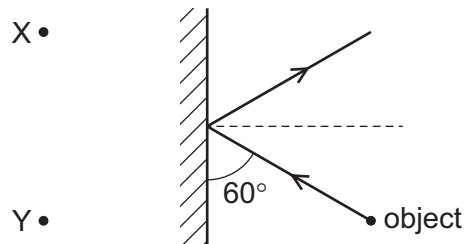


What is the speed of the wave?

- A** 4.0 cm/s      **B** 5.0 cm/s      **C** 20 cm/s      **D** 80 cm/s

36 The diagram shows an object in front of a plane mirror. A ray of light from the object is incident on the mirror, and the angle between the ray and the mirror is  $60^\circ$ .

Two positions X and Y are labelled.



What is the angle of reflection, and at which labelled position is an image of the object formed?

	angle of reflection / $^\circ$	position of image
<b>A</b>	30	X
<b>B</b>	30	Y
<b>C</b>	60	X
<b>D</b>	60	Y

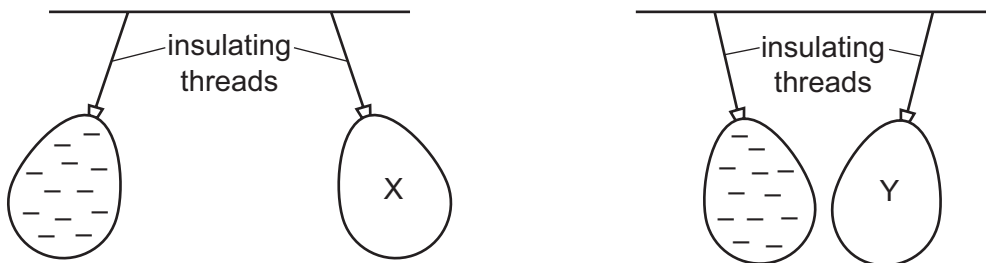
37 Electromagnetic waves are used to scan passengers' luggage before they board an aeroplane.

Electromagnetic waves are also used in a television remote controller.

Which type of electromagnetic wave is used for each of these purposes?

	scanning luggage	television remote controller
<b>A</b>	radio waves	infra-red waves
<b>B</b>	radio waves	ultraviolet waves
<b>C</b>	X-rays	infra-red waves
<b>D</b>	X-rays	ultraviolet waves

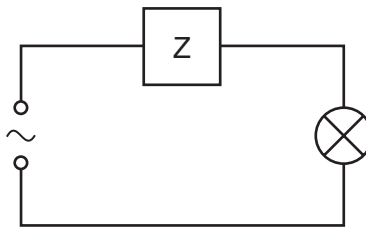
38 Two balloons X and Y are suspended by insulating threads. They are each held near a negatively charged balloon. The balloons hang as shown.



What is the charge on balloon X and what is the charge on balloon Y?

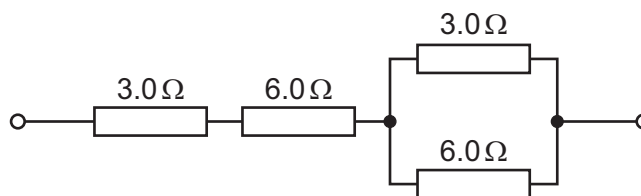
	balloon X	balloon Y
<b>A</b>	negative	negative
<b>B</b>	negative	positive
<b>C</b>	positive	negative
<b>D</b>	positive	positive

- 39 The device Z in this circuit is designed to cut off the electricity supply **automatically** if too much current flows.



What is device Z?

- A a fuse
  - B a resistor
  - C a switch
  - D an ammeter
- 40 Four resistors are connected in the arrangement shown.



What is a possible value of the combined resistance of this arrangement?

- A 11 Ω
- B 12 Ω
- C 15 Ω
- D 18 Ω

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## The Periodic Table of Elements

		Group															
I	II											III	IV	V	VI	VII	VIII
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<b>Key</b> atomic number atomic symbol name relative atomic mass										5 <b>B</b> boron 11	6 <b>C</b> carbon 12	7 <b>N</b> nitrogen 14	8 <b>O</b> oxygen 16	9 <b>F</b> fluorine 19	10 <b>Ne</b> neon 20
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24											1 <b>H</b> hydrogen 1	13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulfur 32	17 <b>Cl</b> chlorine 35.5
19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	21 <b>Sc</b> scandium 45	22 <b>Ti</b> titanium 48	23 <b>V</b> vanadium 51	24 <b>Cr</b> chromium 52	25 <b>Mn</b> manganese 55	26 <b>Fe</b> iron 56	27 <b>Co</b> cobalt 59	28 <b>Ni</b> nickel 59	29 <b>Cu</b> copper 64	30 <b>Zn</b> zinc 65	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	39 <b>Y</b> yttrium 89	40 <b>Zr</b> zirconium 91	41 <b>Nb</b> niobium 93	42 <b>Mo</b> molybdenum 96	43 <b>Tc</b> technetium —	44 <b>Ru</b> ruthenium 101	45 <b>Rh</b> rhodium 103	46 <b>Pd</b> palladium 106	47 <b>Ag</b> silver 108	48 <b>Cd</b> cadmium 112	49 <b>In</b> indium 115	50 <b>Sn</b> tin 119	51 <b>Sb</b> antimony 122	52 <b>Te</b> tellurium 128	53 <b>I</b> iodine 127	54 <b>Xe</b> xenon 131
55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	57–71 lanthanoids	72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192	78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209	84 <b>Po</b> polonium —	85 <b>At</b> astatine —	86 <b>Rn</b> radon —
87 <b>Fr</b> francium —	88 <b>Ra</b> radium —	89–103 actinoids	104 <b>Rf</b> rutherfordium —	105 <b>Db</b> dubnium —	106 <b>Sg</b> seaborgium —	107 <b>Bh</b> bohrium —	108 <b>Hs</b> hassium —	109 <b>Mt</b> meitnerium —	110 <b>Ds</b> darmstadtium —	111 <b>Rg</b> roentgenium —	112 <b>Cn</b> copernicium —	114 <b>Fl</b> flerovium —	116 <b>Lv</b> livermorium —	—	—	—	—

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

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