Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **May/June 2014**

1 hour

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

8868103336

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.

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

CAMBRIDGE
International Examinations

1 Which feature allows root hair cells to carry out their function?

A absence of nucleus

B large surface area

C presence of chloroplasts

D presence of stomata

2 A student placed equal-sized pieces of potato in solutions of different sugar concentrations. She measured the change in length of each piece after 30 minutes. Her results are shown in the table.

sugar concentration (%)	change in length (mm)
0	+4.0
5	+2.2
10	+0.5
15	–1.2
20	–3.0

The student used the results to predict which concentration of sugar would not change the length of a potato strip.

At which concentration would the change in length be 0 mm?

A 9% **B** 10% **C** 11% **D** 25%

3 Amylase is an enzyme important in seed germination.

What is the function of amylase in seed germination?

A breaks the testa so the plumule can emerge

B causes the radical to elongate

C changes the stored starch into sugars for respiration

D helps the seed absorb water to rehydrate the cells

4 Which element is contained in fertilisers and used by plants to synthesise protein?

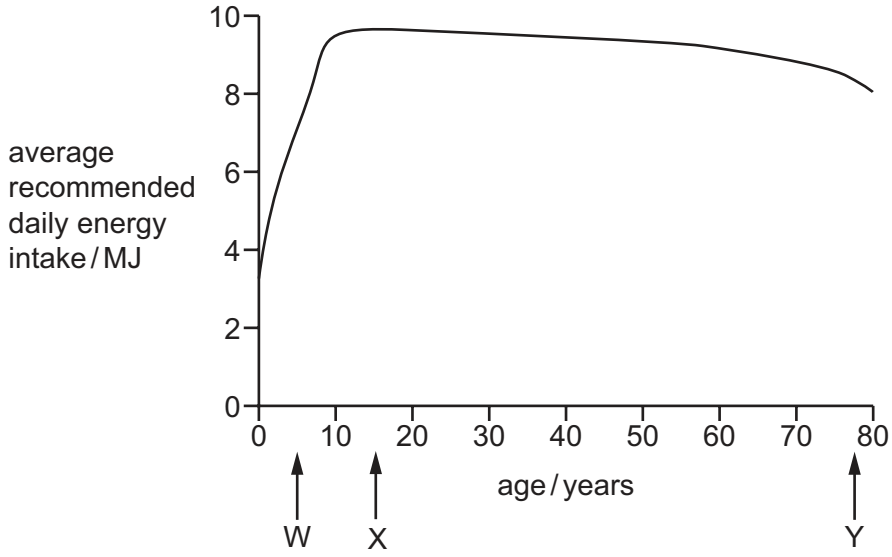
A helium

B nitrogen

C silicon

D sodium

5 The graph shows how the average recommended daily energy intake of a woman varies with age.

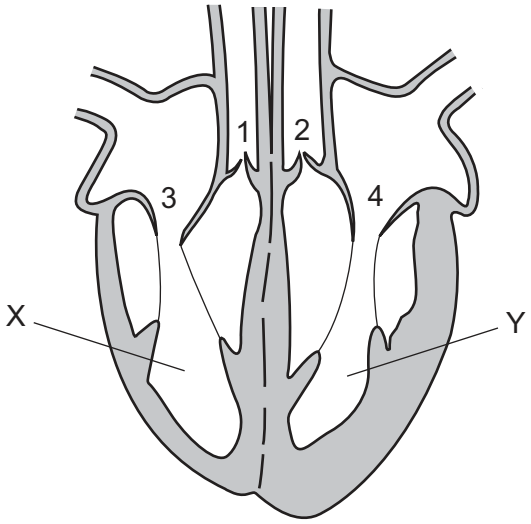


What is the reason for the differences in the recommended energy intakes between W and X, and between X and Y?

	reason for difference between W and X	reason for difference between X and Y
A	difference in body size	difference in body size
B	difference in body size	difference in level of activity
C	difference in level of activity	difference in body size
D	difference in level of activity	difference in level of activity

[Turn over

6 The diagram shows a section through the heart.



What is the position of valves 1-4 while chambers X and Y are emptying?

	valves 1 and 2	valves 3 and 4
A	closed	closed
B	closed	open
C	open	closed
D	open	open

7 How does the composition of expired air differ from inspired air?

	carbon dioxide	nitrogen	oxygen	water vapour
A	decreases	increases	decreases	decreases
B	increases	decreases	increases	does not change
C	increases	does not change	decreases	decreases
D	increases	does not change	decreases	increases

8 Which row describes where hormones are produced and destroyed?

	produced by	destroyed by
A	gland	liver
B	gland	stomach
C	muscle	liver
D	muscle	stomach

9 Why is heroin described as a powerful depressant?

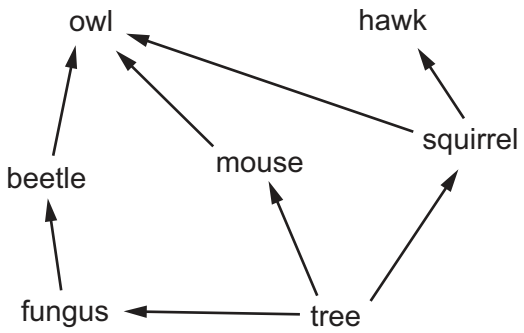
A It causes severe symptoms of withdrawal.

B It is highly addictive.

C It slows down the activity of the nervous system.

D It speeds up reaction times.

10 The diagram shows a food web.



Which of the organisms shown in the food web can only survive by taking in simple inorganic materials?

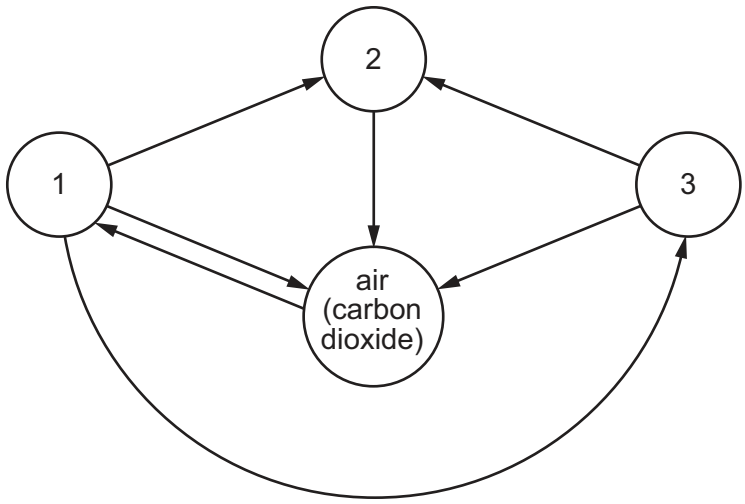
A beetle

B fungus

C owl

D tree

11 In the diagram, arrows represent the movement of carbon compounds in the carbon cycle. The circles represent carbon compounds in animals, decomposers, plants and in the air.



What is represented by each circle?

	1	2	3
A	animals	plants	decomposers
B	plants	animals	decomposers
C	plants	decomposers	animals
D	decomposers	animals	plants

12 Which statement about sexual reproduction is correct?

A All plants reproduce by this process.

B Nuclei of two specialised cells fuse together.

C The offspring are genetically identical.

D Two cells of one type fuse with a single cell of another type.

13 What causes syphilis and how is it treated?

	caused by	treated
A	a bacterium	antibiotics
B	a bacterium	spermicide
C	a virus	antibiotics
D	a virus	spermicide

14 Which substance may be condensed using a water-cooled condenser?

	substance	melting point / °C	boiling point / °C
A	butane	–135	–1
B	pentane	–130	+36
C	bromomethane	–94	+4
D	ammonia	–78	–33

15 An isotope of element X is represented by $^{19}_{9}X$.

What is the electronic structure of X?

A 2,8,8,1 **B** 2,7 **C** 2,8 **D** 2,8,18

16 Calcium reacts with chlorine to form the ionic compound calcium chloride.

An atom of calcium has 20 electrons.

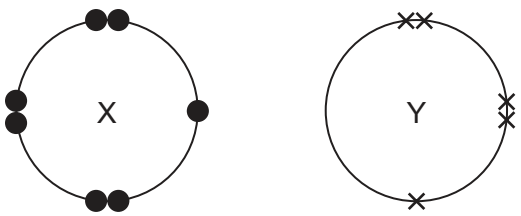
An atom of chlorine has 17 electrons.

What is the electronic configuration of the calcium ion and of the chloride ion?

	calcium ion	chloride ion
A	2,8,8	2,8,8
B	2,8,8,1	2,8,8
C	2,8,8,2	2,8,7
D	2,8,8,8	2,8

17 Atoms of element X have seven outer shell electrons.

Atoms of element Y have five outer shell electrons.



X and Y form a compound with covalent bonds.

What is the formula for the compound of X and Y?

A XY_2 **B** XY_3 **C** X_2Y **D** X_3Y

18 'Meta-fuel', $C_8H_{16}O_4$, is a fuel used in stoves.

What is the equation for its complete combustion?

A $C_8H_{16}O_4 + 2O_2 \rightarrow 8C + 8H_2O$

B $C_8H_{16}O_4 + 6O_2 \rightarrow 8CO + 8H_2O$

C $C_8H_{16}O_4 + 10O_2 \rightarrow 8CO_2 + 8H_2O$

D $C_8H_{16}O_4 + 8O_2 \rightarrow 4CO_2 + 4CO + 8H_2O$

19 Which statement describes a base?

A a substance that produces H^+ ions when dissolved in water

B a substance that reacts with ammonium chloride to produce ammonia gas

C a substance that reacts with sodium hydroxide to form a salt

D a substance that turns Universal Indicator paper red

20 Astatine (At) is in Group VII of the Periodic Table.

Which is a property of astatine?

A It forms a basic oxide.

B It is a good conductor of electricity.

C It is displaced by chlorine from aqueous potassium astatide.

D It displaces iodine from aqueous potassium iodide.

21 Platinum is a metal.

Which statements about platinum are correct?

1 It can be drawn into wires.

2 It conducts heat.

3 It has a low boiling point.

4 It is shiny.

5 It is strong.

A 1, 2, 3 and 4

B 1, 2, 3 and 5

C 1, 2, 4 and 5

D 2, 3, 4 and 5

22 A more reactive metal displaces a less reactive from an aqueous solution of its ions.

Four unknown metals are given the labels W, X, Y and Z and found to react as shown.

$W(s) + X^{2+}(aq) \rightarrow$ no reaction

$X(s) + Y^{3+}(aq) \rightarrow$ a reaction

$Z(s) + W^{+}(aq) \rightarrow$ a reaction

$X(s) + Z^{2+}(aq) \rightarrow$ a reaction

$Z(s) + Y^{3+}(aq) \rightarrow$ no reaction

What is the correct order of reactivity, putting the most reactive first?

A $W \rightarrow X \rightarrow Y \rightarrow Z$

B $X \rightarrow W \rightarrow Z \rightarrow Y$

C $X \rightarrow Y \rightarrow Z \rightarrow W$

D $Z \rightarrow X \rightarrow W \rightarrow Y$

23 Which gas dissolves in water to form acid rain?

A ammonia

B carbon monoxide

C nitrogen

D sulfur dioxide

24 Which compound contains nitrogen and is used as a fertiliser?

A ammonium sulfate

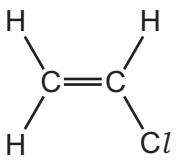
B calcium phosphate

C nitric acid

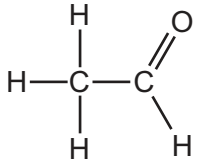
D potassium sulfate

25 Which structural formula represents an unsaturated hydrocarbon?

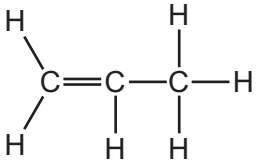
A



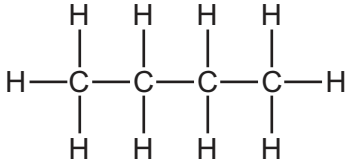
B



C



D



26 When ethene reacts with hydrogen, ethane is produced.

What type of reaction is this?

A addition

B displacement

C oxidation

D polymerisation

27 Which substances are produced by yeast from sugar?

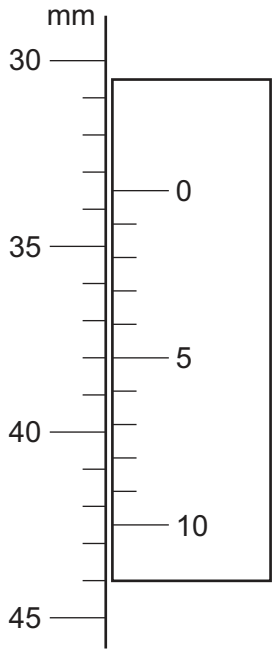
A ethanoic acid and oxygen

B ethanol and carbon dioxide

C ethanol and oxygen

D starch and carbon dioxide

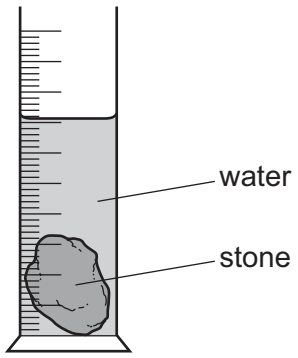
28 The diagram shows part of a vernier scale.



What is the correct reading?

A 30.5 mm **B** 33.5 mm **C** 38.0 mm **D** 42.5 mm

29 To calculate the density of a stone, a student places some water in a measuring cylinder and then places the stone in the water.



What does the student need to measure to be able to calculate the density of the stone?

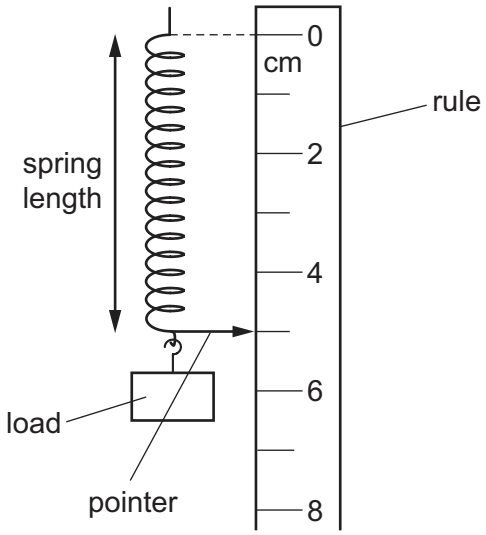
A mass of the stone and combined volume of the water and the stone

B mass of the stone, mass of the water and volume of the water

C mass of the stone, volume of the water and combined volume of the water and the stone

D mass of the water, volume of the water and combined volume of the water and the stone

30 The diagram shows the apparatus a student uses to investigate the extension of a spring.



She is asked to plot an extension-load graph for the spring.

She writes down the steps she will follow.

Which step is **not** correct?

A The load is increased, in stages, on the lower end of the spring.

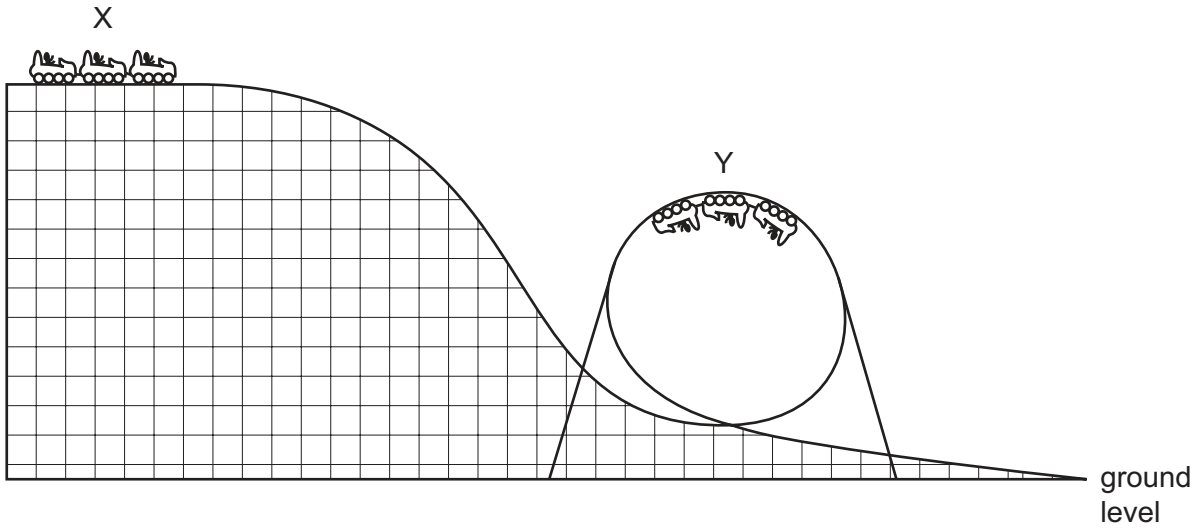
B The reading of the pointer against the scale is recorded for each load.

C The load is reduced, in stages, and the pointer reading recorded.

D The average pointer reading, at each stage, is plotted against the load.

31 In a theme park ride, passengers in a car are initially at rest at the top of the track.

The car then travels down and round a circular loop in the track.



Which form of energy is possessed by the car and passengers at points X and Y?

	X	Y
A	KE only	PE only
B	PE only	KE only
C	KE only	KE and PE
D	PE only	KE and PE

key

KE = kinetic energy

PE = gravitational potential energy

32 What is **not** a consequence of thermal expansion?

A the cracking of a cold plate when put into a very hot oven

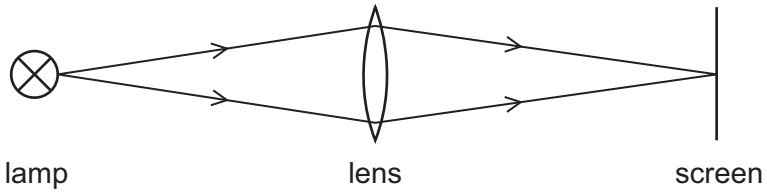
B the distortion of metal rail tracks in very hot weather

C the distortion suffered by a football when kicked

D the water circulation in a heated saucepan

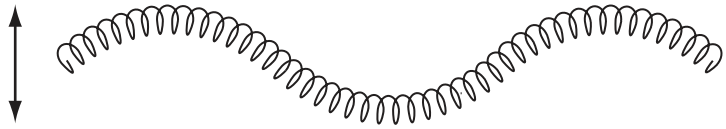
33 Which diagram shows an example of a longitudinal wave?

A light travelling from a lamp to a screen

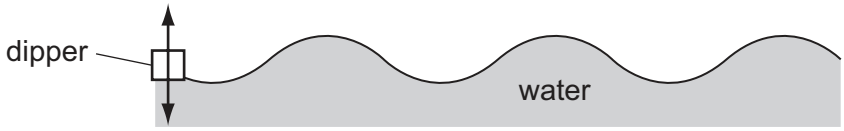


B a spring pushed backwards and forwards

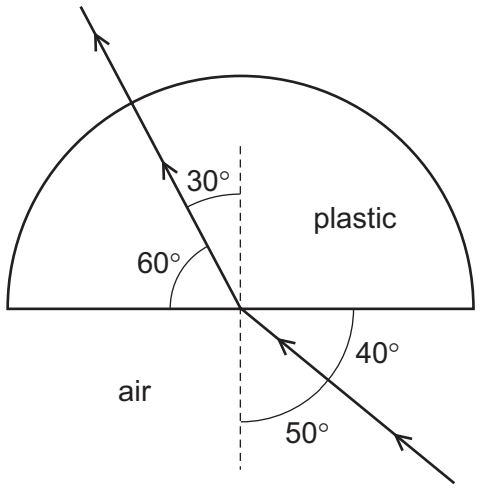
C a spring pushed up and down



D a water ripple caused by a dipper moving up and down



34 A semi-circular block is made from plastic. A ray of light passes through it at the angles shown.



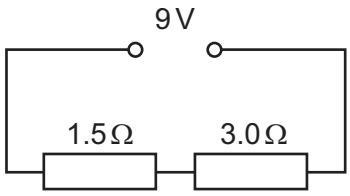
What is the refractive index of the plastic?

A 0.74 **B** 0.88 **C** 1.29 **D** 1.53

35 Which row correctly describes what happens when two electrostatic charges are brought nearer to one another?

	like charges	unlike charges
A	attract	attract
B	attract	repel
C	repel	attract
D	repel	repel

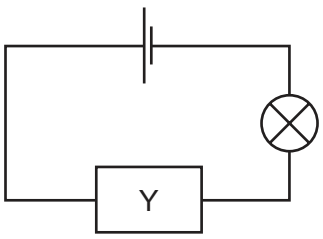
36 Two resistors are connected in series with a 9 V supply.



What is the current in the circuit?

A 2.0 A **B** 3.0 A **C** 4.5 A **D** 6.0 A

37 In the circuit shown, component Y can be used to gradually change the brightness of the lamp.



What is component Y?

A a battery

B a resistor

C a switch

D a variable resistor

38 A light bulb is marked 120 V, 60 W.

How much energy does the bulb dissipate in one minute?

A 2 J **B** 60 J **C** 120 J **D** 3600 J

39 $^{238}_{92}U$ is a nuclide of uranium.

What does the nucleus contain?

A 92 protons and 146 neutrons

B 92 protons and 238 neutrons

C 92 protons, 146 neutrons and 92 electrons

D 92 protons, 238 neutrons and 92 electrons

40 After use, a radioactive source still contains material that is radioactive.

How may it be disposed of safely?

A by burning the source at high temperatures

B by burying the source deep underground

C by cooling the source quickly to a very low temperature

D by washing the source into a fast-flowing river

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
																4 **He** Helium 2
					1 **H** Hydrogen 1											
7 **Li** Lithium 3	9 **Be** Beryllium 4										11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12										27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	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	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

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

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

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