



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/12**

Paper 1 Multiple Choice

**October/November 2011**

**45 minutes**

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

\* 8 8 3 9 7 8 5 4 0 8 \*

**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.

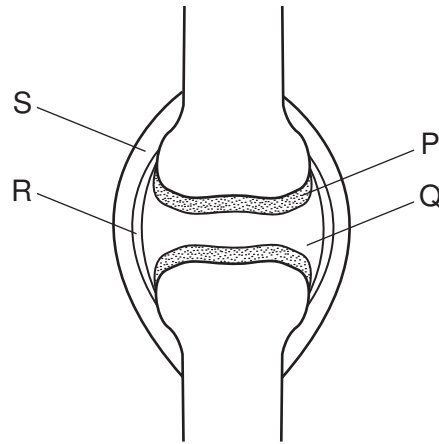
Any rough working should be done in this booklet.

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

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



1 The diagram shows a synovial joint.



Which two parts prevent friction between the bones?

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

2 The binomial name for a tiger is *Panthera tigris* and for a lion, *Panthera leo*.

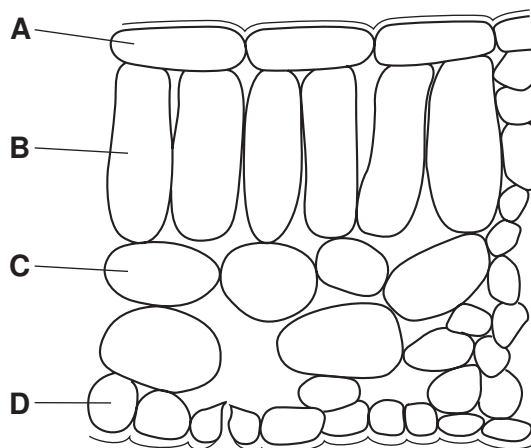
What do the scientific names show?

Lions and tigers

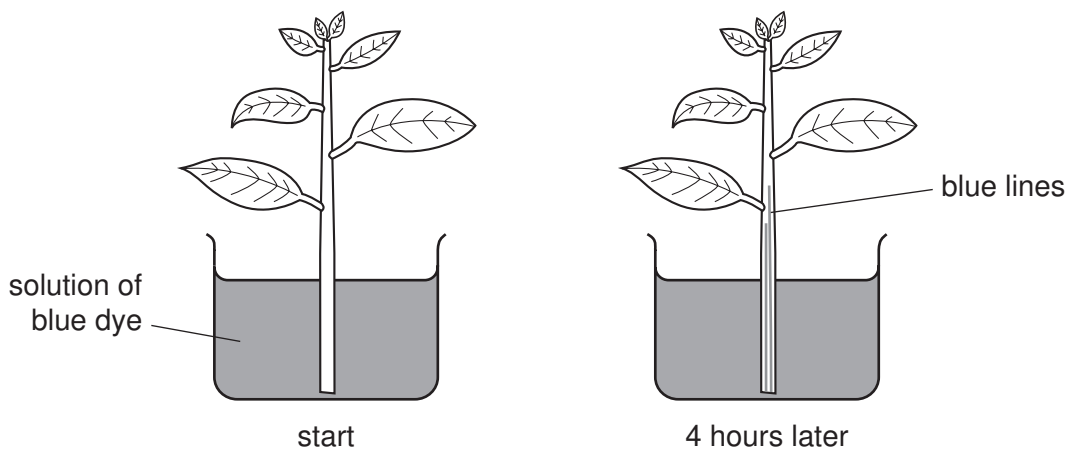
- A** are both in the same species.  
**B** are genetically identical.  
**C** can interbreed.  
**D** have many features in common.

3 The diagram shows a section through a leaf.

Which layer of cells produces most sugar?



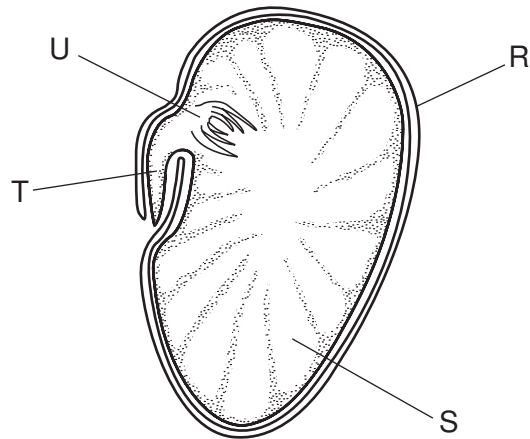
- 4 A swollen abdomen caused by kwashiorkor is a symptom of a lack of which dietary component?
- A carbohydrate
  - B fat
  - C fibre
  - D protein
- 5 Why is a leaf first dipped into hot water when performing the starch test?
- A to make its membranes permeable
  - B to make starch soluble
  - C to remove air from intercellular spaces
  - D to remove chlorophyll
- 6 The diagram shows a shoot of a plant with a transparent stem in a solution of blue dye.



What do the blue lines in the stem show?

- A The dye is drawn up the phloem in the stem.
- B The dye moves up the stem by diffusion.
- C The dye shows liquid can circulate in the stem.
- D The dye travels through tubes in the stem.

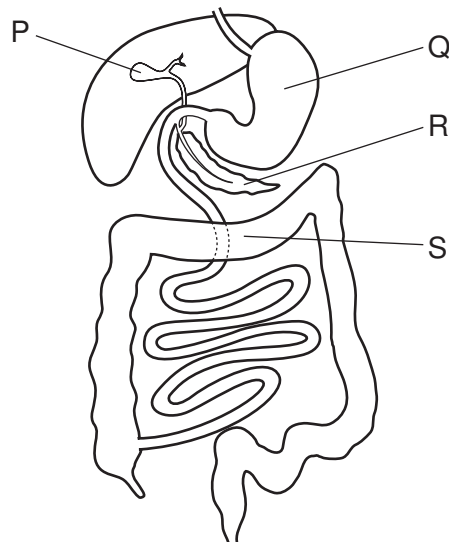
- 7 The diagram shows a section through a bean seed.



What are the labelled parts?

	cotyledon	plumule	radicle	testa
<b>A</b>	R	T	U	S
<b>B</b>	R	U	T	S
<b>C</b>	S	T	U	R
<b>D</b>	S	U	T	R

- 8 The diagram shows some parts of the alimentary canal and its associated organs.



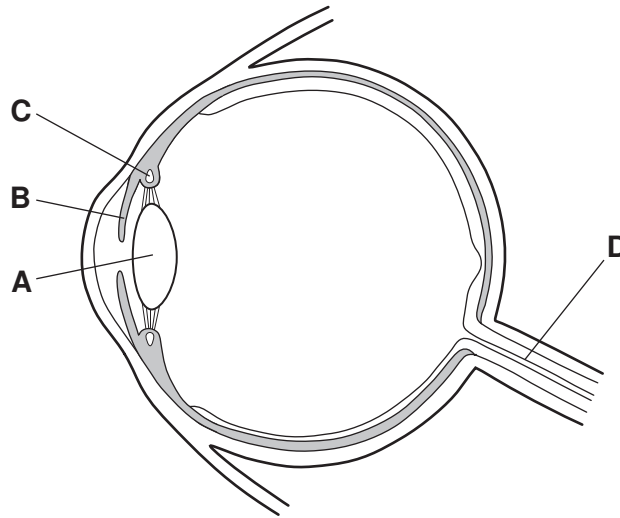
Which organs produce digestive enzymes?

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

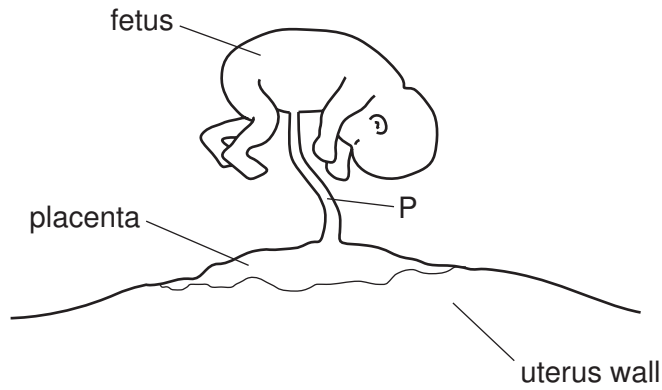
9 The diagram shows a section through the eye.

When a person moves from shade into bright sunlight, a reflex action takes place.

Where does the response to bright sunlight occur?



10 The diagram shows a fetus attached to its mother's uterus via the placenta.



What is carried in structure P?

	mother's blood	fetus's blood	oxygenated blood	deoxygenated blood
<b>A</b>	✓	x	✓	x
<b>B</b>	✓	x	x	✓
<b>C</b>	x	✓	✓	✓
<b>D</b>	x	✓	x	✓

key  
 ✓ = carried in P  
 x = not carried in P



15 Which would be a liquid at 50 °C?

	melting point °C	boiling point °C
<b>A</b>	-100	80
<b>B</b>	-73	-10
<b>C</b>	-60	40
<b>D</b>	95	280

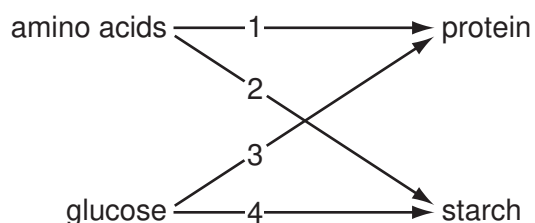
16 Processes used in the petrochemical industry include

- 1 cracking,
- 2 distillation.

For which of these processes is a catalyst used?

- A** both 1 and 2  
**B** 1 only  
**C** 2 only  
**D** neither 1 nor 2

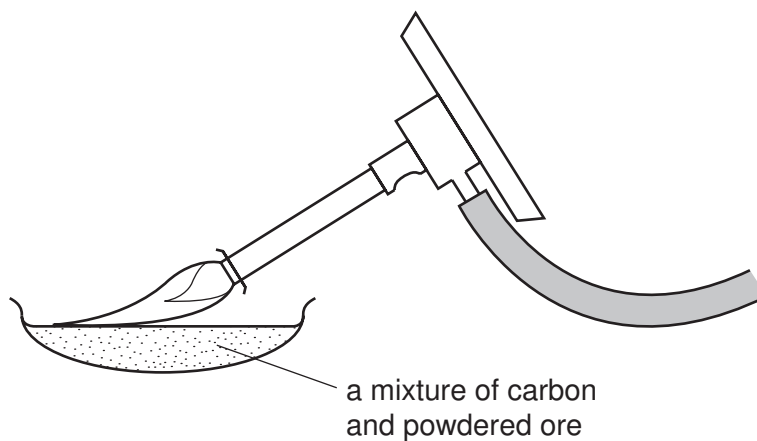
17 In the diagram below, the compounds on the left are monomers and those on the right are polymers.



Which two arrows link the monomer to the correct polymer?

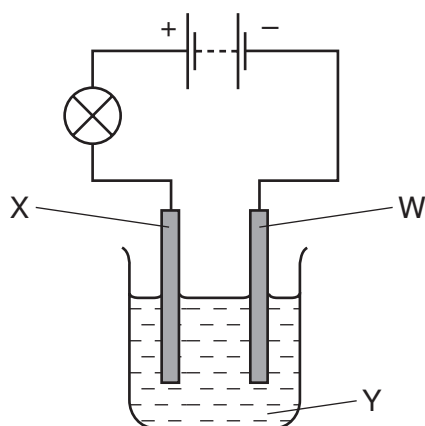
- A** 1 and 2      **B** 1 and 4      **C** 2 and 3      **D** 3 and 4

- 18 The diagram shows a metal being extracted from its powdered ore using carbon.



What happens to the ore in this reaction?

- A It burns.
  - B It decomposes.
  - C It is oxidised.
  - D It is reduced.
- 19 An experiment is set up to test the effect of electricity on solution Y.

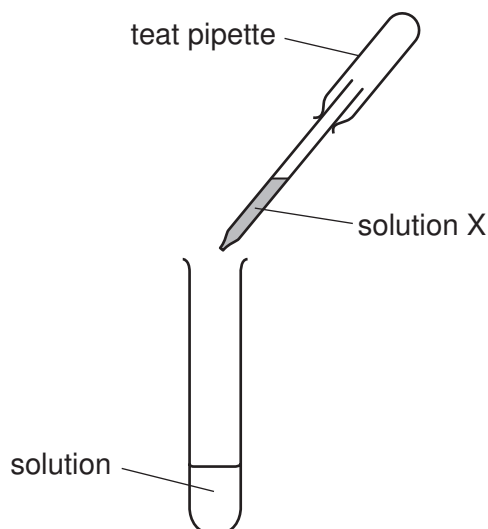


What are the names of W, X and Y?

	W	X	Y
<b>A</b>	anode	cathode	electrode
<b>B</b>	anode	cathode	electrolyte
<b>C</b>	cathode	anode	electrode
<b>D</b>	cathode	anode	electrolyte



20 Using solution X, a student successfully tested for the presence of chloride ions.



What is solution X and the result of the test?

	solution X	result
<b>A</b>	dilute sulfuric acid	yellow precipitate
<b>B</b>	dilute sulfuric acid	white precipitate
<b>C</b>	silver nitrate solution	yellow precipitate
<b>D</b>	silver nitrate solution	white precipitate

21 Diamond and silicon(IV) oxide are hard materials.

What could be the reason for this?

- A** They are compounds of non-metallic elements.
- B** They are naturally occurring materials.
- C** They have giant structures with covalent bonding.
- D** They have very high melting points.

22 Why is an analgesic used in medicine?

- A** as a painkiller
- B** as a vitamin
- C** to kill bacteria
- D** to kill viruses

- 23 What happens when an acid reacts with an alkali?
- A Neutralisation takes place and the temperature falls.
  - B Neutralisation takes place and the temperature rises.
  - C Reduction takes place and the temperature falls.
  - D Reduction takes place and the temperature rises.

- 24 Which test and result show that a fertiliser contains nitrate ions?

	test	result
A	warm with aqueous sodium hydroxide	gas turns litmus blue
B	warm with aqueous sodium hydroxide	gas turns litmus red
C	warm with aqueous sodium hydroxide, then add aluminium metal	gas turns litmus blue
D	warm with aqueous sodium hydroxide, then add aluminium metal	gas turns litmus red

- 25 The positions of four elements are shown in part of the Periodic Table.


Which elements form a bond by sharing electrons?

- A W and X      B W and Y      C X and Y      D Y and Z
- 26 Salad dressing contains oil dispersed in water.

What is the name of this type of colloidal system?

- A emulsion
- B gel
- C sol
- D solution

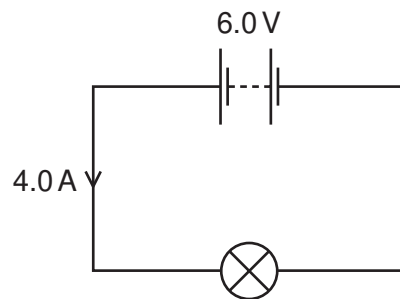
27 Which is a solid fossil fuel?

- A coal
- B oil
- C sugar
- D wood

28 Which of the following is a unit of density?

- A  $\text{cm}^3/\text{g}$
- B  $\text{g}/\text{cm}^2$
- C  $\text{g}/\text{cm}^3$
- D  $\text{kg}/\text{m}^2$

29 The circuit shows a lamp connected to a 6.0V battery.

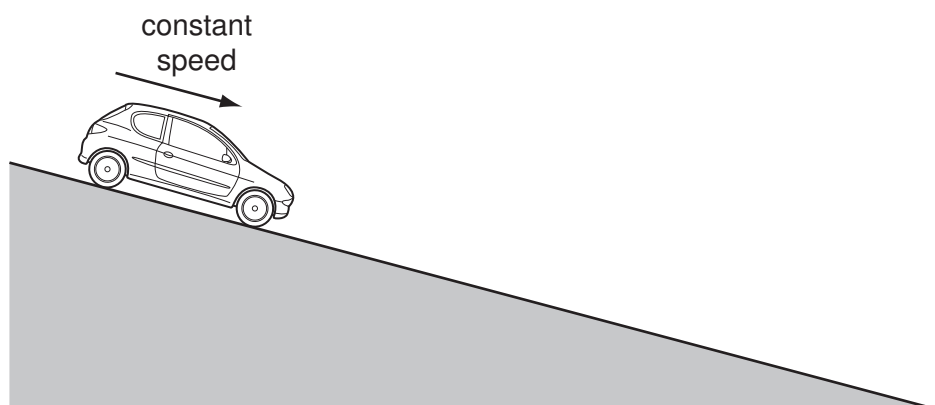


A current of 4.0A flows in the circuit for 20s.

How much charge flows through the lamp?

- A 120C
- B 80C
- C 24C
- D 0.20C

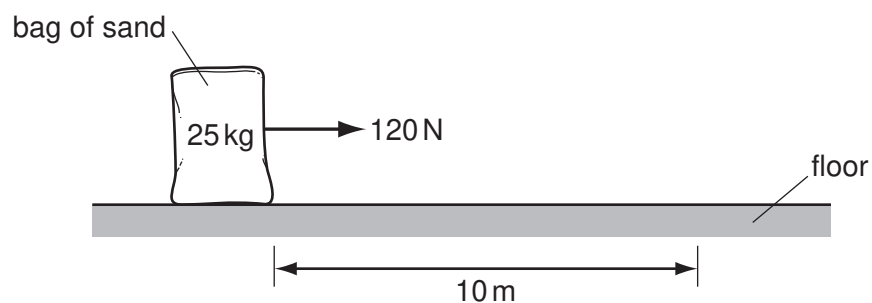
- 30 A car rolls down a hill at a constant speed.



Which row describes the friction force and the unbalanced force acting on the car?

	friction force	unbalanced force
<b>A</b>	acts downhill	acts downhill
<b>B</b>	acts uphill	acts downhill
<b>C</b>	acts uphill	is zero
<b>D</b>	is zero	is zero

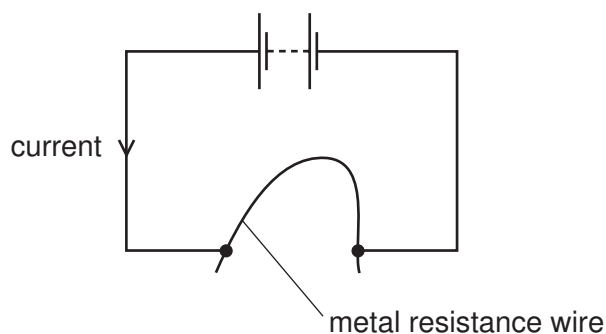
- 31 A horizontal force of 120 N is used to pull a 25 kg bag of sand 10 m along a floor.



How much work is done by the force?

- A** 2.5 J      **B** 12 J      **C** 250 J      **D** 1200 J
- 32 A girl of mass 50 kg is running at 6.0 m/s.
- What is her momentum?
- A** 300 J      **B** 300 kg m/s      **C** 900 J      **D** 900 kg m/s

- 33 A student connects a length of metal resistance wire to a battery.



The student wishes to increase the current in the resistance wire.

Which change would do this?

- A Connect a second wire in series with the first wire.
  - B Heat the wire.
  - C Shorten the wire.
  - D Use a thinner wire.
- 34 Which type of electromagnetic waves are used for cooking?
- A gamma rays
  - B infra-red waves
  - C ultraviolet waves
  - D X-rays
- 35 A sky-diver jumps from a helicopter which is very high and not moving.

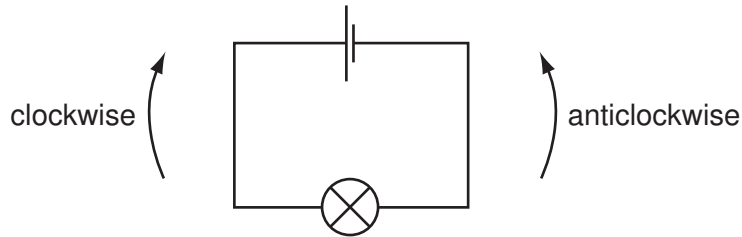
She does not open her parachute when she first jumps.

Which row describes her acceleration and the air resistance acting on her in the first few seconds as she falls?

	acceleration	air resistance
<b>A</b>	constant	constant
<b>B</b>	constant	increasing
<b>C</b>	decreasing	constant
<b>D</b>	decreasing	increasing

- 36 What are the particles given off by the heated tungsten filament in a thermionic diode?
- A alpha particles  
 B electrons  
 C neutrons  
 D protons

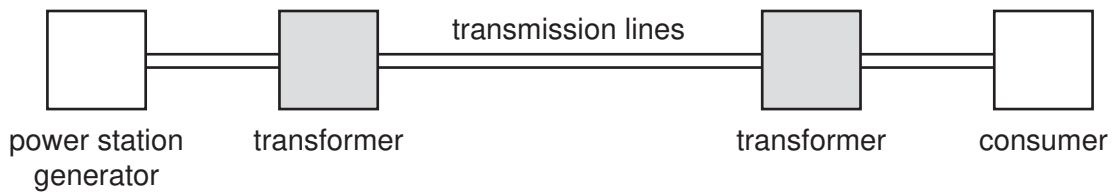
- 37 Charged particles flow in the circuit below.



What are the particles and which way do they flow?

	particles	direction
<b>A</b>	electrons	clockwise
<b>B</b>	electrons	anticlockwise
<b>C</b>	protons	clockwise
<b>D</b>	protons	anticlockwise

- 38 The diagram represents an electrical energy transmission system.



Why are the transformers used?

- A to decrease the energy loss from the transmission lines  
 B to make the transmission lines safer  
 C to supply the consumer with energy at very high voltage  
 D to transmit the energy from the power station at low voltage
- 39 A light bulb is marked '3.0V, 6.0W'.  
 How much current flows in the bulb when it operates at normal brightness?
- A 0.50A      B 2.0A      C 6.0A      D 18A

40 A machine is claimed to be 100% efficient.

For this to be true, which statement must be correct?

- A All the energy put into it is changed into useful energy.
- B It is very easy to use.
- C It produces more energy than is put into it.
- D It wastes a small amount of energy.

## DATA SHEET

### The Periodic Table of the Elements

Group																					
I	II											III	IV	V	VI	VII	0				
										1 <b>H</b> Hydrogen 1											4 <b>He</b> Helium 2
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10				
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12											27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18				
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36				
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	<b>Tc</b> Technetium 43	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54				
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57 *	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	186 <b>Re</b> Rhenium 75	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	<b>Po</b> Polonium 84	<b>At</b> Astatine 85	<b>Rn</b> Radon 86				
<b>Fr</b> Francium 87	226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89 †																			

\*58-71 Lanthanoid series

†90-103 Actinoid series

a	a = relative atomic mass
<b>X</b>	X = atomic symbol
b	b = proton (atomic) number

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

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

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