



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/13**

Paper 1 Multiple Choice

**May/June 2011**

**45 minutes**

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

\* 7 4 2 6 9 1 5 6 7 1 \*

**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 **15** printed pages and **1** blank page.

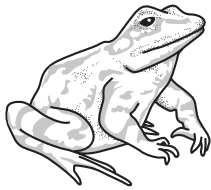


1 Which process releases energy in all living things?

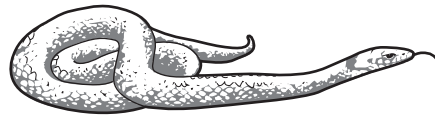
- A breathing
- B digestion
- C muscle contraction
- D respiration

2 The diagram shows four vertebrate animals.

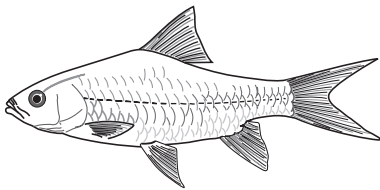
P



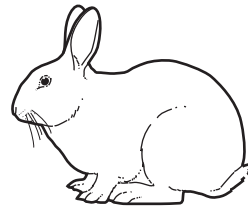
Q



R



S



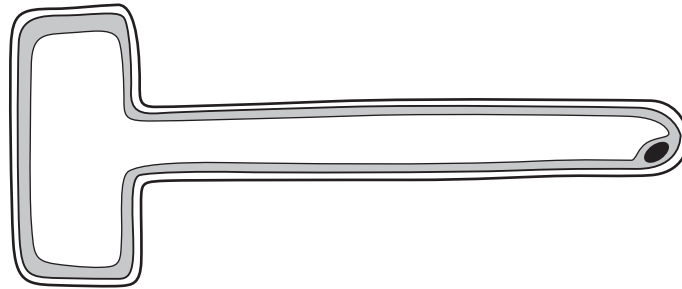
Which animals have lungs?

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

3 Which molecule carries energy into a cell and which is a process that uses this energy?

	molecule	process
A	glucose	growth
B	iron	movement
C	protein	digestion
D	starch	storage

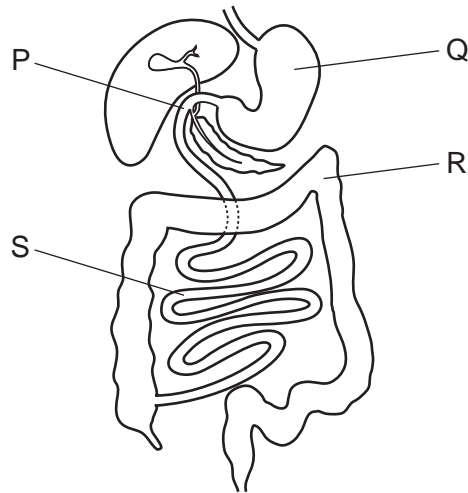
- 4 The diagram shows a root hair cell.



What shows that it is a plant cell?

- A It has a large surface area.
  - B It has a large vacuole.
  - C It has no cell membrane.
  - D It has no cell wall.
- 5 What happens shortly after eating a large amount of sugar?
- A More insulin is secreted by the pancreas.
  - B More urea is made in the liver.
  - C More urine is excreted by the kidneys.
  - D More water is removed from the blood.

- 6 The diagram shows part of the alimentary canal.



Where is bile added and where is acid released?

	addition of bile	release of acid
<b>A</b>	P	Q
<b>B</b>	Q	R
<b>C</b>	R	S
<b>D</b>	S	P

- 7 Tests were carried out on a clear liquid. The table shows the results.

test	result
biuret	purple colour
ethanol	white colour
iodine	brown colour

What did the clear liquid contain?

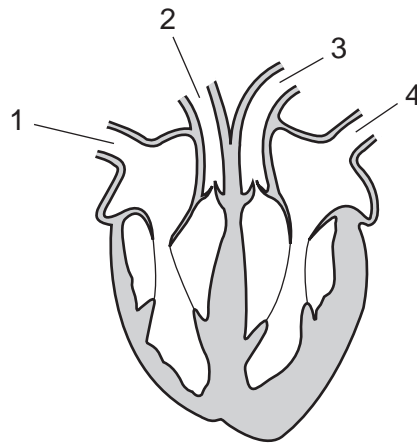
	fat	protein	starch
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	✓	x	✓
<b>D</b>	x	✓	✓

key

✓ = yes

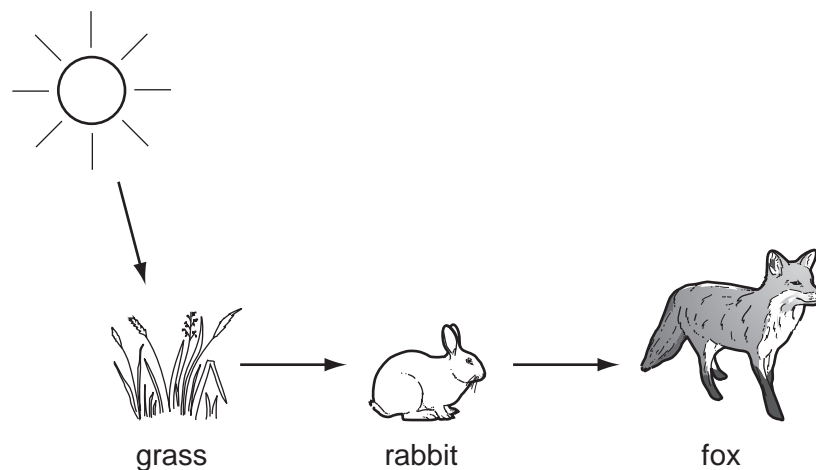
x = no

- 8 The diagram shows a section through the heart.



Which two blood vessels are arteries?

- A** 1 and 2      **B** 2 and 3      **C** 3 and 4      **D** 4 and 1
- 9 What is an ecosystem?
- A** a community and its habitat  
**B** a group of organisms and their predators  
**C** all the organisms in a food chain  
**D** where an organism lives
- 10 The diagram shows a short food chain.



In the food chain, what is the importance of the rabbit?

- A** It absorbs carbon dioxide.  
**B** It absorbs the Sun's energy.  
**C** It passes on energy from plants.  
**D** It releases oxygen.

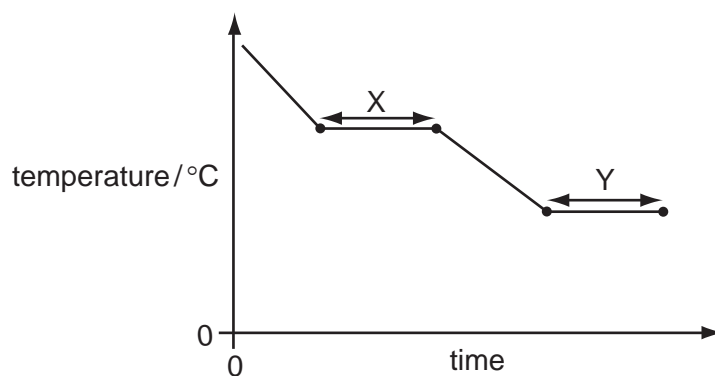
- 11 Which is an example of cloning?
- A pollinating flowers by insects
  - B producing offspring by sexual intercourse
  - C producing plants by tissue culture
  - D seeds forming in an ovary
- 12 Why is seed dispersal important?
- A It causes the development of a fruit.
  - B It makes seeds more fertile.
  - C It prevents asexual reproduction.
  - D It reduces competition between seedlings.
- 13 What passes from a mother to a fetus in her uterus?
- A blood platelets
  - B mineral ions
  - C plasma
  - D red blood cells

- 14 Which trends in physical properties are correct for the alkali metals down Group I?

	hardness	melting point
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

- 15 What is made when amino acids join together in a large chain?
- A cellulose
  - B glucose
  - C protein
  - D starch

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



Which describes the processes occurring at X and Y?

	X	Y
<b>A</b>	boiling	melting
<b>B</b>	condensing	freezing
<b>C</b>	freezing	condensing
<b>D</b>	melting	boiling

17 Some properties of three substances are shown.

substance	melting point / °C	boiling point / °C	electrical conductivity when molten
W	801	1413	good
X	-111	-78	poor
Y	1610	2230	poor

What are the structures of W, X and Y?

	giant covalent structure	giant ionic structure	molecular structure
<b>A</b>	W	Y	X
<b>B</b>	X	W	Y
<b>C</b>	Y	W	X
<b>D</b>	Y	X	W

18 Large hydrocarbons can be .....1..... to make smaller, more useful molecules.

Small hydrocarbon molecules can be .....2..... to make long molecules.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	cracked	distilled
<b>B</b>	cracked	polymerised
<b>C</b>	distilled	polymerised
<b>D</b>	distilled	cracked

19 Electrolysis of sodium chloride is used to obtain chlorine.

In what form is sodium chloride electrolysed and at which electrode is the chlorine obtained?

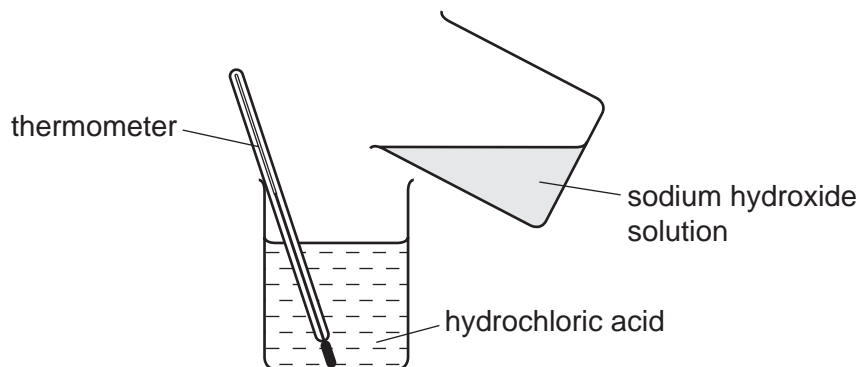
	form of sodium chloride	electrode at which chlorine is obtained
<b>A</b>	in aqueous solution	anode
<b>B</b>	in aqueous solution	cathode
<b>C</b>	solid	anode
<b>D</b>	solid	cathode

20 How is carbon (coke) used in the extraction of iron from iron oxide?

- A** as an anode
- B** as a cathode
- C** as an oxidising agent
- D** as a reducing agent



21 Sodium hydroxide solution is added to hydrochloric acid.



Which shows how the pH and temperature change as the reaction takes place?

	pH	temperature
<b>A</b>	decrease	decrease
<b>B</b>	decrease	increase
<b>C</b>	increase	decrease
<b>D</b>	increase	increase

22 Which statements about a positive test for a nitrate ion are correct?

- 1 Aluminium is used.
- 2 The nitrate ion is reduced to ammonia.
- 3 Ammonia turns damp litmus paper red.

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

23 A solution is tested by adding acidified silver nitrate solution.

Which ion causes the white precipitate to form?

- A** chloride ions,  $Cl^-$
- B** copper ions,  $Cu^{2+}$
- C** hydroxide ions,  $OH^-$
- D** sodium ions,  $Na^+$

24 Which statement about methane is **not** correct?

- A Methane burns in air to form carbon dioxide and water.
- B Methane can be obtained from the decay of waste material.
- C Methane is a fossil fuel.
- D When methane burns, an endothermic reaction takes place.

25 The diagram shows part of the Periodic Table.

Which element has atoms containing three electrons in the outer shell?

26 Aspirin can be used to relieve headaches.

Which terms correctly describe aspirin?

	analgesic	chemotherapy agent	drug
A	✓	✓	x
B	✓	x	✓
C	x	✓	x
D	x	x	✓

key

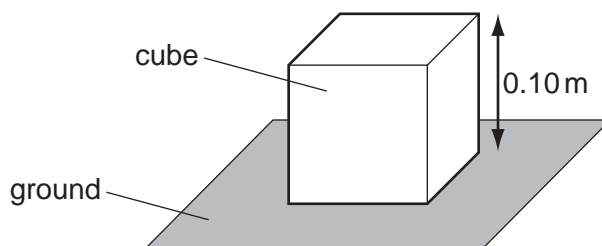
✓ = yes

x = no

27 Which is **not** a colloid?

- A cellulose
- B milk
- C paint
- D smoke

- 28 One side of a cube stands on the ground.



The cube weighs 200 N and its sides are 0.10 m long.

How much pressure does the cube exert on the ground?

- A** 2.0 Pa      **B** 20 Pa      **C** 2000 Pa      **D** 20 000 Pa
- 29 A student needs to find the density of a large cubic block of wood.
- Which two pieces of apparatus should she use?
- A** balance and metre rule  
**B** balance and thermometer  
**C** measuring cylinder and metre rule  
**D** measuring cylinder and thermometer
- 30 In an experiment, a student measures the time taken for an object to fall to the ground. He carries out the experiment ten times. The table shows his results.

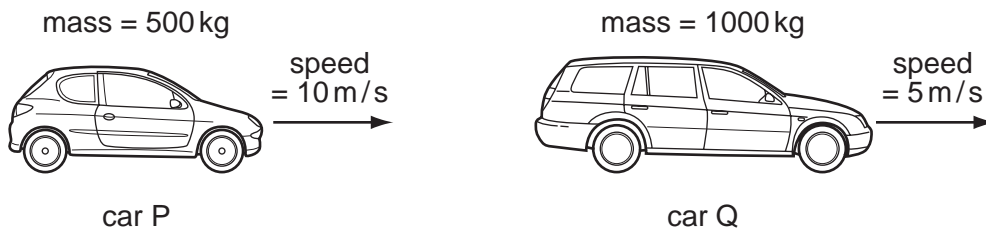
time/s	26.4	26.8	26.4	24.4	24.0	26.8	25.4	23.4	26.4	24.0
--------	------	------	------	------	------	------	------	------	------	------

Which value should the student use?

- A** 24.0 s      **B** 25.4 s      **C** 26.4 s      **D** 26.8 s
- 31 Which group contains only secondary colours of light?

- A** cyan, green, magenta  
**B** cyan, green, yellow  
**C** green, magenta, yellow  
**D** yellow, cyan, magenta

32 Two cars have different masses and different speeds as shown.



How do the momentum and the kinetic energy of the two cars compare?

	momentum	kinetic energy
<b>A</b>	P greater than Q	P less than Q
<b>B</b>	P equal to Q	P greater than Q
<b>C</b>	P equal to Q	P equal to Q
<b>D</b>	P less than Q	P equal to Q

33 A satellite orbits the Earth.

Is the satellite in a gravitational field and is the satellite in a magnetic field?

	a gravitational field	a magnetic field
<b>A</b>	✓	✓
<b>B</b>	✓	✗
<b>C</b>	✗	✓
<b>D</b>	✗	✗

key

✓ = in field

✗ = not in field

34 What is meant by the current in a wire?

- A** the charge flowing through the wire per second
- B** the energy the wire can transfer elsewhere per second
- C** the power the wire can produce per second
- D** the work the wire does per second

- 35 An electronic circuit is used as a temperature detector.



The current in the detector is small. The detector operates a component that allows it to control a larger current in a heater.

Which component is suitable?

- A a diode
  - B a dynamo
  - C a reed relay
  - D a transformer
- 36 Microphones and earphones are both used with audio equipment.

Which energy change takes place in a microphone and which takes place in an earphone?

	microphone	earphone
<b>A</b>	electrical to sound	electrical to sound
<b>B</b>	electrical to sound	sound to electrical
<b>C</b>	sound to electrical	electrical to sound
<b>D</b>	sound to electrical	sound to electrical

- 37 Electrical energy from a power station is used a long distance away from it.

Which row shows the type of current needed and the device used for efficient transmission?

	type of current	device
<b>A</b>	alternating	dynamo
<b>B</b>	alternating	transformer
<b>C</b>	direct	dynamo
<b>D</b>	direct	transformer

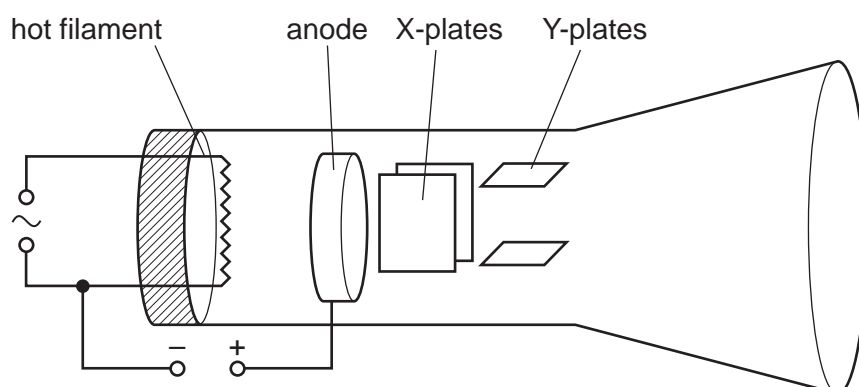
- 38 Which process is used in a nuclear power station and which nuclear change happens in this process?

	process used	nuclear change
<b>A</b>	fission	heavy nuclei split
<b>B</b>	fission	light nuclei join together
<b>C</b>	fusion	heavy nuclei split
<b>D</b>	fusion	light nuclei join together

- 39 Which row describes the properties of beta radiation?

	electromagnetic	ionising	
<b>A</b>	✓	✓	key
<b>B</b>	✓	x	✓ = yes
<b>C</b>	x	✓	x = no
<b>D</b>	x	x	

- 40 The diagram shows the basic structure of a cathode-ray tube in an oscilloscope.



From which component do the cathode rays start?

- A** the anode
- B** the hot filament
- C** the X-plates
- D** the Y-plates



**DATA SHEET**  
**The Periodic Table of the Elements**

		Group										
I	II	III	IV	V	VI	VII	0					
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12											20 <b>Ne</b> Neon 10
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20											40 <b>Ar</b> Argon 18
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38											84 <b>Kr</b> Krypton 36
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56											131 <b>Xe</b> Xenon 54
	226 <b>Ra</b> Radium 88											227 <b>Ac</b> Actinium 89 †

5 <b>B</b> Boron 5	11 <b>B</b> Boron 5	6 <b>C</b> Carbon 6	12 <b>C</b> Carbon 6	7 <b>N</b> Nitrogen 7	14 <b>N</b> Nitrogen 7	8 <b>O</b> Oxygen 8	16 <b>O</b> Oxygen 8	9 <b>F</b> Fluorine 9	19 <b>F</b> Fluorine 9	2 <b>He</b> Helium 2
27 <b>Al</b> Aluminium 13	27 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	28 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	31 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	32 <b>S</b> Sulfur 16	17 <b>Cl</b> Chlorine 17	35.5 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18
31 <b>Ga</b> Gallium 31	31 <b>Ga</b> Gallium 31	32 <b>Ge</b> Germanium 32	73 <b>Ge</b> Germanium 32	33 <b>As</b> Arsenic 33	75 <b>As</b> Arsenic 33	34 <b>Se</b> Selenium 34	79 <b>Se</b> Selenium 34	35 <b>Br</b> Bromine 35	80 <b>Br</b> Bromine 35	36 <b>Kr</b> Krypton 36
49 <b>In</b> Indium 49	49 <b>In</b> Indium 49	48 <b>Cd</b> Cadmium 48	112 <b>Cd</b> Cadmium 48	51 <b>Sb</b> Antimony 51	122 <b>Sb</b> Antimony 51	52 <b>Te</b> Tellurium 52	128 <b>Te</b> Tellurium 52	53 <b>I</b> Iodine 53	127 <b>I</b> Iodine 53	54 <b>Xe</b> Xenon 54
81 <b>Tl</b> Thallium 81	81 <b>Tl</b> Thallium 81	80 <b>Hg</b> Mercury 80	201 <b>Hg</b> Mercury 80	83 <b>Bi</b> Bismuth 83	209 <b>Bi</b> Bismuth 83	84 <b>Po</b> Polonium 84	209 <b>Po</b> Polonium 84	85 <b>At</b> Astatine 85	210 <b>At</b> Astatine 85	86 <b>Rn</b> Radon 86

58 <b>Ce</b> Cerium 58	140 <b>Ce</b> Cerium 58	59 <b>Pr</b> Praseodymium 59	141 <b>Pr</b> Praseodymium 59	60 <b>Nd</b> Neodymium 60	144 <b>Nd</b> Neodymium 60	61 <b>Pm</b> Promethium 61	145 <b>Pm</b> Promethium 61	62 <b>Sm</b> Samarium 62	150 <b>Sm</b> Samarium 62	63 <b>Eu</b> Europium 63	152 <b>Eu</b> Europium 63	64 <b>Gd</b> Gadolinium 64	157 <b>Gd</b> Gadolinium 64	65 <b>Tb</b> Terbium 65	159 <b>Tb</b> Terbium 65	66 <b>Dy</b> Dysprosium 66	162 <b>Dy</b> Dysprosium 66	68 <b>Er</b> Erbium 68	167 <b>Er</b> Erbium 68	69 <b>Tm</b> Thulium 69	169 <b>Tm</b> Thulium 69	70 <b>Yb</b> Ytterbium 70	173 <b>Yb</b> Ytterbium 70	71 <b>Lu</b> Lutetium 71	175 <b>Lu</b> Lutetium 71		
90 <b>Th</b> Thorium 90	232 <b>Th</b> Thorium 90	91 <b>Pa</b> Protactinium 91	231 <b>Pa</b> Protactinium 91	92 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	93 <b>Np</b> Neptunium 93	237 <b>Np</b> Neptunium 93	94 <b>Pu</b> Plutonium 94	244 <b>Pu</b> Plutonium 94	95 <b>Am</b> Americium 95	243 <b>Am</b> Americium 95	96 <b>Cm</b> Curium 96	247 <b>Cm</b> Curium 96	97 <b>Bk</b> Berkelium 97	247 <b>Bk</b> Berkelium 97	98 <b>Cf</b> Californium 98	251 <b>Cf</b> Californium 98	99 <b>Es</b> Einsteinium 99	252 <b>Es</b> Einsteinium 99	100 <b>Fm</b> Fermium 100	257 <b>Fm</b> Fermium 100	101 <b>Md</b> Mendelevium 101	288 <b>Md</b> Mendelevium 101	102 <b>No</b> Nobelium 102	289 <b>No</b> Nobelium 102	103 <b>Lr</b> Lawrencium 103	262 <b>Lr</b> Lawrencium 103

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

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

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