



# **Cambridge Lower Secondary Sample Test**

## **For use with curriculum published in September 2020**

# **Science Paper 1**

## **Stage 7**

**45 minutes**

Name .....

No additional materials are needed.

### **INSTRUCTIONS**

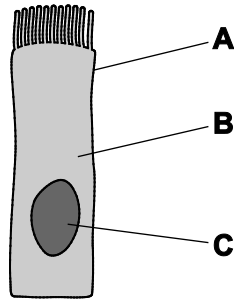
- Answer **all** questions.
- Write your answer to each question in the space provided.
- You should show all your working on the question paper.

### **INFORMATION**

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

1 The human body is made of different types of cells.

(a) Look at the diagram of a ciliated cell.



Name structures **A**, **B** and **C**.

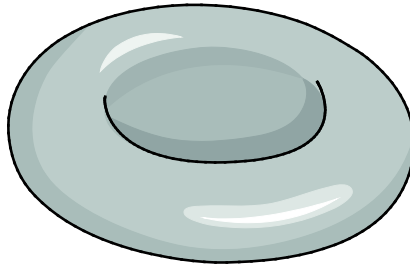
**A** .....

**B** .....

**C** .....

[3]

(b) A red blood cell is adapted to carry oxygen in the human body.



red blood cell

Describe **two** ways a red blood cell is adapted to carry oxygen in the human body.

Give an explanation for each adaptation.

adaptation .....

explanation .....

.....

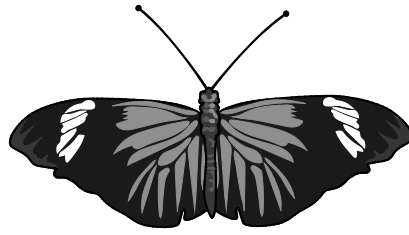
adaptation .....

explanation .....

.....

[4]

2 The diagram shows a species of butterfly.



Tick (✓) the correct box which gives a description of the word **species**.

The butterflies breed together and **all** their offspring are female.

The butterflies breed together but do **not** produce offspring.

The butterflies breed together and produce fertile offspring.

The butterflies breed together and produce offspring that are **not** fertile.

[1]

3 Pierre and Blessy test five substances, **A**, **B**, **C**, **D** and **E**, with three different indicators.

They use these indicators:

- blue litmus
- methyl orange
- thymolphthalein.

Pierre and Blessy use this information about the different indicators to sort the substances into acidic, neutral or alkaline.

indicator	acidic	neutral	alkaline
blue litmus	red	blue	blue
methyl orange	red	yellow	yellow
thymolphthalein	colourless	colourless	blue

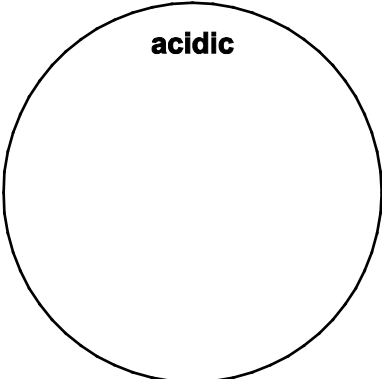
Here are their results.

indicator	substance				
	A	B	C	D	E
blue litmus	blue	red	blue	blue	red
methyl orange	yellow	red	yellow	yellow	red
thymolphthalein	blue	colourless	blue	colourless	colourless

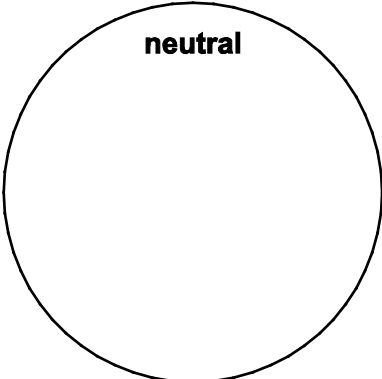
Sort the substances **A**, **B**, **C**, **D** and **E** into three groups: acidic, neutral and alkaline.

Put the letter of each substance into the correct circle.

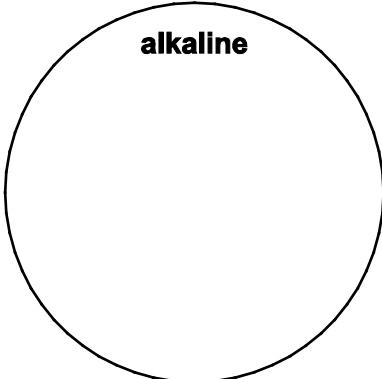
**acidic**



**neutral**



**alkaline**



[2]

- 4 Hazard symbols warn about the dangers of a substance.

Draw a line to match each **hazard symbol** to its correct **description**.

**hazard symbol**



**description**

oxidising

toxic

irritant

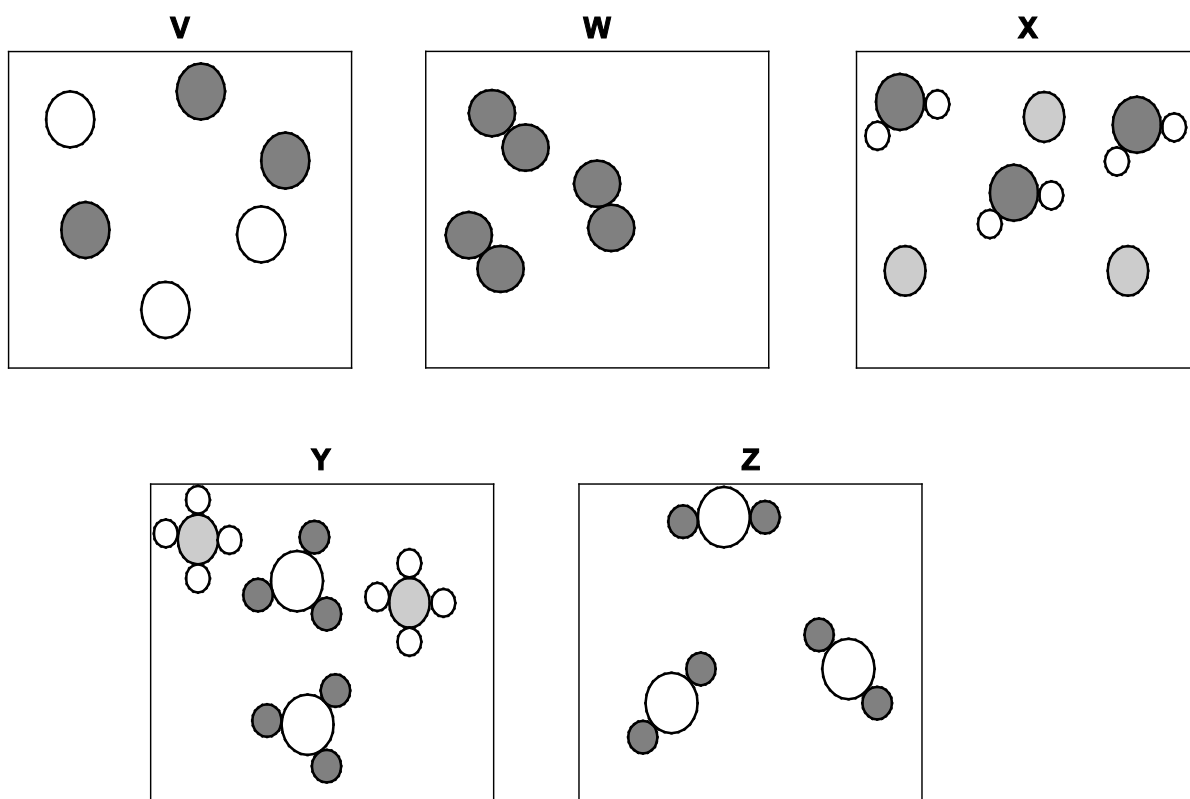
highly flammable

corrosive

[4]

- 5 The particle model is used to represent whether substances are elements, compounds or mixtures.

Look at the particle models for different substances **V**, **W**, **X**, **Y** and **Z**.



- (a) Put ticks (✓) in the table to show which description each particle model represents.

One has been done for you.

description	particle model				
	V	W	X	Y	Z
one compound					
one element		✓			
mixture of two elements					
a mixture of a compound and an element					
mixture of two compounds					

[4]

(b) One of the particle models represents the gas carbon dioxide.

Describe how to test for carbon dioxide.

test .....

observation for a positive result .....

..... [2]

(c) One of the particle models represents the gas hydrogen.

Describe how to test for hydrogen.

test .....

observation for a positive result .....

..... [2]

6 Safia investigates the effect of the number of earthworms on the rate of decay of dead leaves.

Safia:

- measures the mass of some dead leaves
- places the dead leaves in a container
- adds **five** earthworms
- measures the mass of the dead leaves after one week
- repeats with a different number of earthworms.

(a) Write down two **control** variables in her investigation.

1 .....

2 .....

..... [2]

(b) What is the **independent** variable in her investigation?

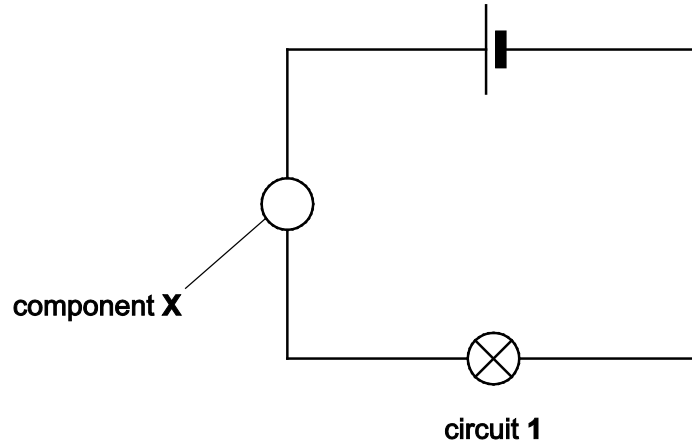
..... [1]

(c) What is the **dependent** variable in her investigation?

..... [1]

7 Mike and Oliver investigate the current flowing in different series circuits.

(a) Here is series circuit 1.



Component **X** measures the current.

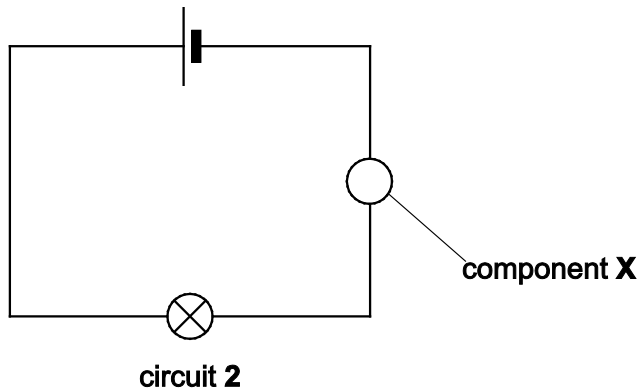
(i) Name component **X**.

..... [1]

(ii) What is the unit for current?

..... [1]

(b) Mike and Oliver move component **X** to make series circuit 2.



What happens to the reading of component **X** in circuit 2 compared to circuit 1?

.....

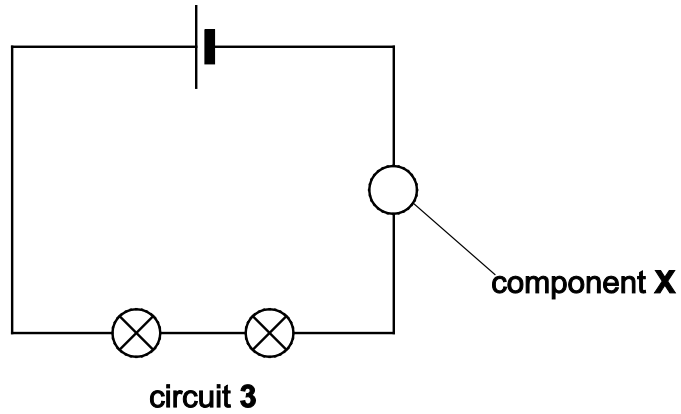
Use ideas about electrons to explain your answer.

.....  
 .....  
 .....

[2]



(c) Mike and Oliver add a lamp to series circuit 2 to make series circuit 3.



What happens to the reading of component **X** in circuit **3** compared to circuit **2**?

.....

Explain your answer.

.....

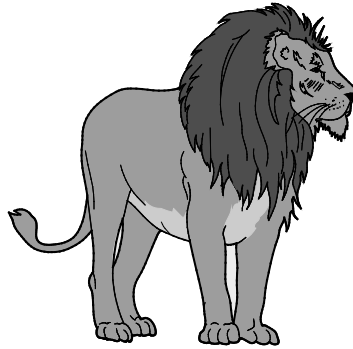
.....

.....

[1]

8 Lily and Mia are discussing living and non-living organisms.

(a) Lily and Mia both think that a lion is a living organism.



They are both correct.

Give **two** reasons why a lion is a living organism.

- 1 .....
- 2 .....

[2]

(b) Lily thinks that a virus is a living organism.

Mia does **not** agree with Lily.

Explain why Lily and Mia both think they are correct.

.....

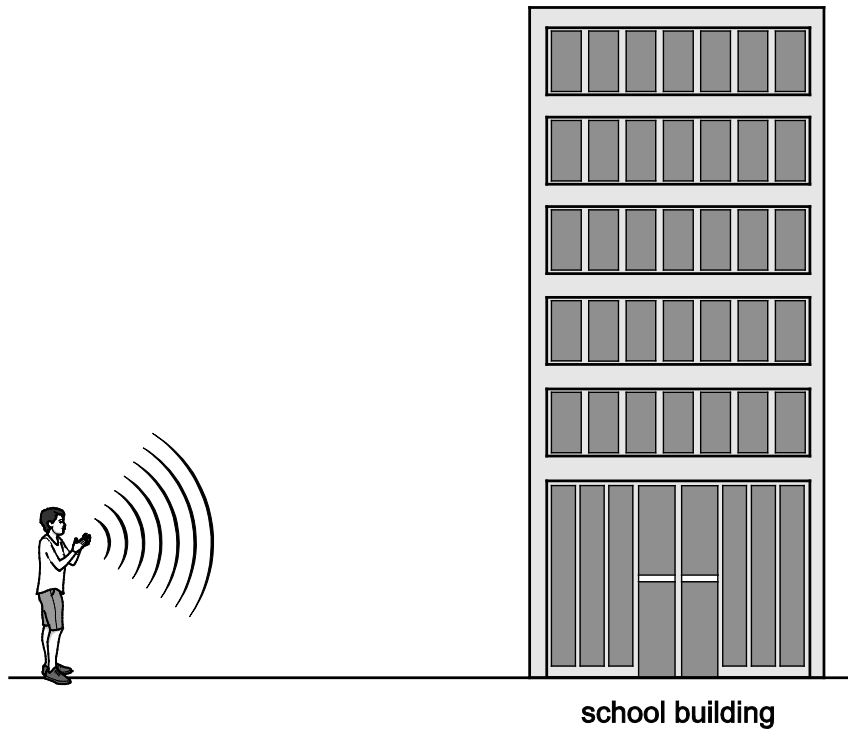
.....

.....

.....

[2]

## 9 Carlos investigates echoes.



Carlos:

- stands outside his school
- measures the distance between himself and the school
- claps his hands
- records the time it takes for him to hear the echo
- repeats this at different distances from the school.

(a) Why does Carlos hear an echo when he claps his hands?

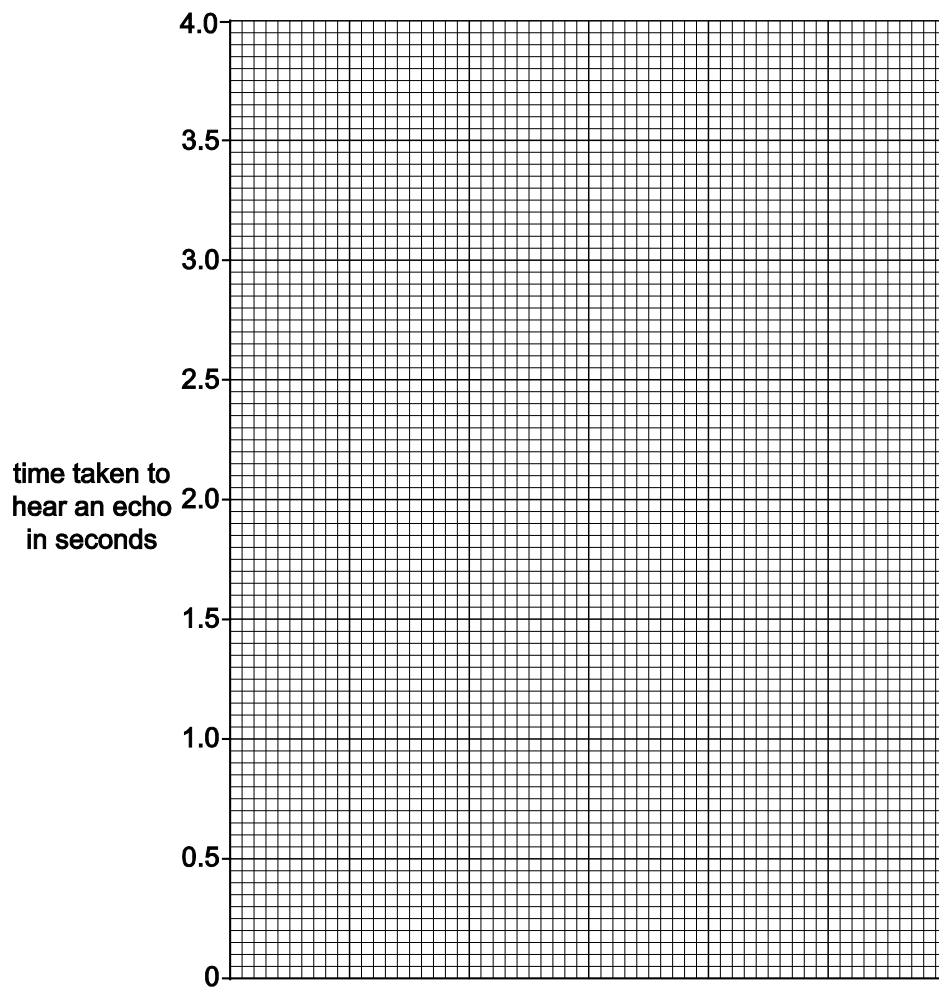
.....

..... [2]

(b) Here are his results.

distance between Carlos and the school in metres	time taken to hear an echo in seconds
170	1.0
255	1.5
340	2.0
425	3.5
510	3.0
595	3.5

- (i) Plot the data on the grid:
- choose a suitable scale for the x-axis
  - label the x-axis
  - plot all the results.



.....

[3]

(ii) Which one of the results is anomalous?

..... [1]

(iii) Draw a straight line of best fit for the results you have plotted.

Ignore the anomalous result. [1]

(iv) Describe the trend shown in the graph.

.....  
..... [1]

(c) Carlos stands 200 m from the school.

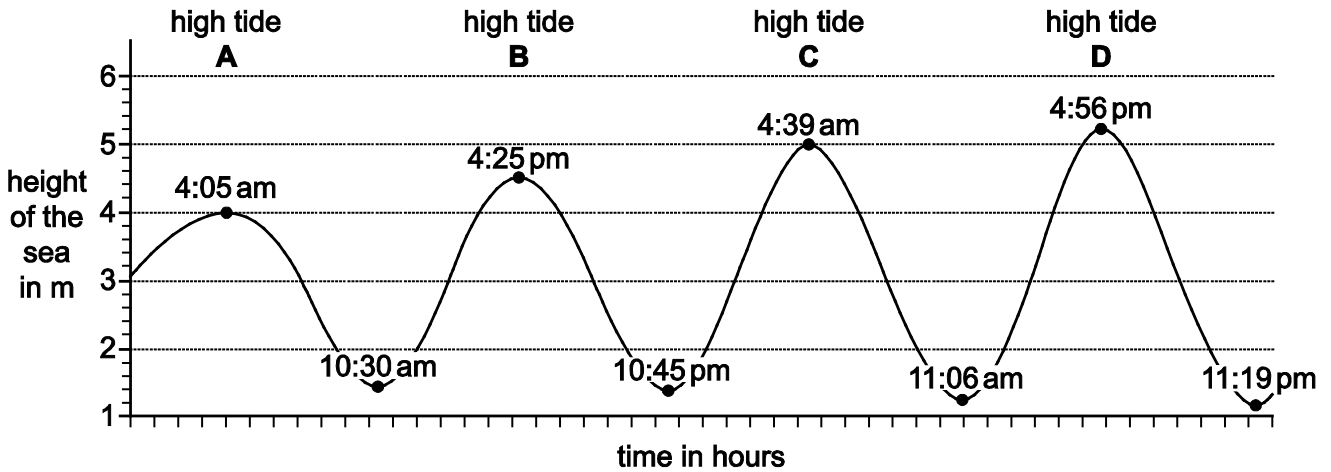
(i) Use the graph to find the time it takes for Carlos to hear the echo.

..... [1]

(ii) Use your answer to (c)(i) to calculate the time it takes the echo to travel from the school to Carlos.

..... [1]

10 The graph shows the tide times for a town on the coast over a period of two days.



(a) There are four high tides on the graph, **A**, **B**, **C** and **D**.

Put the high tides in order from the highest height of the sea to the lowest height of the sea.

..... [1]

(b) Rajiv thinks that low tides are exactly 12 hours apart.

Is Rajiv correct? .....

Use the graph to explain your answer.

.....  
 ..... [1]

(c) What is the difference in the height of the sea between high tide at 4.39 am and low tide at 11.06 am?

..... [1]

(d) Explain what causes high tides.

.....  
 .....  
 ..... [2]



## 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	<table border="1"> <thead> <tr> <th colspan="3">Key</th> </tr> <tr> <th>atomic number</th> <th>atomic symbol</th> <th>relative atomic mass</th> </tr> </thead> <tbody> <tr> <td>1</td> <td><b>H</b></td> <td>hydrogen 1</td> </tr> </tbody> </table>								Key			atomic number	atomic symbol	relative atomic mass	1	<b>H</b>	hydrogen 1	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	13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulphur 32	17 <b>Cl</b> chlorine 35.5	18 <b>Ar</b> argon 40	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 —	113 <b>Nh</b> nihonium —	114 <b>Fl</b> flerovium —	115 <b>Mc</b> moscovium —	116 <b>Lv</b> livermorium —	117 <b>Ts</b> tennessine —	118 <b>Og</b> oganeson —
Key																																																																																																								
atomic number	atomic symbol	relative atomic mass																																																																																																						
1	<b>H</b>	hydrogen 1																																																																																																						

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.).