

Monday 21 May 2012 – Morning

**GCSE GATEWAY SCIENCE
ADDITIONAL SCIENCE B**

B624/01 Unit 2 Modules B4 C4 P4 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Duration: 1 hour



Candidate
forename

Candidate
surname

Centre number

Candidate number

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

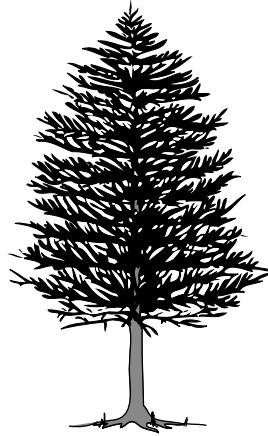
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

Answer **all** the questions.

Section A – Module B4

- 1** Pine tree forests cover large parts of Canada.



- (a)** Pine trees make food by photosynthesis.

- (i)** Which part of the pine tree has the most cells that photosynthesise?

..... [1]

- (ii)** Small green structures inside plant cells absorb light energy for photosynthesis.

Write down the name of these structures.

..... [1]

- (iii)** For photosynthesis, the pine trees need water and carbon dioxide.

Put ticks (✓) in **two** boxes to show where these substances enter the tree.

water enters through leaf pores

☐

carbon dioxide enters through leaf pores

☐

water enters through roots

☐

carbon dioxide enters through roots

☐

water enters through flowers

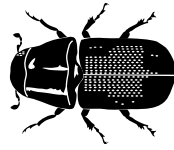
☐

carbon dioxide enters through flowers

☐

[2]

- (b) Small beetles are killing many of the pine trees in Canada.



The mountain pine beetle feeds from the tubes in the tree that transport sugar.

The beetle also infects the tree with a fungus.

This fungus blocks up the xylem vessels in the tree trunk.

This kills the tree.

- (i) Write down the name of the tubes from which the beetle feeds.

..... [1]

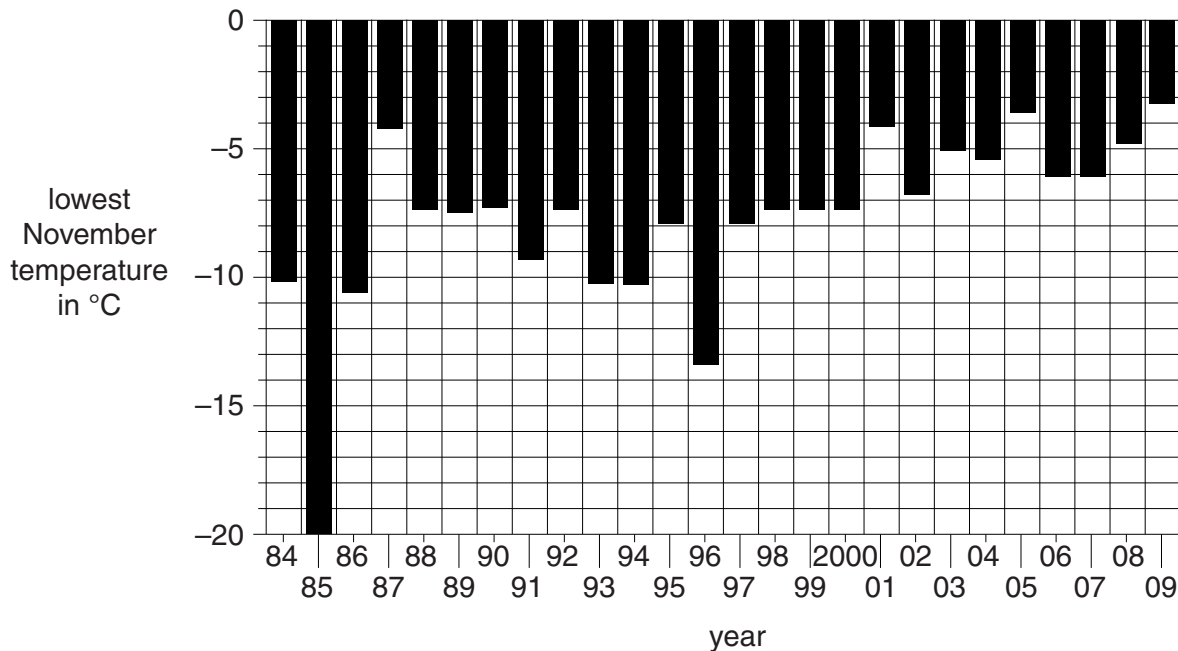
- (ii) The dead trees are used for fuel and burned.

Write down **one other** type of biomass that is burned for fuel.

..... [1]

- (c) Many of the beetles are killed if temperatures drop below -6°C in November.

The graph shows the lowest November temperature in the pine forest each year from 1984 to 2009.



- (i) In 1988 there was a large increase in the number of beetles, but the number soon decreased.

Use the graph to work out in which year there was a big increase in numbers again.

..... [1]

- (ii) The recent increase in numbers has lasted for a number of years.

Scientists are worried that it might continue for many more years.

Use the graph to suggest why.

.....

 [2]

- (d) The scientists are planning to use biological control to save the pine trees.

They are releasing another type of beetle called the clerid beetle into the forests.

Suggest how this beetle acts as a biological control.

..... [1]

[Total: 10]

2 Bill grows lettuces on his farm.

(a) He finds that slugs and birds are eating the lettuces.

Hedgehogs are eating the slugs.

(i) The lettuces are **producers** in this feeding relationship.

What is meant by the word producer?

..... [1]

(ii) Sketch a **pyramid of biomass** to represent these feeding relationships.

Write the names of the organisms in the correct boxes in the pyramid.

[2]

(b) Bill tries a new way of growing lettuces.

He grows them in tanks without soil.

Water containing minerals is pumped through the tanks.

What name is given to this method of growing lettuces without soil?

Put a ring around the correct answer in this list.

battery farming

crop rotation

hydroponics

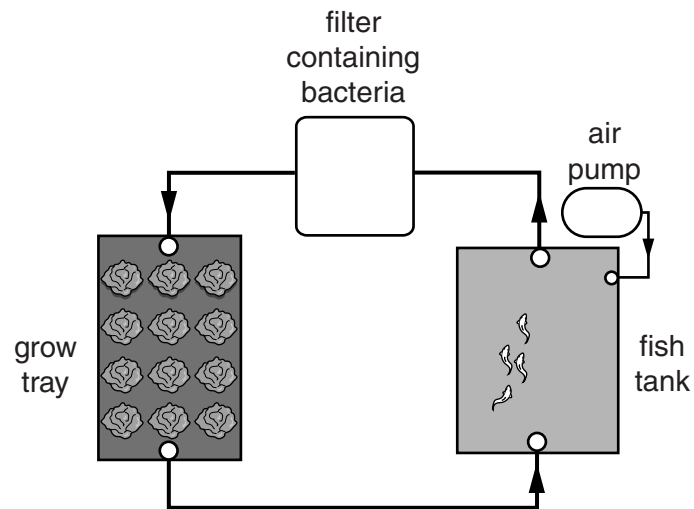
transpiration [1]

(c) The diagram shows the equipment that Bill uses.

He keeps fish in a tank and then circulates the water through a filter containing bacteria.

The fish make waste.

The bacteria convert the waste into minerals needed by the lettuce.



(i) Which part of the lettuce plant takes up the minerals?

..... [1]

(ii) Bill adds a chemical to the water that will kill pests.

Suggest **one** reason why he wants to kill pests.

..... [1]

[Total: 6]

3 Read this information about preserving food.



In the 18th century, Napoleon was travelling in hot countries with his army.

The food often started to rot because of the hot conditions.

The French government offered a large sum of money to anybody who could find a way to stop the food rotting.

Nicolas Appert solved the problem.

He put food into glass bottles and used steam to heat the bottles to high temperatures.

He then removed the steam and quickly sealed each bottle with a cork and wax.

Appert won the prize and set up his own factory.

- (a) Write down **one** type of microorganism that caused Napoleon's food to rot.

..... [1]

- (b) Explain why Appert needed to seal each bottle after heating it with steam.

.....
 [1]

- (c) The principle used in Appert's method is still used in one type of food preservation.

Draw a straight line to join each **type of food preservation** to the **principle** that it uses.

type of food preservation	principle
drying	Appert's method
canning	adding vinegar
pickling	removing water

[2]

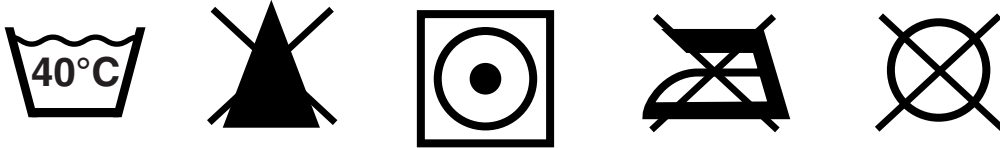
[Total: 4]

Section B – Module C4

4 Miles is doing the washing.

He washes a shirt.

Look at the wash label on his shirt.



(a) What do these symbols tell you about how Miles should wash, dry and iron his shirt?

.....

.....

.....

..... [3]

(b) Miles washes his shirt at a low temperature.

This saves him money.

Write down one **other advantage** of washing clothes at lower temperatures.

..... [1]

(c) Miles uses a biological washing powder that contains **enzymes**.

What is the job of the enzymes in the washing powder?

.....

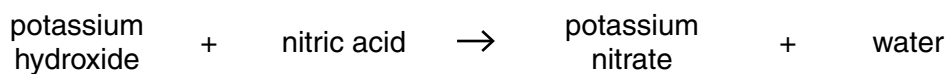
..... [1]

[Total: 5]

- 5 Kylie makes a fertiliser called potassium nitrate.

She adds an alkali called potassium hydroxide to nitric acid.

Look at the word equation.



- (a) What is the name of this **type** of reaction?

Choose from this list.

catalysis

neutralisation

precipitation

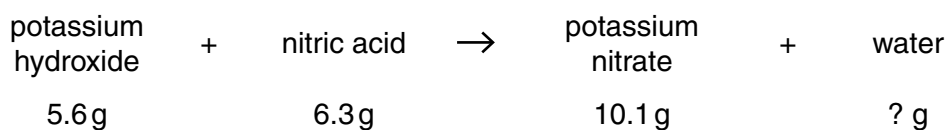
reversible

answer

[1]

- (b) Kylie uses 5.6 g of potassium hydroxide and 6.3 g of nitric acid.

She makes 10.1 g of potassium nitrate.



- (i) What mass of water does she make?

answer g

[1]

- (ii) Kylie does the experiment again.

This time she uses 16.8 g of potassium hydroxide and 18.9 g of nitric acid.

Calculate the mass of potassium nitrate she will make.

.....

answer g

[1]

- (iii) Kylie does the experiment a third time.

She expects to make 5.5 g of potassium nitrate.

She actually makes 4.4 g.

Show by calculation that her percentage yield is 80%.

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

- (c) The formula for potassium nitrate is KNO_3 .

Which essential element for plant growth is **not** in potassium nitrate?

..... [1]

- (d) Farmers add fertilisers to their fields.

This is so they can make more money from their crops.

Write about why adding fertilisers will make more money for the farmer.

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

[Total: 8]

- 6 Carbon exists in three solid forms at room temperature.

These are diamond, graphite and buckminsterfullerene.

- (a) Match each **form of carbon** with its **properties**.

Draw only three straight lines.

form of carbon	properties
diamond	hard with a high melting point
graphite	black solid which dissolves in petrol to make a red solution
buckminsterfullerene	conducts electricity

[2]

- (b) Diamond is used for making jewellery.

Write down **one other** use of diamond.

..... [1]

- (c) Graphite is used to make pencil leads.

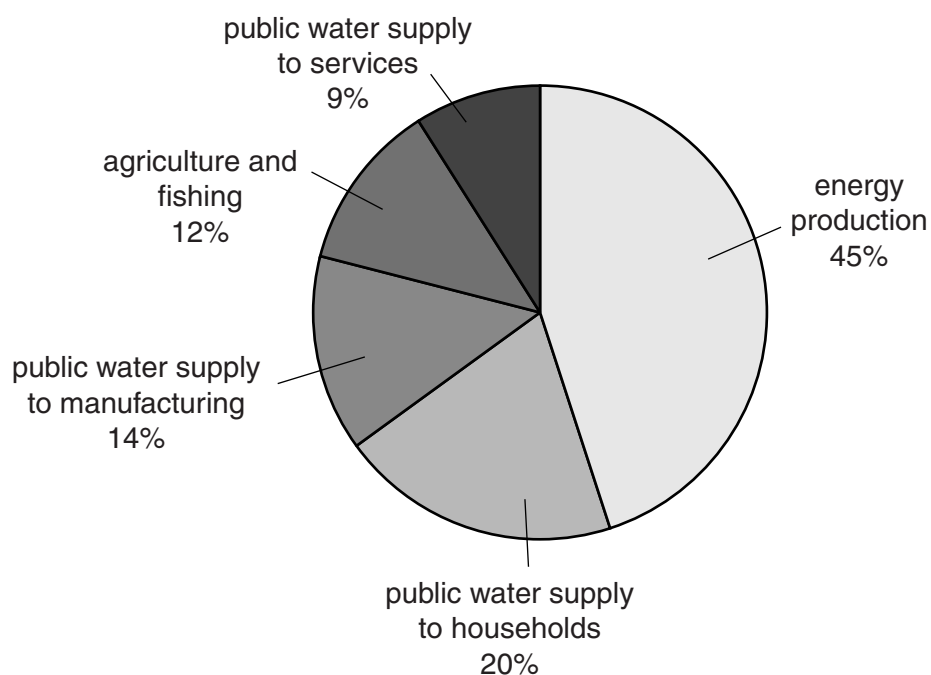
Explain why.

.....

 [2]

[Total: 5]

- 7 Look at the pie chart. It shows the total use of water in the UK in 2005.



- (a) Which sector used the **greatest** percentage of water?

..... [1]

- (b) What is the **total** percentage of water used for the public water supply?

..... [1]

[Total: 2]

Section C – Module P4

- 8 This question is about static electricity.

Danni combs her hair.



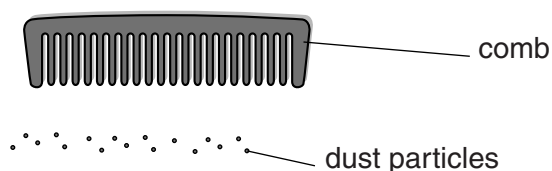
- (a) Both the comb and her hair become **charged**.

Complete this sentence.

If Danni's hair has a charge then the comb has
a charge. [2]

- (b) She places the comb near some dust particles.

The dust particles are **uncharged**.



- (i) What happens to the dust particles?

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

- (ii) Describe how this idea can be useful in the **home**.

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

(c) Write about two **other** uses of static electricity.

1

.....

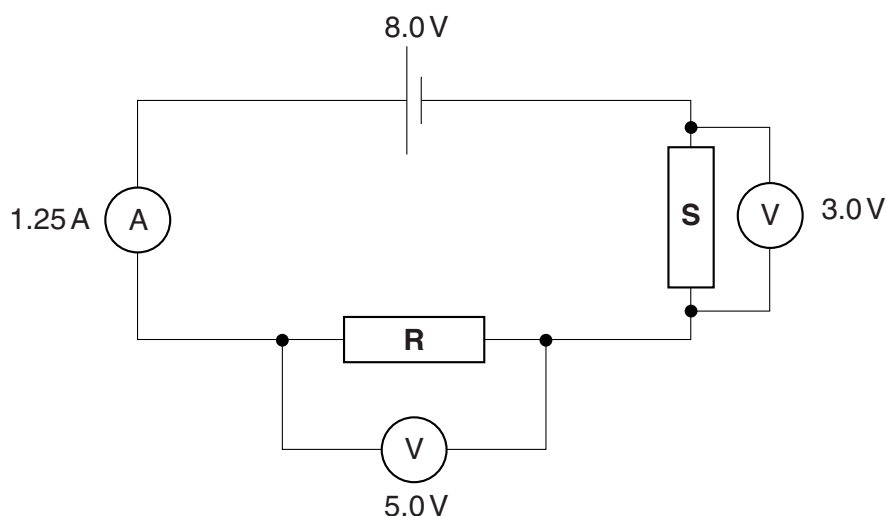
2

..... [2]

[Total: 6]

9 Ramiz is investigating electrical circuits.

He builds a circuit with two resistors in it.



(a) Ramiz measures

- the current in the circuit
- the voltage across each resistor.

Calculate the **resistance** of resistor **R**.

The equations on page 2 may help you.

.....

.....

.....

resistance of **R** = ohms (Ω) [2]

(b) (i) Ramiz adds another identical cell to his circuit.

This doubles the supply voltage.

This increases the current flowing through the resistor.

What happens to the **value** of the **voltage** across resistor **R**?

.....

..... [1]

- (ii) He adds a third resistor to the circuit.

It is placed in series with the other resistors.

What happens to the current in the circuit?

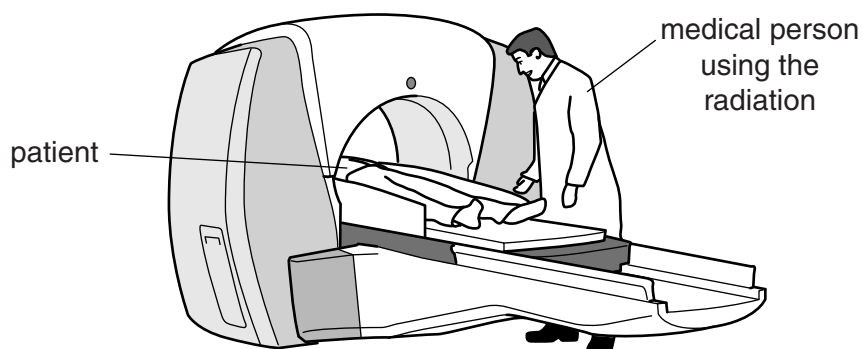
.....
..... [1]

[Total: 4]

10 Radioactive isotopes emit nuclear radiation.

Nuclear radiation has many uses in hospitals.

One use is as a **tracer**.



(a) Write about the **other** uses of nuclear radiation in hospitals.

In your answer, include the

- name given to the medical **person** using the radiation
- **other** uses of radioactive isotopes in hospitals
- **type** of radiation used.

.....

.....

.....

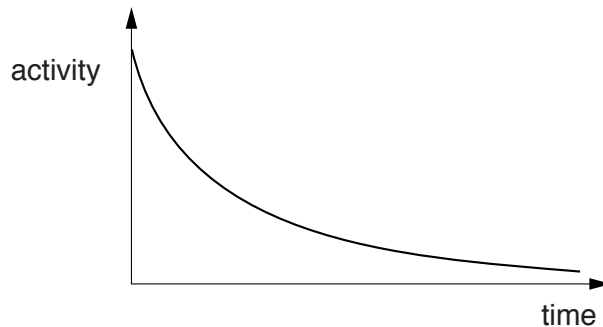
.....

..... [3]

(b) When a tracer is put into a patient it is tracked around the body.

(i) Tracers are radioactive.

The graph shows how the activity (radioactivity) of a tracer changes over time.



Use the graph to describe what happens to the activity of the tracer over time.

.....
 [1]

(ii) Nuclear radiation comes from part of an unstable atom.

Write down the name of this **part** of the atom.

..... [1]

(c) Complete the sentences using phrases from this list.

a beta particle

a gamma ray

an X-ray

an alpha particle

An unstable atom emits a helium nucleus.

Scientists call this helium nucleus

An unstable atom emits a fast moving electron.

Scientists call this fast moving electron [2]

[Total: 7]

11 Ultrasound is used in hospitals.

(a) Look at the statements about ultrasound.

Put ticks (✓) in the boxes beside the **three** correct statements.

it is used to measure blood flow

☐

it is used to sterilise hospital equipment

☐

it is a longitudinal wave

☐

it is used to break up kidney stones

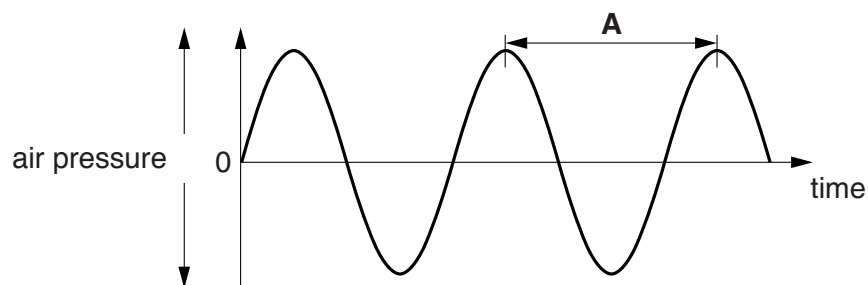
☐

it is an electromagnetic wave

☐

[2]

(b) Ultrasound waves can be shown as a wave diagram.



What feature of the wave is shown by the letter **A**?

..... [1]

[Total: 3]

END OF QUESTION PAPER

21
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The Periodic Table of the Elements

24

1	2	Key										3	4	5	6	7	0	
		relative atomic mass atomic symbol name atomic (proton) number																
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	63.5 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	[98] 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	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86	
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated							

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.