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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

B622/01

GATEWAY SCIENCE

SCIENCE B

Unit 2 Modules B2 C2 P2 (Foundation Tier)

WEDNESDAY 15 JUNE 2011: Morning

DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **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).**
- **Answer ALL the questions.**

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 three.**
- **The Periodic Table is provided.**
- **The total number of marks for this paper is 60.**

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

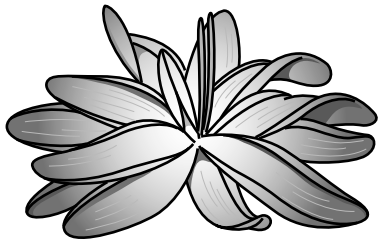
$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

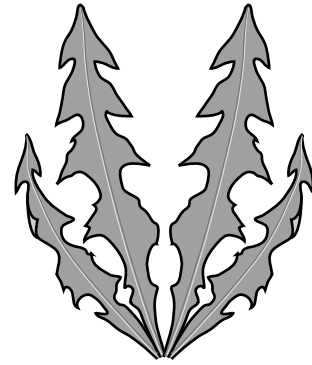
Answer ALL the questions.

SECTION A – MODULE B2

- 1 Michaela finds two types of plants growing near her school.**



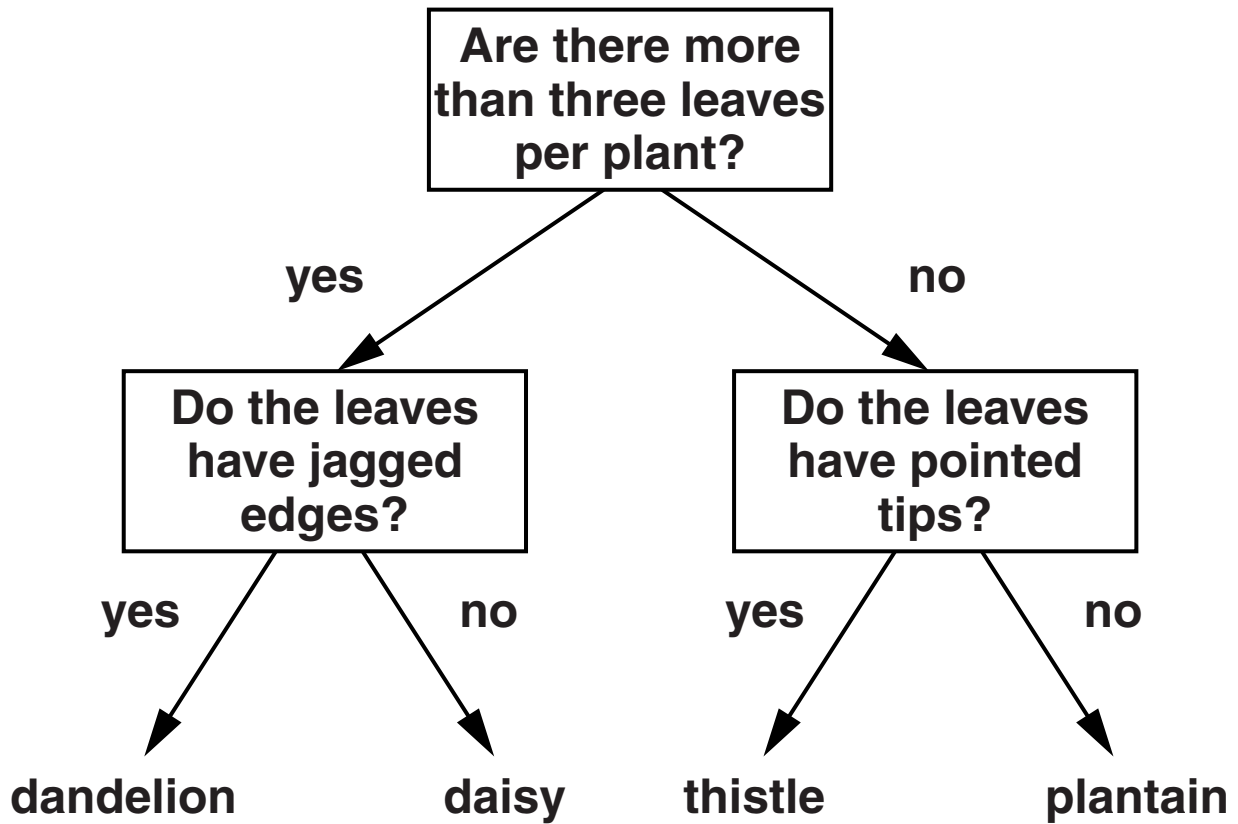
plant A



plant B

(a) She wants to identify the two plants.

Her teacher writes a key to help her to do this.



Use the key to identify plants A and B.

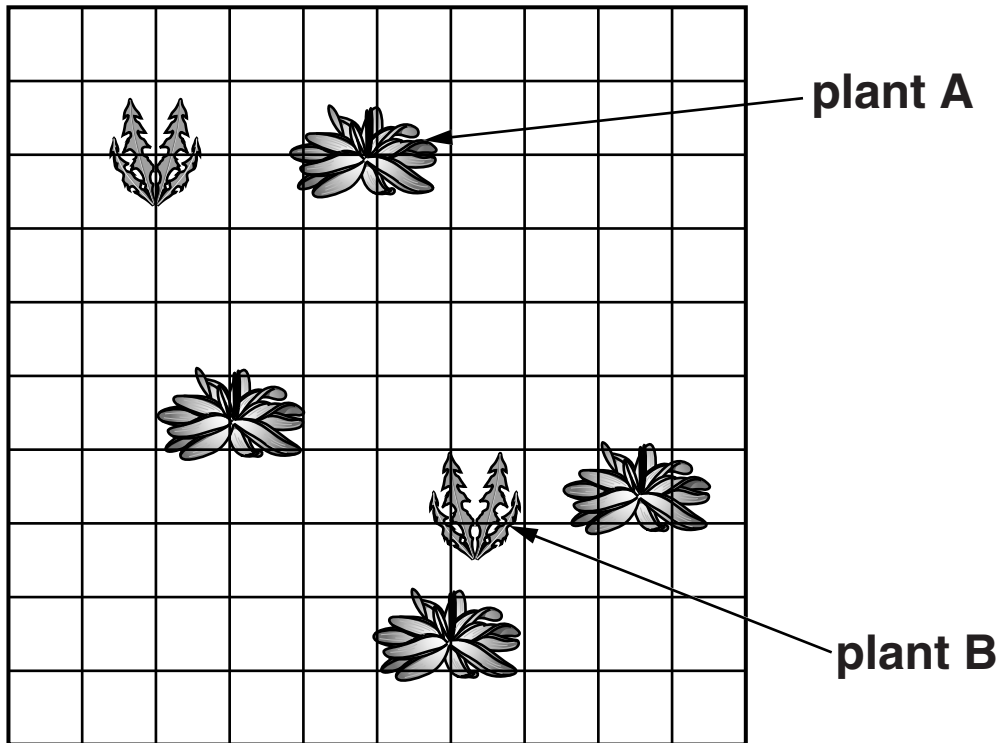
plant A is a _____

plant B is a _____

[2]

(b) Michaela then wants to estimate how many there are of each type of plant.

The equipment she uses to count the plants is a square grid.



(i) What is the name of the square grid that Michaela uses?

_____ [1]

(ii) Michaela thinks that the two types of plant might compete with each other.

Write down ONE thing that they might compete for.

_____ [1]

(iii) Michaela thinks that plant A is out-competing plant B.

Look at the diagram.

What evidence is there for her idea?

_____ [1]

(c) Michaela makes some notes about how the two plants make food.

Complete the sentences by writing one word in each space.

The two plants make food by a process called

_____ .

They need a green chemical called

_____ to make food.

The process makes sugar and releases a gas

called _____ .

The plants make more food and grow faster in the

summer because there is more

_____ . [4]

[Total: 9]

2 Polar bears live in the arctic.

They are predators, feeding on seals that live under the ice.

(a) Polar bears have white fur.

Suggest why their fur is white.

_____ [1]

(b) Polar bears have small ears.

How does this help them to live in the arctic?

_____ [1]

- (c) Scientists are worried that the number of polar bears might be going down.**

There have been very few attempts to count the number of polar bears.

You have been provided with a graph on a separate sheet. It shows the results of three studies in one large area in the arctic.

- (i) The three studies give different possible ranges for the number of polar bears.**

Write down the largest and smallest possible number of polar bears found by any of the studies.

largest number _____

smallest number _____ [1]

- (ii) What name is given to an area where an organism such as a polar bear lives?**

Choose your answer from the list.

CLIMATE COMMUNITY HABITAT POPULATION

answer _____ [1]

(d) The level of carbon dioxide in the air is increasing.

Scientists are worried that this might cause polar bears to become ENDANGERED.

(i) What does endangered mean?

_____ [1]

(ii) Suggest how the increasing level of carbon dioxide could affect the polar bears.

_____ [2]

[Total: 7]

3 Scientists have recently discovered some fossil bones in Georgia in Eastern Europe.

The fossils may be from a human ancestor and are 1.8 million years old.

The scientists have modelled what they think the human ancestor looked like when it was alive.

(a) Which TWO groups did the human ancestor belong to?

Draw ONE line to link the correct group in COLUMN ONE to the correct group in COLUMN TWO.

COLUMN ONE	COLUMN TWO
vertebrate	fish
	amphibian
	bird
invertebrate	mammal

[1]

(b) Only the bones have been preserved as fossils.

Why have the other parts of the body NOT become fossils?

[1]

(c) Most scientists agree that modern humans have less hair on their bodies than this ancestor.

One explanation for this is about fleas that can live in hair and feed on blood.

Modern humans may have evolved less hair because this means they have fewer fleas.

What word is used to describe the type of feeding relationship between fleas and humans?

[1]

(d) Scientists disagree over which species this human ancestor belongs to.

Some of the fossil bones look like those of *Homo habilis*, a human ancestor that lived in Africa.

Some of the fossil bones look like those of *Homo erectus*, which also lived in Africa.

Which of these statements about classifying the human ancestor is correct?

Put a tick (✓) in the box next to the correct statement.

It could be in either species because members of a species are not all identical.

It cannot be in either species because members of the same species always live in the same place.

It should be named *Homo habilis*, even though it has more features in common with *Homo erectus*.

[1]

[Total: 4]

SECTION B – MODULE C2

4 Pam investigates the properties of iron and aluminium.

Look at the table. It shows her results.

PROPERTY	IRON	ALUMINIUM
magnetism	magnetic	non magnetic
ease of corrosion	rusts	_____
electrical conduction	good	_____
malleability	_____	bends easily

(a) Complete the table. [3]

(b) Iron rusts.

Complete the sentence about rusting.

Iron needs _____ and

_____ to rust. [2]

(c) Copper is another metal.

It is used to make electrical wires because it is a good conductor of electricity.

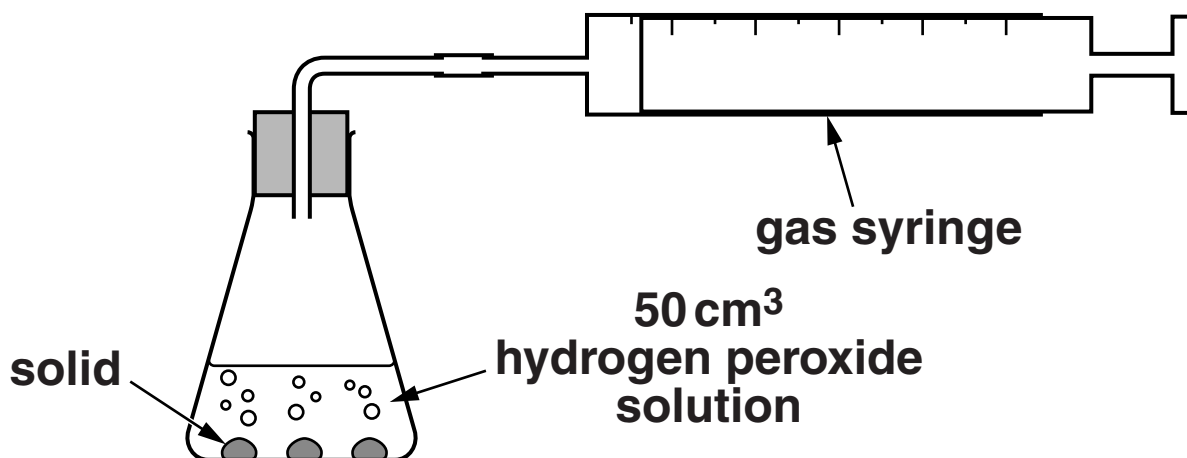
Suggest one OTHER reason why copper is used to make electrical wires.

[1]

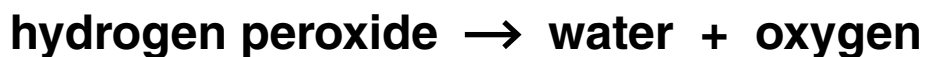
[Total: 6]

5 Louise and Mike investigate the decomposition of hydrogen peroxide solution.

Look at the diagram. It shows the apparatus they use.



Look at the word equation for the reaction.



On its own, hydrogen peroxide solution reacts very slowly.

A solid must be added to make the reaction faster.

Louise and Mike add DIFFERENT solids to hydrogen peroxide solution.

They work out the rate of the reaction each time.

Look at their results.

SOLID ADDED	MASS OF SOLID AT START IN g	MASS OF SOLID AT END IN g	RELATIVE RATE OF REACTION
NONE	–	–	1
A	0.2	0.1	10
B	0.3	0.2	5
C	0.1	0.1	10
D	0.2	0.2	1

(a) Which solid DOES NOT CHANGE the rate of the reaction?

Choose A, B, C or D.

answer _____

[1]

(b) Which solid is acting as a CATALYST for this reaction?

Choose A, B, C or D.

answer _____

Explain your answer.

[3]

[Total: 4]

6 Limestone, marble and granite are rocks used in buildings.

(a) Write down the name of another material used in buildings.

_____ [1]

(b) Place limestone, marble and granite in order of hardness.

Write the hardest rock first.

hardest _____

softest _____

[1]

(c) Limestone is heated with clay.

Write down the name of the substance made.

_____ [1]

(d) Limestone and marble are made of the same chemical.

Write down the name of this chemical.

Choose from

ALUMINIUM OXIDE

CALCIUM CARBONATE

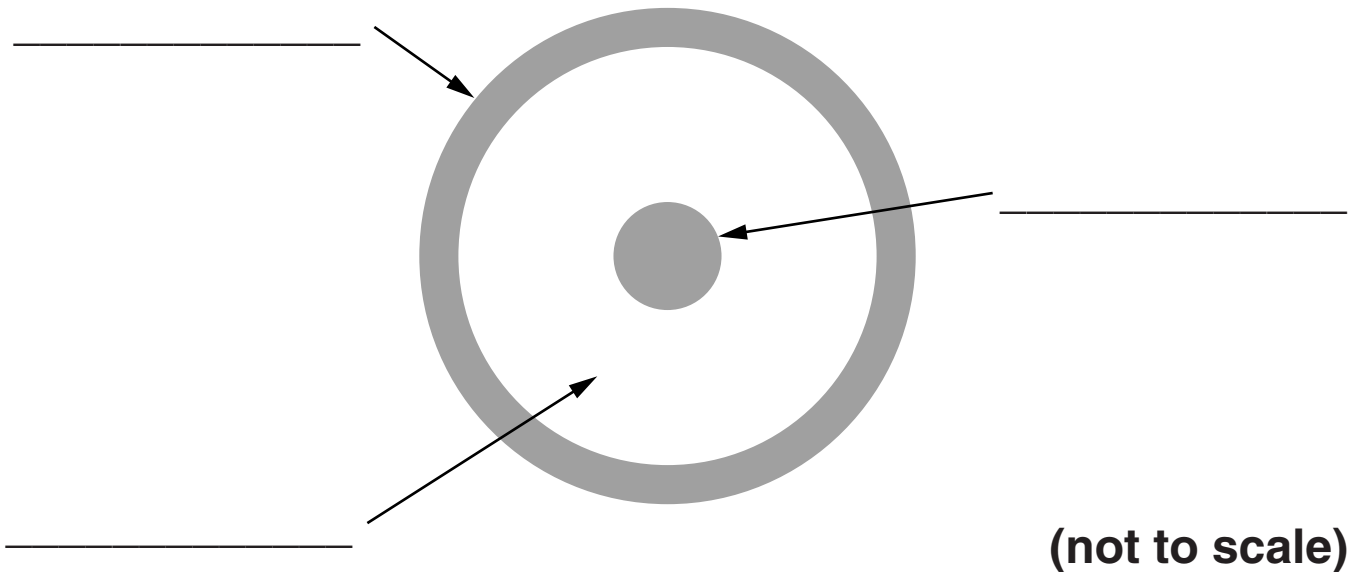
CALCIUM OXIDE

COPPER SULFATE

answer _____ [1]

[Total: 4]

7 Look at the diagram. It shows the structure of the Earth.



(a) Label the diagram. Use words from this list.

CORE

CRUST

MANTLE

[2]

(b) Write down the name of the main metal present in the core.

_____ **[1]**

[Total: 3]

8 Air sometimes contains pollutants.

Look at the table. It shows some common pollutants and the problems they cause.

POLLUTANT	PROBLEM CAUSED
oxides of nitrogen	photochemical smog
carbon monoxide	_____
sulfur dioxide	_____

(a) Complete the table. [2]

(b) Calcium carbonate is used to decrease sulfur dioxide pollution.

The formula of calcium carbonate is



What is the total number of ATOMS in this formula?

_____ [1]

[Total: 3]

SECTION C – MODULE P2

9 Sizewell is a nuclear power station in Suffolk.

It is next to the sea.

Nuclear power stations produce waste.

(a) Write down ONE reason why the waste is harmful.

_____ [1]

(b) Finish the sentence.

Power stations are often built by the sea because

they _____

_____ . [1]

(c) The electricity produced by a nuclear power station is transmitted around the country.

This is done at very HIGH VOLTAGES.

Explain why.

_____ [1]

(d) What is the unit of electrical power?

Choose from

AMP

OHM

VOLT

WATT

answer _____ **[1]**

[Total: 4]

10 Charlie has solar lamps in her garden.

The Sun shines onto the photocells. These are on top of the solar lamps.

The electricity produced charges batteries in the solar lamp.

(a) Finish the sentences by choosing the BEST words from this list.

ALTERNATING

AREA

CONSTANT

DIRECT

HEAT

LIGHT

VOLUME

A photocell transfers _____

energy from the Sun into electricity.

The electrical power produced depends on the

_____ of the photocell.

The LED in the lamp works with

_____ current.

[3]

(b) Write down one DISADVANTAGE of using photocells to provide electricity.

_____ [1]

(c) The current through the LED in the lamp is 0.02 A. The voltage from the batteries is 3V.

Calculate the power of the LED.

The equations on page 3 may help you.

answer _____ [2]

[Total: 6]

11 About 65 million years ago an asteroid struck the Earth.

Some scientists think this caused the dinosaurs and other living things to become extinct.

(a) Describe two OTHER things that happened as a result of the asteroid colliding with Earth.

[2]

(b) Some asteroids and comets are called Near Earth Objects (NEOs).

Scientists MONITOR Near Earth Objects.

Explain why.

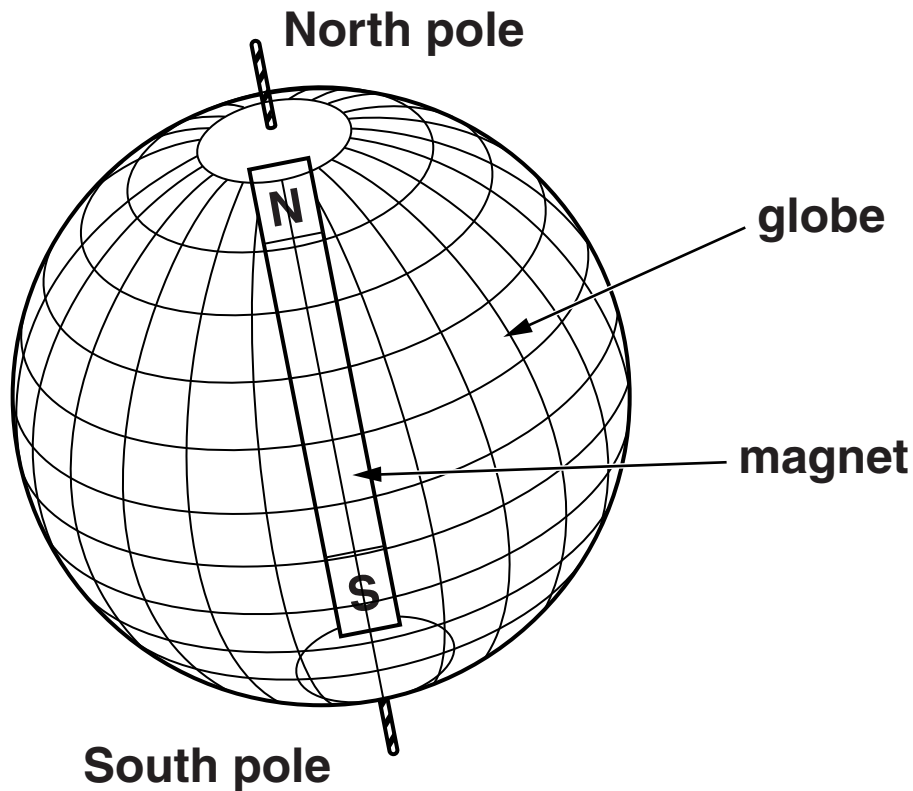
[1]

[Total: 3]

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12 Alan's science teacher makes a model of the Earth.

He places a magnet inside a globe.



(a) Alan wants to plot the direction of the magnetic field around the model.

What piece of equipment should he use?

_____ [1]

(b) The Earth and magnetic materials have magnetic fields around them.

What else can cause a magnetic field?

_____ [1]

(c) Magsat is an artificial satellite that orbits Earth.

It monitors the Earth's magnetic field.

Write about TWO OTHER uses of artificial satellites.

[2]

[Total: 4]

13 Scientists who work near radioactive material wear a film badge.

(a) The badge measures exposure to each type of nuclear radiation.

Finish the sentence.

The three types of nuclear radiation are ALPHA,

_____ and _____. [1]

(b) Write down two PRECAUTIONS a scientist should use when handling radioactive material.

1 _____

2 _____ [2]

[Total: 3]

END OF QUESTION PAPER

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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0	
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 C carbon 6	13 Al aluminium 13	14 N nitrogen 7	15 O oxygen 8	16 F fluorine 9	17 Ne neon 10
	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27
	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77
	87 Fr francium 87	88 Ra radium 88	89 Ac* actinium 89	104 Rf rutherfordium 104	105 Db dubnium 105	106 Sg seaborgium 106	107 Bh bohrium 107	108 Hs hassium 108	109 Mt meitnerium 109
	133 Cs caesium 133	137 Ba barium 137	139 La* lanthanum 139	178 Hf hafnium 178	181 Ta tantalum 181	184 W tungsten 184	186 Re rhenium 186	190 Os osmium 190	192 Ir iridium 192
	223 Fr francium 223	226 Ra radium 226	227 Ac* actinium 227	261 Rf rutherfordium 261	262 Db dubnium 262	266 Sg seaborgium 266	268 Bh bohrium 268	277 Hs hassium 277	288 Mt meitnerium 288
	101 Pb lead 101	102 Bi bismuth 102	103 Po polonium 103	104 At astatine 104	105 Rn radon 105	106 Fr francium 106	107 Ra radium 107	108 Ac actinium 108	109 Th thorium 109
	119 Sb antimony 119	120 Te tellurium 120	121 I iodine 121	122 Xe xenon 122	123 At astatine 123	124 Rn radon 124	125 Fr francium 125	126 Ra radium 126	127 Ac actinium 127
	151 Sn tin 151	152 Pb lead 152	153 Bi bismuth 153	154 Po polonium 154	155 At astatine 155	156 Rn radon 156	157 Fr francium 157	158 Ra radium 158	159 Ac actinium 159
	201 Hg mercury 201	202 Tl thallium 202	203 Pb lead 203	204 Bi bismuth 204	205 Po polonium 205	206 At astatine 206	207 Rn radon 207	208 Fr francium 208	209 Ra radium 209
	112 Cd cadmium 112	113 In indium 113	114 Sn tin 114	115 Pb lead 115	116 Bi bismuth 116	117 Po polonium 117	118 At astatine 118	119 Rn radon 119	120 Fr francium 120
	63.5 Cu copper 63.5	64 Zn zinc 64	65 Ga gallium 65	66 Ge germanium 66	67 As arsenic 67	68 Se selenium 68	69 Br bromine 69	70 Kr krypton 70	71 Rb rubidium 71
	59 Ni nickel 59	58 Co cobalt 58	59 Fe iron 59	60 Mn manganese 60	61 Cr chromium 61	62 V vanadium 62	63 Ti titanium 63	64 Zr zirconium 64	65 Nb niobium 65
	106 Pd palladium 106	107 Rh rhodium 107	108 Ru ruthenium 108	109 Rh rhodium 109	110 Pd palladium 110	111 Ag silver 111	112 Cd cadmium 112	113 In indium 113	114 Sb antimony 114
	197 Au gold 197	198 Hg mercury 198	199 Tl thallium 199	200 Pb lead 200	201 Bi bismuth 201	202 Po polonium 202	203 At astatine 203	204 Rn radon 204	205 Fr francium 205
	201 Hg mercury 201	202 Tl thallium 202	203 Pb lead 203	204 Bi bismuth 204	205 Po polonium 205	206 At astatine 206	207 Rn radon 207	208 Fr francium 208	209 Ra radium 209
	112 Cd cadmium 112	113 In indium 113	114 Sb antimony 114	115 Te tellurium 115	116 I iodine 116	117 Xe xenon 117	118 At astatine 118	119 Rn radon 119	120 Fr francium 120
	65 Zn zinc 65	66 Ga gallium 66	67 Ge germanium 67	68 As arsenic 68	69 Se selenium 69	70 Br bromine 70	71 Kr krypton 71	72 Rb rubidium 72	73 Sr strontium 73
	27 Al aluminium 27	28 Si silicon 28	29 P phosphorus 29	30 S sulfur 30	31 Cl chlorine 31	32 Ar argon 32	33 K potassium 33	34 Ca calcium 34	35 Sc scandium 35
	11 B boron 11	12 C carbon 12	13 N nitrogen 13	14 O oxygen 14	15 F fluorine 15	16 Ne neon 16	17 He helium 17	18 Li lithium 18	19 Be beryllium 19
	1 H hydrogen 1	2 He helium 2	3 Li lithium 3	4 Be beryllium 4	5 B boron 5	6 C carbon 6	7 N nitrogen 7	8 O oxygen 8	9 F fluorine 9

1
H
hydrogen
1

Key
relative atomic mass
atomic symbol
name
atomic (proton) number

Elements with atomic numbers 112-116 have been reported but not fully authenticated

* 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.