OCR
RECOGNISING ACHIEVEMENT

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B622/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

SCIENCE B

Unit 2 Modules B2 C2 P2 (Foundation Tier)

TUESDAY 17 JUNE 2008

Morning
Time: 1 hour

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
                            Ruler (cm/mm)

Candidate Forename		Candidate Surname	

Centre Number		Candidate Number	

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

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

FOR EXAMINER'S USE

Section	Max.	Mark
A	**20**	
B	**20**	
C	**20**	
TOTAL	**60**	

This document consists of **20** printed pages.

2

EQUATIONS

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

wave speed = frequency $\times$ wavelength

power = voltage $\times$ current

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

3

Answer **all** the questions.

Section A – Module B2

1   Some ecosystems occur naturally, while other ecosystems are artificial.

   (a) Look at the list of ecosystems.

   Put a tick (✔) in the box next to the **artificial** ecosystem.

   desert

   fish farm

   lake

   woodland

   [1]

   (b) Look at the picture.
   It shows animals and plants in a pond ecosystem.
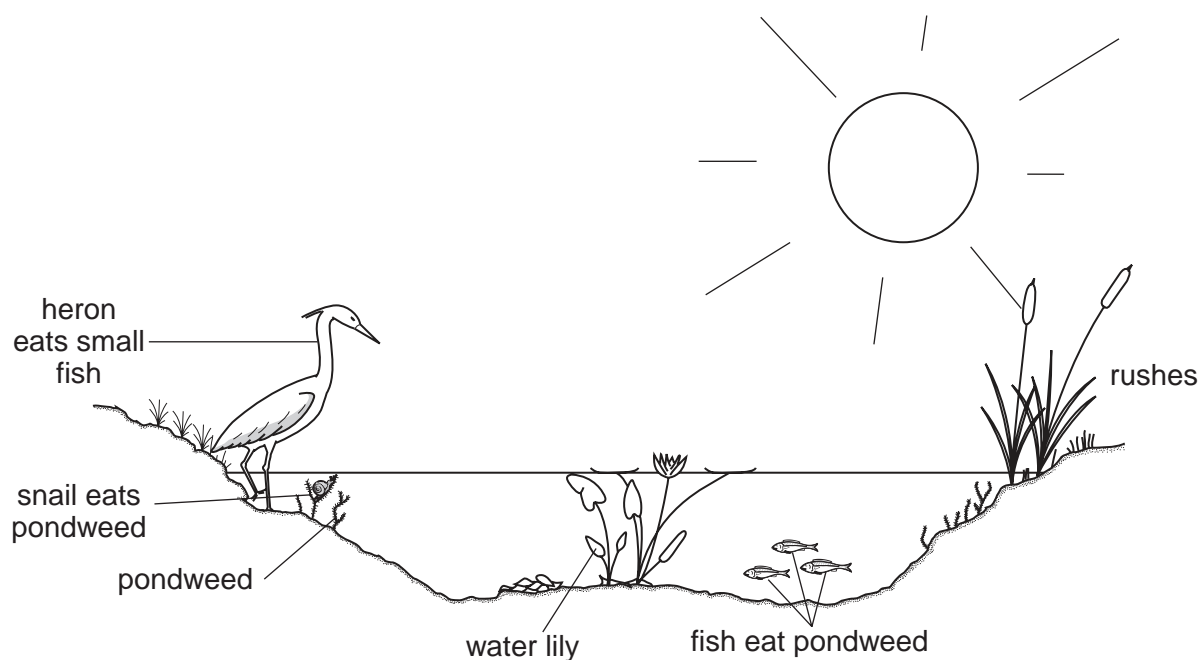
   (i) Write down the name of **one predator** found in the pond ecosystem.

   ....[1]

   (ii) The pondweed and water lily compete for space.

   Write down **one other** thing they compete for.

   ....[1]

[Turn over for the remainder of question 1

4

(c) The plants in the pond photosynthesise.

Look at the list.

Put a (ring) around **two** substances that plants need for photosynthesis.

carbon dioxide

cellulose

nitrogen

oxygen

water

[2]

(d) During photosynthesis, plants make glucose.

This glucose can be used for different things.

Write about how plants use glucose.

....

....

....

....[2]

(e) The plants photosynthesise faster in the summer than in the winter.

Explain why.

....

....[1]

[Total: 8]

5

2 Look at the picture of a brown bear.

Bears are predators.

(a) Bears have eyes at the front of the head.

This helps bears catch prey.

Explain how.

....
....[1]

(b) Suggest **one other** way bears are adapted to catch prey.

....
....[1]

(c) Brown bears are **not** adapted to live in cold conditions in the Arctic.

Polar bears have adaptations so they can live in very cold conditions.
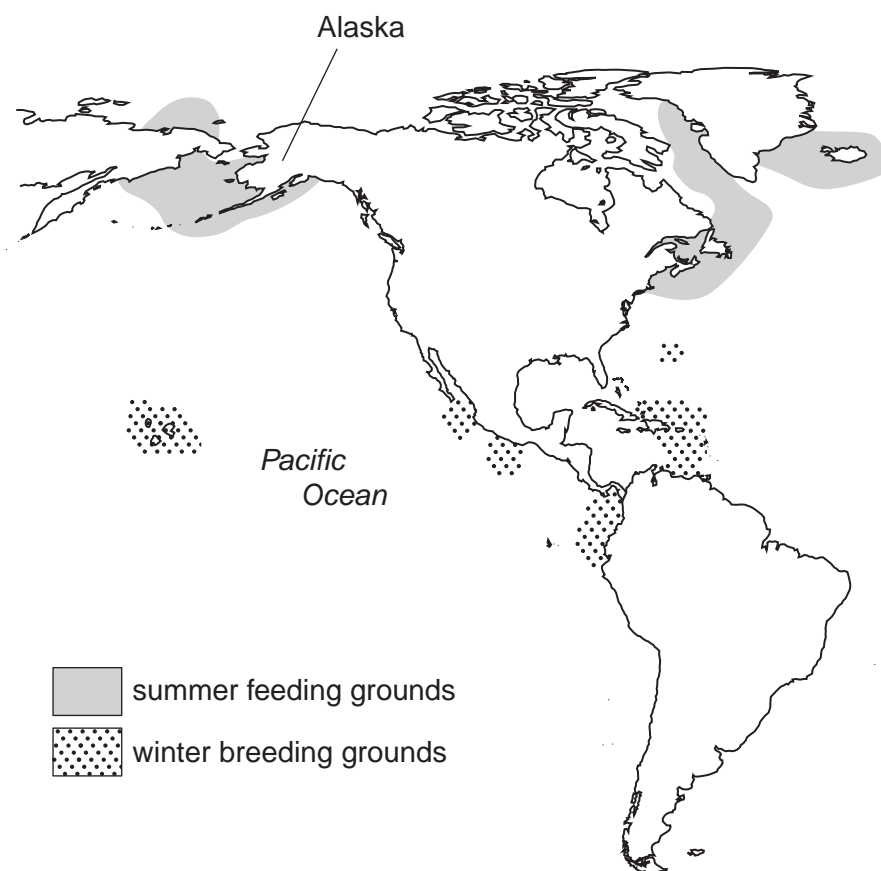
Describe **one** of these adaptations.

....
....

Explain how the adaptation you have chosen helps the polar bear.

....
....[2]

[Total: 4]

[Turn over

3 Look at the map.

It shows the parts of the world where humpback whales feed and breed.

(a) Humpback whales spend the summer in the sea near Alaska.

Suggest **one** reason why.

....

....[1]

(b) Humpback whales move far away from the coast of Alaska to breed.

Suggest **one** reason why.

....

....[1]

(c) Some countries wish to hunt whales for food.

They believe the whales could be a sustainable resource.

What is meant by a **sustainable resource**?

....

....[1]

(d) Some whales are kept in captivity.

Suggest **one** argument for and **one** argument against keeping whales in captivity.

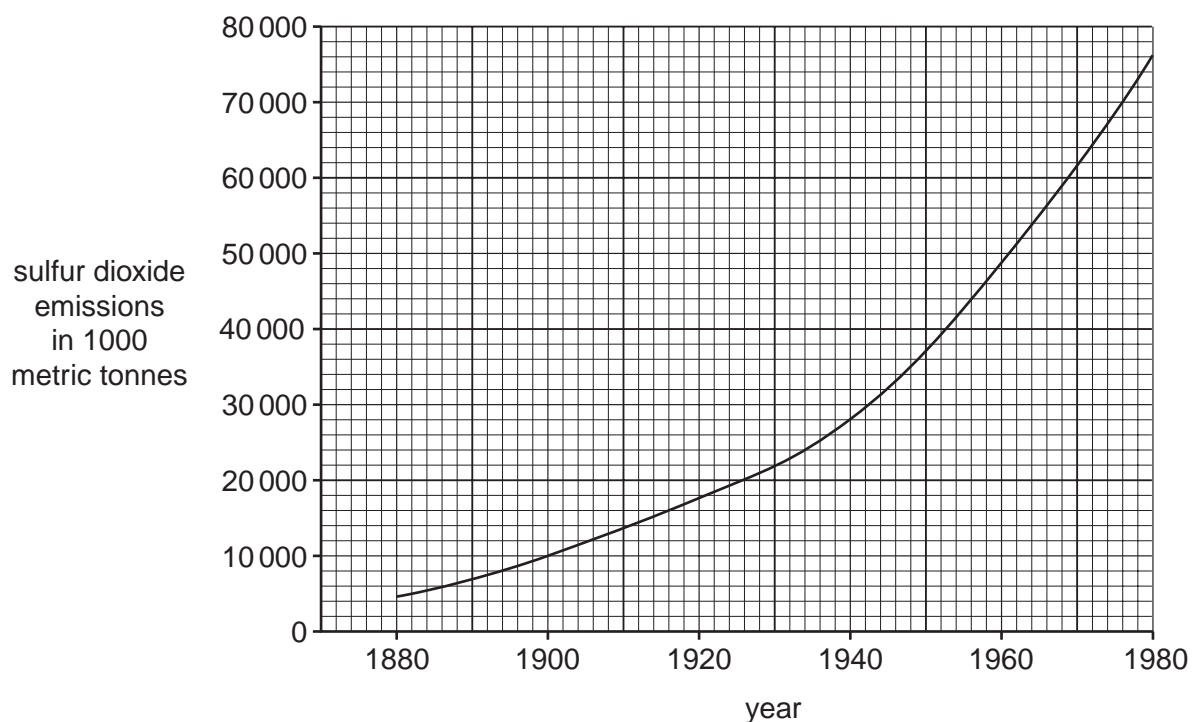for ....

....

against ....

....[2]

[Total: 5]

4 Look at the graph.

It shows world sulfur dioxide emissions between 1880 and 1980.

(a) (i) Describe the change in sulfur dioxide emissions between **1880** and **1980**.

....[1]

(ii) Suggest **one** reason for this change.

....[1]

(b) The change in sulfur dioxide levels is causing problems in the environment.

Write down **one** of these problems.

....[1]

[Total: 3]

[Turn over

8

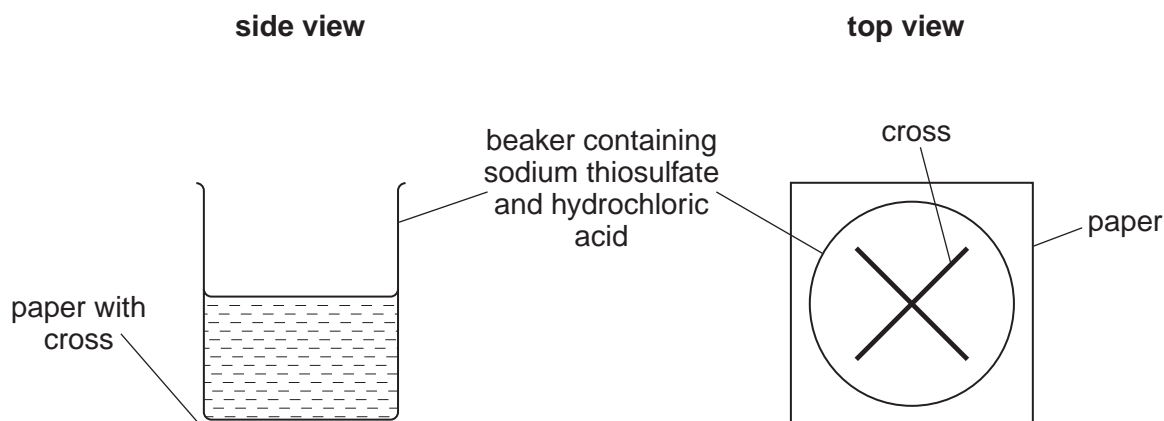## Section B – Module C2

5   Rob and Catherine investigate the reaction between sodium thiosulfate and hydrochloric acid.

A yellow solid is made during the reaction.

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

Rob and Catherine look down at the cross. A yellow solid is made. The liquid in the beaker gets cloudy.
After a time they cannot see the cross.
Rob and Catherine measure this reaction time.
They do the experiment four times.
They use four different concentrations of sodium thiosulfate solution, **A**, **B**, **C** and **D**.
They do all the experiments at 20 °C.

Look at their results.

concentration of sodium thiosulfate	reaction time in seconds
A	41
B	74
C	135
D	67

(a) (i) Which concentration of sodium thiosulfate gave the **fastest** reaction?

Choose from **A**, **B**, **C** or **D**.

answer ....   [1]

(ii) Which is the **least** concentrated solution of sodium thiosulfate?

Choose from **A**, **B**, **C** or **D**.

answer ....   [1]

9

(b) Changing the concentration changes the rate of the reaction.

Write about **other** ways of changing the rate of reaction.

....

....

....[2]

(c) The reaction between sodium thiosulfate and hydrochloric acid happens quite slowly.

Rusting is another slow reaction.

(i) Two substances react with iron to make rust (hydrated iron(III) oxide).

Complete the word equation to show these two substances.

iron + ... + ... $\rightarrow$ hydrated iron(III) oxide   [2]

(ii) Iron objects rust more quickly in areas near to the sea.

Suggest why.

....[1]

[Total: 7]

[Turn over

6 This question is about the air.

Look at the table. It shows some of the gases in clean, dry air.

gas	percentage in clean, dry air
oxygen	21
....	78
carbon dioxide	0.035

(a) Complete the table.   [1]

(b) Respiration happens in living things.

Look at the word equation for respiration.

$$\text{glucose} + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$
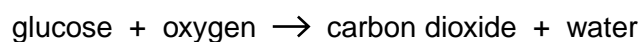
Complete the sentence. Use the word equation to help you.

During respiration, the level of carbon dioxide in the air .... and

the level of .... in the air decreases.   [2]

(c) Carbon monoxide is a pollutant found in air.

Carbon monoxide, CO, burns in oxygen, O_2.

Carbon dioxide, CO_2, is made.

Write a balanced **symbol** equation for this reaction.

....[2]

[Total: 5]

7   This question is about construction materials.

Look at the photograph. It shows some buildings.

© iStockphoto.com / Malcolm Romain

(a) Rocks such as granite, limestone and marble are used to construct buildings.

Write down the names of **two** other construction materials.

Use the photograph to help you.

1 ....

2 ....[2]

(b) Limestone and marble have the chemical formula $CaCO_3$.

(i) What is the chemical name of limestone and marble?

....[1]

(ii) How many **carbon** atoms are there in the formula $CaCO_3$?

answer ....   [1]

[Total: 4]

[Turn over

8 This question is about paints.

Paints are made up of three materials.

They are a **solvent**, a **binding medium** and a **pigment**.

(a) Match each **material** to **its job in the paint**.

One has been done for you.

material		its job in the paint
solvent		helps to stick the paint to a surface
binding medium		gives the paint its colour
pigment		thins the paint making it easier to use

[1]

(b) Pigments give the paint its colour.

Some pigments are **thermochromic**.

What is meant by a thermochromic pigment?

....[1]

(c) Paints are **colloids**.

Look at the sentences about colloids.

Which sentences about colloids are correct?

Put ticks (✔) in the boxes next to the correct sentences.

Particles are mixed and dispersed through a liquid. ☐

Solid particles dissolve in the liquid. ☐

A colloid is a single compound. ☐

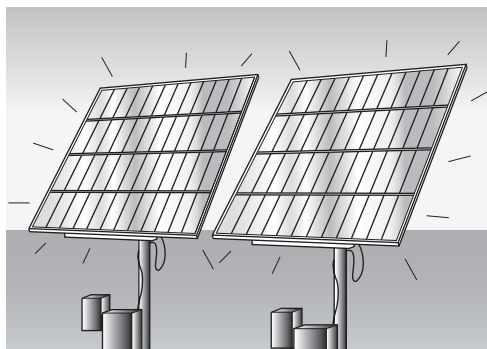Solid particles are suspended in a liquid. ☐

[2]

[Total: 4]

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13

Section C – Module P2

9 This question is about photocells. The diagram shows some photocells.

Look at the statements about photocells.

Three of these statements are correct.

Put ticks (✔) in the boxes next to the **three** correct statements.

Photocells transfer light into electricity.	☐
Photocells produce direct current.	☐
Photocells produce alternating current.	☐
Photocells don't need power cables.	☐
Photocells pollute the environment.	☐
Photocells use energy from the Sun.	☐

[3]

[Total: 3]

[Turn over

10 This question is about generation of electricity and the cost of using it.

(a) Batteries produce **direct** current.

A **generator** is part of a **power station**.

What type of current does a generator in a power station produce?

....[1]

(b) Power stations are part of the electricity supply system.

The diagram shows the main stages in the production of electricity in a power station.

energy source	→	power station produces electricity	→	electricity goes to national grid	→	electricity goes to consumers
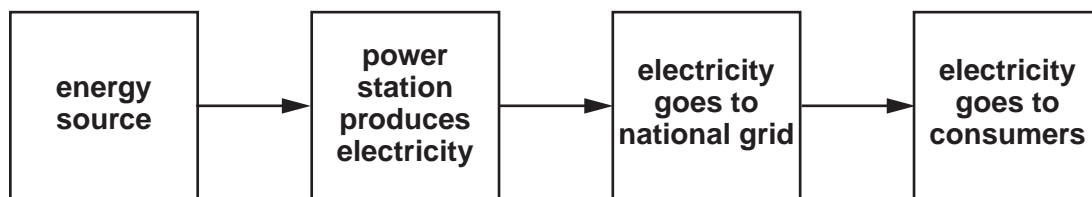
(i) What energy source (fuel) could be used at the start?

....[1]

(ii) What is the **national grid**?

....

....[1]

(iii) People in **houses** are one type of consumer.

Write down the name of another type of **consumer**.

....[1]

(c) The electrical appliances in Robert's house use electricity.

In one week, the electrical appliances in Robert's house

- use 12 kilowatts of power
- are on for a total of 8 hours.

(i) Calculate the total number of units of electrical energy used by Robert's appliances in one week.

The equations on page 2 may help you.

....

....

answer .... units of electrical energy   [2]

15

(ii) The cost of a unit of electricity is 10 pence.

Calculate the cost of the electricity used in Robert's house in one week.

....

....

answer .... pence [1]

[Total: 7]

[Turn over

11 This question is about **nuclear** radiation.

(a) Pardeep knows that there are **three** types of nuclear radiation.
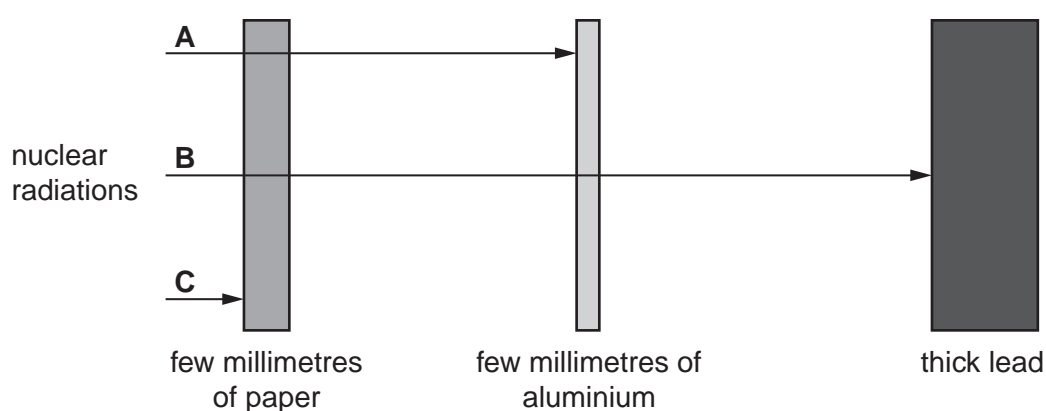
Beta is one type.

Name **one** other type of nuclear radiation.

....[1]

(b) In a physics lesson, Pardeep's class are learning about nuclear radiation.

The teacher tells the class about how nuclear radiations penetrate substances.

The teacher does an experiment. The diagram shows the results.

Pardeep thinks that nuclear radiation **A** is **beta** radiation.

He does not think that **B** or **C** can be beta radiation.

Explain why he is correct.

....

....

....

....

....[3]

[Total: 4]

12 Kate is investigating magnetism.

(a) She places a plotting compass near a magnet.

X	magnet	Y
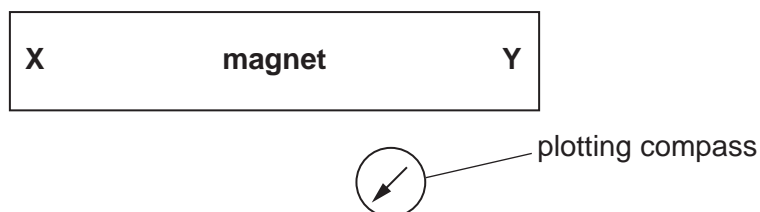
plotting compass

Complete these sentences about Kate's investigation.

The ends of the magnet **X** and **Y** are the north and south .... of the magnet.

The plotting compass shows the .... of the magnetic field. [2]

(b) Kate then does a different investigation using a coil.

The coil is connected to a switch and a battery.

battery

switch

coil
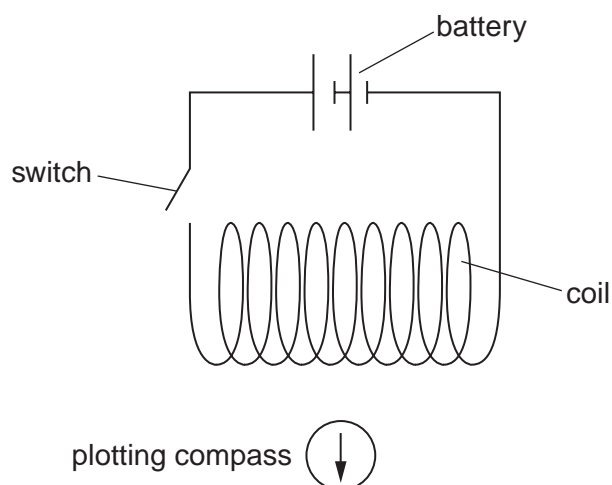
plotting compass

When the switch is closed, the plotting compass moves.

What has been created around the coil to cause the plotting compass to move?

....[1]

[Total: 3]

[Turn over

13 This question is about the Universe.

The **Big Bang** theory describes how the Universe began.

Complete the sentences about the start of the Universe.

Choose from the list.

explosion	gas	life	rock	size	water

The Universe started with an enormous ....

Stars in the Universe started as a huge cloud of ....

Stars have a finite ....   [3]

[Total: 3]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE

The Periodic Table of the Elements

20

Group 1	2												3	4	5	6	7	0
							1 H hydrogen 1											4 He helium 2
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.

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