OCR
RECOGNISING ACHIEVEMENT

GENERAL CERTIFICATE OF SECONDARY EDUCATION **F** **B622/01**

GATEWAY SCIENCE
SCIENCE B

Unit 2 Modules B2 C2 P2

FOUNDATION TIER

THURSDAY 7 JUNE 2007

Morning
Time: 1 hour

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

CUP/T30695

Candidate Name

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question 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.

FOR EXAMINER'S USE		
Section	**Max.**	**Mark**
A	**20**	
B	**20**	
C	**20**	
TOTAL	**60**	

This document consists of **22** printed pages and **2** blank pages.

[Turn over

EQUATIONS

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

wave speed = frequency $\times$ wavelength

power = voltage $\times$ current

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

Answer **all** the questions.

Section A – Module B2

1 Look at the picture of an Orca.

(a) The Orca is a mammal.

Mammals belong to a larger group of animals.

What name is given to this group?

Put a (ring) around the correct answer.

amphibians

fish

invertebrates

vertebrates

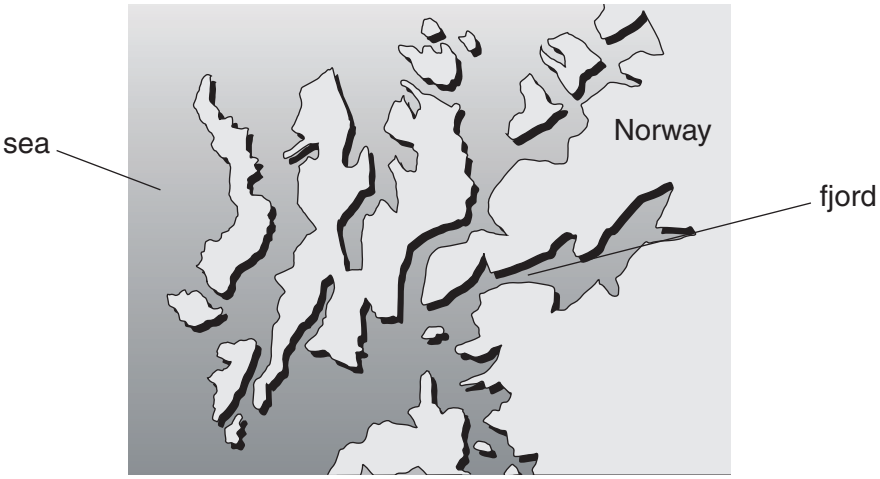
[1]

[Turn over for remainder of question 1

(b) The Orcas feed on a fish called herring.

Each winter, large numbers of herring move into a Norwegian fjord.

The Orcas follow the herring.



The boxes below contain words and their meanings.

They are about the relationship between the Orca and the herring.

Draw a straight line from each **word** to its **meaning**.

One has been done for you.

word	**meaning**
	all the animals and plants in the fjord
community	
	Orca
habitat	
	the fjord
predator	
	herring
prey	
	number of herring in the fjord

[3]

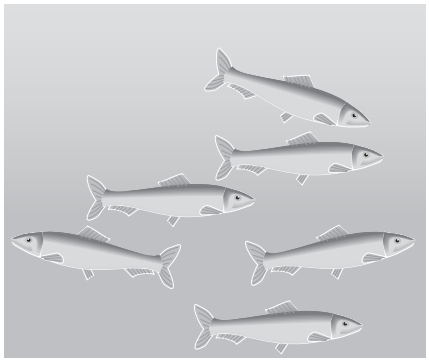
(c) In summer, the herring leave the fjord for the sea.

There are no Orcas in the fjord during the summer.

Suggest why.

.....[1]

(d) Look at the picture. It shows a group of herring.



(i) Herring are adapted to avoid being caught by the Orca.

Look at the statements.

Which **one** is a true statement about the way herring are adapted?

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

built for speed	☐
covered in scales	☐
live alone	☐
sharp teeth	☐

[1]

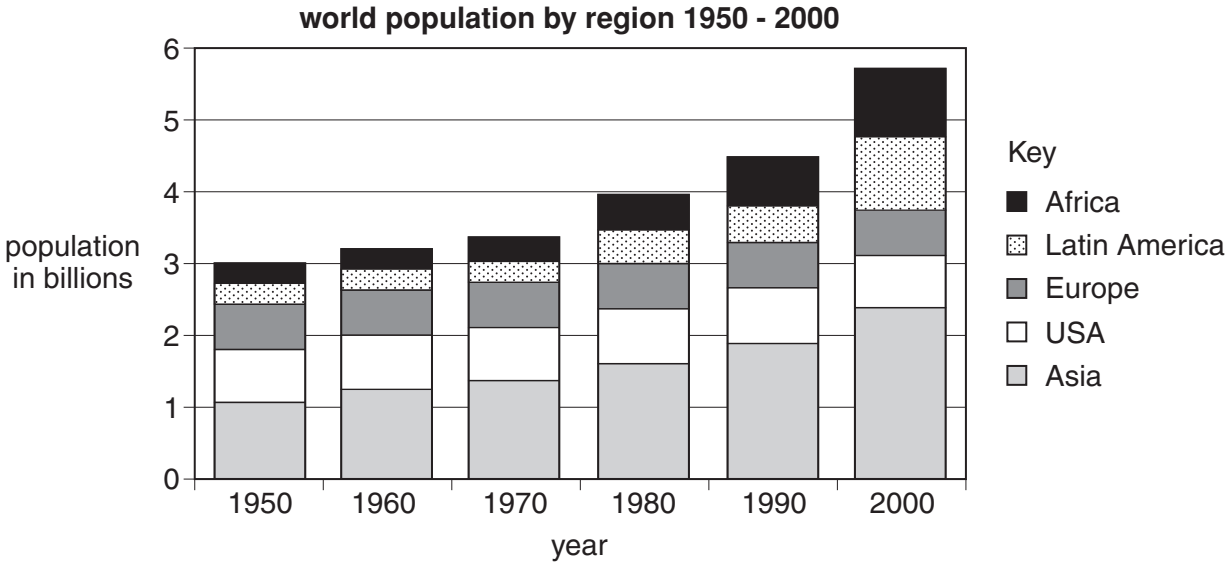
(ii) Write down **one other** way the herring are adapted to avoid being caught.

.....[1]

[Total: 7]

2 Look at the graph.

It shows the world population by region between the years 1950 – 2000.



(a) In Europe, the population is constant.

In Africa, the population is still growing.

Name **one other** area shown in the graph in which the population is still growing.

.....[1]

(b) The growth in population has led to more use of resources such as fossil fuels.

(i) Write down the name of **one** gas made when fossil fuels burn.

.....[1]

(ii) Look at the list.

pollution

resources

sewage

waste

water

Finish the sentences by choosing the best words from this list.

Using more ..... means there is more pollution.

The types of pollution include household ..... and

..... . [3]

[Total: 5]

3 Look at the picture. It shows a mammal in the dense forests of Borneo.

(a) Scientists think that this mammal is a new species.

Write down **one** characteristic you can see in the picture that only mammals have.

.....

.....[1]

(b) This mammal had never been seen by scientists before.

Suggest why.

.....

.....[1]

(c) This mammal may be an **endangered species**.

(i) What is meant by the words **endangered species**?

.....

.....[1]

(ii) Look at the list of animals.

Put a (ring) around the animal that is also an endangered species.

giant panda

giraffe

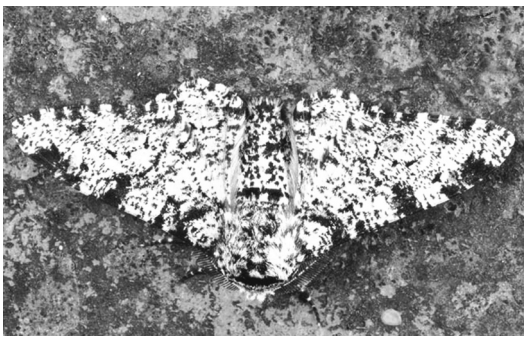
red deer

[1]

[Total: 4]

4 Look at the pictures.

They show two forms of a moth. The moths rest on trees with their wings open.



In polluted areas, the trees are darker than the trees in unpolluted areas.

(a) There are more dark moths than pale moths in **polluted** areas.

Explain why.

.....

.....

.....[2]

(b) A survey of moths was carried out in an **unpolluted** area.

Moths were collected in the morning.

The moths were marked with harmless paint on the underside of the wing and released.

They were then collected again later in the day.

Look at the table. It shows the results of the survey.

	number of moths	
	pale form	**dark form**
number caught first time	500	467
number caught the second time	480	471
number of marked moths caught the second time	60	30

The population of moths in an area can be calculated using the formula:

$$\text{population} = \frac{\text{number caught first time} \times \text{number caught second time}}{\text{number of marked moths caught second time}}$$

Use the formula to estimate the population of **pale** moths in the wood.

.....

.....

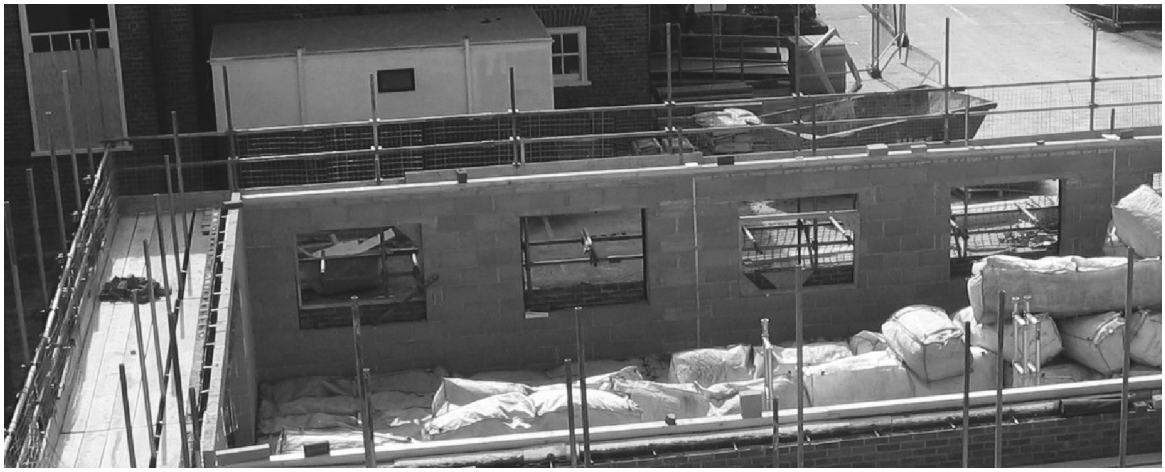
.....[2]

[Total: 4]

Section B – Module C2

5 This question is about materials used in constructing buildings.

(a) Look at this picture of a construction site.



Many materials are used to construct buildings.

Two of these are steel and concrete.

Write down **two** other materials used to construct buildings.

1 .....

2 .....[2]

(b) Steel is a mixture of iron and carbon.

(i) Which word best describes steel?

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

alloy	☐
compound	☐
element	☐
molecule	☐

[1]

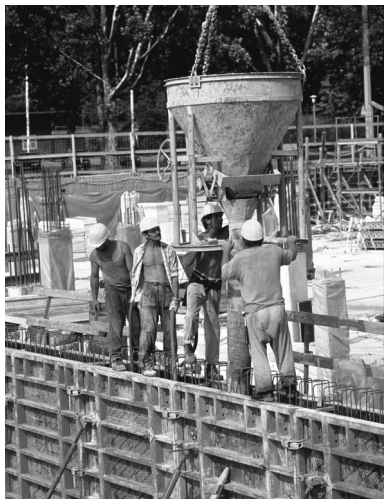
(ii) The surface of steel is often painted.

Suggest why.

.....

.....[1]

(c) Look at this picture.



© Rosenfeld Images Ltd/Science Photo Library

It shows reinforced concrete being made.

Reinforcing the concrete makes it stronger.

Describe how concrete can be reinforced.

.....

.....[1]

[Total: 5]

6 Clean air is a mixture of gases.

The gases include carbon dioxide, nitrogen, oxygen and water vapour.

The percentages of these gases do not vary much.

This is because of **photosynthesis** and **respiration**.

(a) Finish the sentences about photosynthesis and respiration.

Choose from the list.

carbon dioxide

decreases

increases

nitrogen

oxygen

(i) Photosynthesis ..... the level of oxygen in the air and ..... the level of carbon dioxide. [1]

(ii) Respiration increases the level of ..... and decreases the level of ..... . [1]

(b) Cars can cause air pollution.

Look at the diagram. It shows a simple view of an exhaust pipe of a car.

Look at the table. It shows the amounts of gases found at points **A** and **B**.

gas	percentage of gas entering catalytic converter at A	percentage of gas leaving catalytic converter at B
carbon dioxide	8.0	9.6
carbon monoxide	5.0	4.1
hydrogen	2.0	0.8
oxygen	4.0	2.8
nitric oxide	0.3	0.0
nitrogen	71.0	71.3
water vapour	9.0	10.7

(i) Which gas makes up **most** of the exhaust gases?

.....[1]

(ii) Write down the name of one gas whose percentage **decreases** between points **A** and **B**.

.....[1]

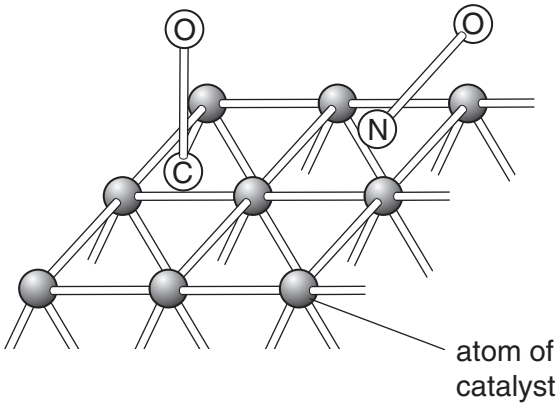
(iii) A catalytic converter changes carbon monoxide into carbon dioxide.

What evidence is there for this in the table?

.....

.....[2]

(c) Look at the diagram. It shows a model of the surface of a catalytic converter.



In a catalytic converter, carbon monoxide molecules collide with nitric oxide molecules.

These molecules react on the surface of the catalyst.

A powdered catalyst works better than a lump of catalyst.

Explain why.

Use ideas about particles.

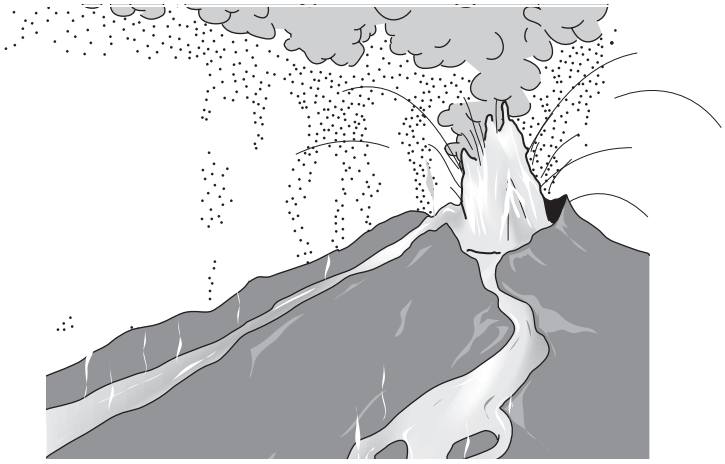
.....

.....

.....[2]

[Total: 8]

7 This picture shows an active volcano.



The liquid rock from the mantle is erupting from the volcano.

It is causing a lot of damage.

(a) What is the name given to liquid rock that erupts out of a volcano?

Choose from:

crust **lava** **metamorphic** **sedimentary**

answer .....[1]

(b) Liquid rock that erupts out of a volcano cools down to make a **type** of rock.

What type of rock?

Choose from:

igneous **metamorphic** **sedimentary**

answer .....[1]

(c) Some people live near to active volcanoes.

It is dangerous to live near an active volcano.

Write down **one** reason why some people still want to live near an active volcano.

.....

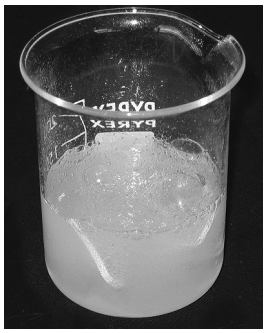
.....[1]

[Total: 3]

8 Magnesium ribbon reacts with dilute hydrochloric acid.

Look at the photograph.

It shows 0.5 g of magnesium ribbon reacting with 70 cm^3 of dilute hydrochloric acid.



(a) Look at the equation for this reaction.

$$Mg + 2HCl \longrightarrow MgCl_2 + H_2$$

Write down the formula of one **product** of the reaction.

.....[1]

(b) The reaction goes much faster if

- 70 cm^3 of **hotter** acid is used
- 0.5 g of magnesium **powder** is used.

Describe one **other** way to make the reaction faster.

.....

.....[1]

(c) If hot acid is used instead of cold acid, the reaction goes much faster.

Explain why.

Use ideas about particles.

.....

.....

.....[2]

[Total: 4]

Section C – Module P2

9 This question is about nuclear radiation.

(a) Nuclear radiation can be harmful to people.

How can nuclear radiation be **harmful**?

.....

.....[1]

(b) Nuclear radiation can be useful.

How can nuclear radiation be **useful**?

.....

.....[1]

(c) Complete this sentence.

The three types of nuclear radiation are ..... , beta and gamma. [1]

(d) Beta radiation will penetrate (go through) some materials.

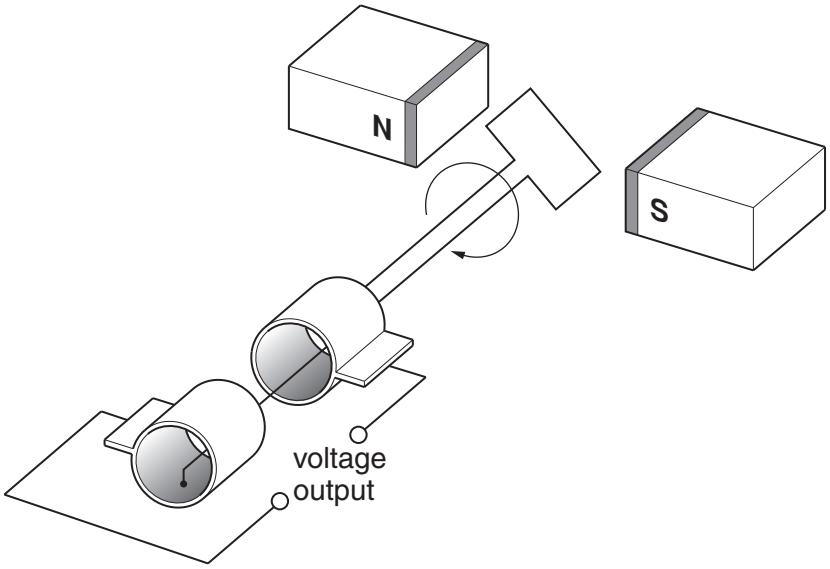
Complete the table. One has been done for you.

nuclear radiation	does it penetrate a sheet of paper?	does it penetrate a few mm of aluminium?	does it penetrate lead?
beta			no

[1]

[Total: 4]

10 Look at the diagram of a generator.



(a) Complete the sentences about how the generator works.

Choose your answers from the list.

coil of wire

current

less

magnet

more

Electricity is generated by movement of the ..... near the magnet.

The ..... can be increased by using faster movement.

It can also be increased by using a stronger .....

or ..... turns of wire. [3]

(b) Batteries produce a different type of current to this generator.

What type of current does a **battery** produce?

.....[1]

(c) What type of current does this **generator** produce?

.....[1]

[Total: 5]

11 Look at the information about some electrical appliances.

appliance	power in kW	time used in hours
cooker	8.0	3.0
immersion heater	6.0	2.0
iron	1.0	1.0
kettle	3.0	0.1

(a) The cooker is the most expensive to use.

Suggest **two** reasons why.

1 .....

2 .....[2]

(b) **(i)** The immersion heater is used for 2 hours.

Calculate the number of kilowatt hours (units) used by the immersion heater.

.....

.....

answer .....kWh [2]

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

Calculate the cost of using the immersion heater for 2 hours.

.....

.....

answer ..... pence [1]

[Total: 5]

12 This question is about magnetism.

(a) Magnets have two poles.

What are the two poles of a magnet called?

Choose your answer from the list.

AC and DC

north and south

positive and negative

answer .....[1]

(b) The Earth is surrounded by a magnetic field.

Write about the Earth's magnetic field.

In your answer, describe

- how you can detect it
- what causes it
- where the poles are.

.....

.....

.....

.....[3]

[Total: 4]

13 People often think about how the Universe began.

One theory that explains the start of the Universe is the **Big Bang**.

The Big Bang started with an explosion.

(a) What is **still** happening to the Universe after the Big Bang?

Put a (ring) around the correct answer.

getting bigger

staying the same size

getting smaller

[1]

(b) Stars began to form after the Big Bang.

They are not formed from an explosion.

Complete the sentence.

Stars begin their life as ..... . [1]

[Total: 2]

END OF QUESTION PAPER

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The Periodic Table of the Elements

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.