F

OCR RECOGNISING ACHIEVEMENT

General Certificate of secondary education

GATEWAY SCIENCE

B623/01

ADDITIONAL SCIENCE B

Unit 1 Modules B3 C3 P3
(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)

Monday 19 January 2009
Morning

Duration: 1 hour

B6231

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

•   Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
•   Use 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, however additional paper may be used if necessary.

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.

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

OCR is an exempt Charity

Turn over

2

EQUATIONS

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

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

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

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

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

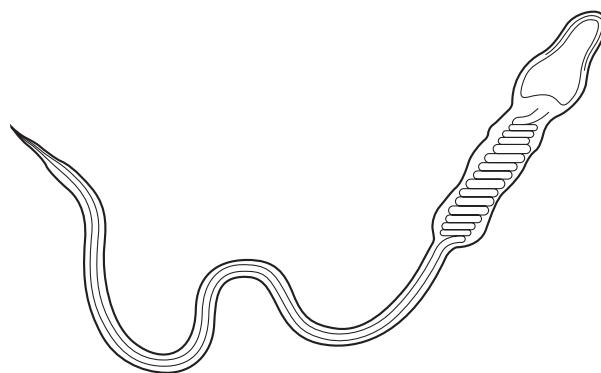$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

3

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Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

4

Answer **all** the questions.

Section A – Module B3

1   The diagram shows a type of sex cell.

(a) Write down the name of this type of sex cell.

    .... **[1]**

(b) What is the job of this cell?

    .... **[1]**

(c) Write about how **two** parts of this cell help it to do its job.

    1 ....

    ....

    2 ....

    .... **[2]**

[Total: 4]

2 **(a)** The list shows different substances found in the body.

carbon dioxide

food

oxygen

These substances move around the body.

The arrows in the diagram show where some substances move.

substance

| lungs | ....→ | bloodstream |

| small intestine | ....→ | bloodstream |

| mother | food and ....→ | foetus |
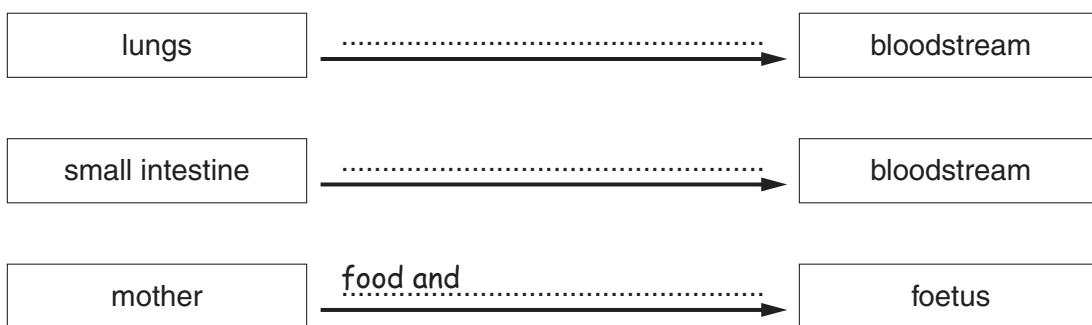
Write the name of the correct substance above each arrow on the diagram.

Choose the substances from the list.

Each substance can be used **once**, **more than once** or **not at all**. **[3]**

(b) Which part of a cell controls which substances can enter?

.... **[1]**

[Total: 4]

3 Harry grows potatoes.

Harry plants a potato in soil and it grows into a potato plant.

Several months later the plant has made many new potatoes.
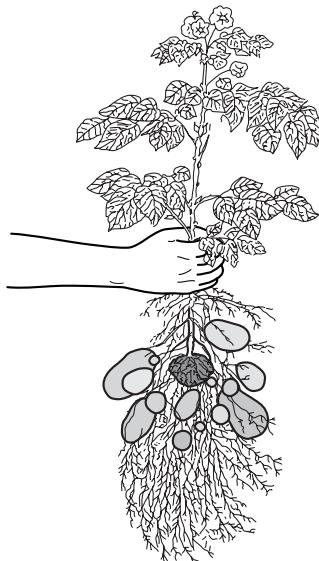
These potatoes can all grow into new plants.

(a) Write down the name of this type of reproduction.

.... **[1]**

(b) The potatoes grow by producing new cells by cell division.

Write down the name of this type of cell division.

.... **[1]**

(c) Harry grows different types of potatoes.

They all have different properties.

Some of these properties are shown in the table.

property of potato	type of potato			
	goldrush	**asterix**	**Yukon gold**	**pink eye**
good for baking	✓	✗	✓	✓
good for potato salads	✗	✓	✗	✗
skin colour	brown	red	yellow	pink
number of potatoes produced	high	very high	high	medium

(i) Harry wants to grow potatoes with a brown skin which are good for baking.

Which type should Harry grow?

.... [1]

(ii) Harry also wants to produce a yellow skinned potato with a very high yield.

He decides that he needs to set up a selective breeding programme.

Which **two** types of potato from the table should he use in his programme?

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

(iii) Harry starts his selective breeding programme by growing these two types of potato.

Describe what he should do to complete the selective breeding programme.

....

....

....

....

.... [2]

[Total: 6]

4 Scientists are trying to develop new treatments for heart attacks.

(a) Heart attacks may cause heart muscle to be damaged.

They are often caused by the build up of a substance in the arteries supplying blood to the heart muscle.

What is the name of this substance?

Put a (ring) around the answer in this list.

cholesterol

enzymes

plasma

protein

[1]

(b) The scientists insert a small tube into a blood vessel in the leg.

The tube is moved along inside this blood vessel so that it enters the heart.

They use this tube to inject stem cells into the heart muscle.
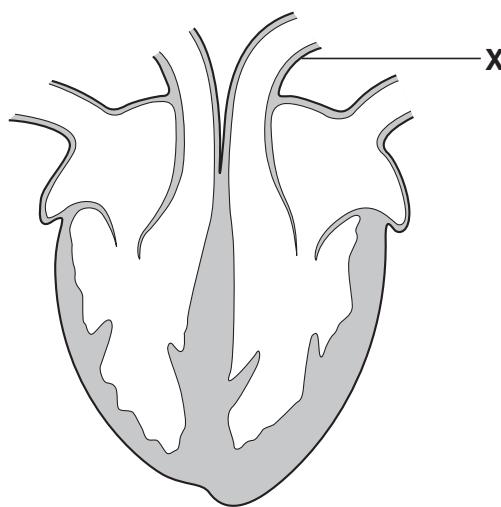
The tube enters the heart through the blood vessel labelled **X**.

Write down the name of blood vessel **X**.

.... [1]

(c) The scientists inject stem cells into the heart muscle.

They hope that the stem cells will repair the damaged muscle.

What are stem cells?

....

.... **[1]**

[Total: 3]

5 A scientist is explaining how she can help the police to find a thief.

> All I need to find is one cell at the crime scene.
> I can then remove the DNA from the cell.
> I then make many copies of the DNA.
> I use special protein molecules that act as catalysts to speed up this process.
> If the DNA found at the crime scene matches a person's DNA, this would make them a suspect.

(a) The DNA is removed from the cell.

Which part of the cell contains DNA?

.... **[1]**

(b) The scientist uses special protein molecules as catalysts to speed up reactions.

What are these protein molecules called?

.... **[1]**

(c) A suspect's DNA matches the DNA found at the crime scene.

The suspect claims the DNA could match someone else as well.

Why is the scientist sure the DNA could **not** match someone else as well?

....

.... **[1]**

[Total: 3]

Section B – Module C3

6   This question is about the elements in the Periodic Table.

Look at the list of elements.

bromine	**chromium**
hydrogen	**iodine**
magnesium	**neon**
nitrogen	**oxygen**
potassium	**sodium**

Answer the questions.

Choose your answers from the list.

Each element can be used **once**, **more than once** or **not at all**.

The Periodic Table on the back page may help you.

(a) Write down the name of the element which has the **atomic number 12**.

  .... [1]

(b) Write down the names of two elements in **Period 3**.

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

(c) Write down the name of an element which has **8 electrons** in its outer shell.

  .... [1]

(d) Write down the name of a **transition element**.

  .... [1]

[Total: 4]

Turn over

7 Copper is a very useful metal.

Look at the pie-chart. It shows the uses of copper.

non-electrical
machinery
13%

other uses
8%

transport
equipment
13%

electrical
36%

metal products
like piping
30%
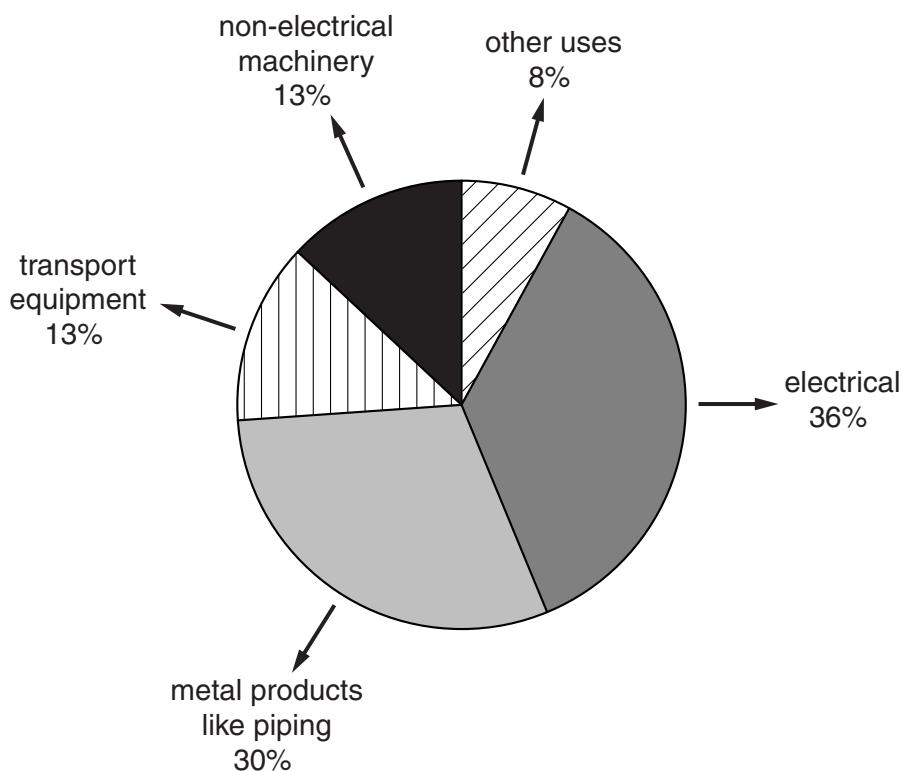
(a) What is the **largest** use for copper?

.... **[1]**

(b) The bottom of a saucepan is often made from copper.

Explain why.

....

.... **[1]**

13

(c) Nadia holds a flask half full of a solution.

She does not know if the solution contains

- a copper compound (containing Cu^{2+} ions)

- or an iron compound (containing Fe^{2+} ions)

She uses sodium hydroxide solution to find out.

Nadia adds sodium hydroxide solution to the unknown solution in the flask.

A coloured solid forms.

She decides that the unknown solution contains a copper compound.

(i) Write down the **colour** of the solid made.

.... [1]

(ii) Write down the name of the type of solid which forms in the flask.

.... [1]

[Total: 4]

8 This question is about chemical formulas.

Look at the list of chemical formulas.

$$MgO$$

$$CO_2$$

$$CuCO_3$$

$$NaOH$$

$$Cl_2$$

$$H_2SO_4$$

(a) (i) Write down the formula of an **element**.

Choose your answer from the list.

answer .... **[1]**

(ii) Which formula contains **7** atoms?

Choose your answer from the list.

answer .... **[1]**

(b) Write down the names of the **elements** in sodium hydroxide, NaOH.

The Periodic Table on the back page may help you.

.... **[1]**

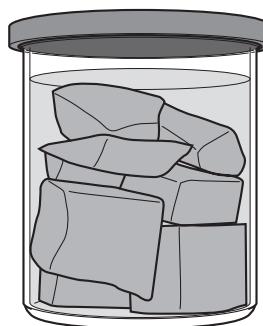**[Total: 3]**

15

9   This question is about the alkali metals.

Lithium, sodium and potassium are called the alkali metals.

(a) (i) Which **group** of the Periodic Table are the alkali metals in?

.... [1]

(ii) The alkali metals are stored under **oil**.

The picture shows lumps of sodium stored under oil.

Explain why alkali metals such as sodium are stored under oil.

....

....

.... [2]

(b) Alkali metals are identified by the colours they give to a flame.

Draw a straight line from each **metal** to the correct **flame colour**.
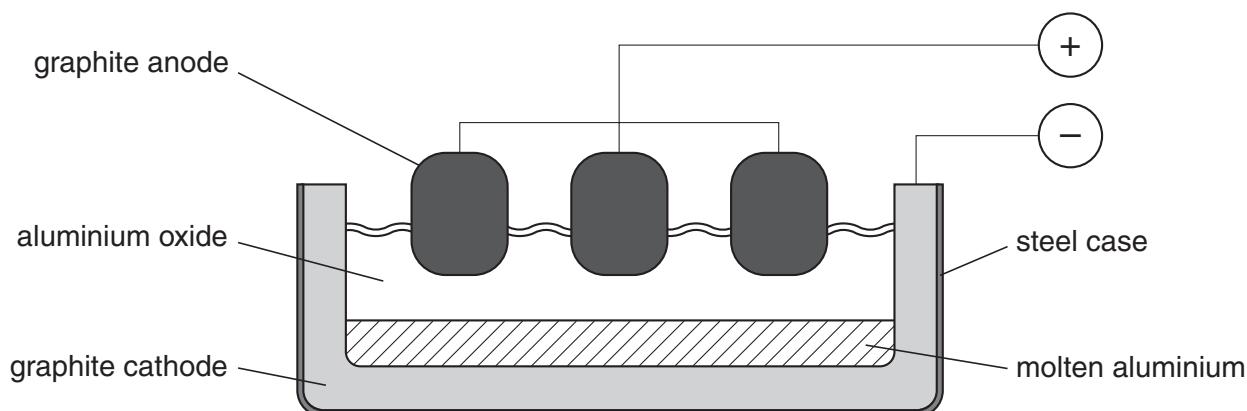
You should only draw **three** lines.

metal	flame colour
sodium	lilac
potassium	yellow
lithium	red

[2]

[Total: 5]

Turn over

10 Aluminium is extracted from its mineral using electricity.

Look at the diagram. It shows the equipment that is used.

(a) Molten aluminium oxide is broken down by electrolysis into aluminium and oxygen.

Write down the **word** equation for the electrolysis of aluminium oxide.

………………………… …………………………	$\rightarrow$	………………………… …………………………	+	………………………… …………………………

[1]
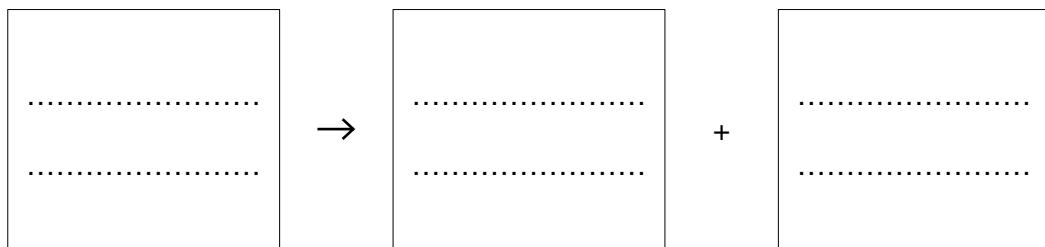
(b) Write down the name of a **mineral** that contains aluminium oxide.

.... [1]

(c) Every few days the **graphite anodes** have to be replaced.

Explain why the graphite anodes need to be replaced.

In your answer

• describe what happens to the graphite anodes

• and explain why it happens.

....

....

.... [2]

[Total: 4]

Section C – Module P3

11 Four swimmers have a race. They swim two lengths of the swimming pool.

Dave measures the time each swimmer takes to swim two lengths.

Look at the information about the swimmers.

swimmer	time for 1st length in seconds	time for 2nd length in seconds
Daly	22	20
Gita	24	24
Sam	21	22
Duncan	26	30

(a) Who swims fastest for the **first** length?

Choose from   **Daly**   **Gita**   **Sam**   **Duncan**

.... **[1]**

(b) Who increases their speed for the **second** length?

Choose from   **Daly**   **Gita**   **Sam**   **Duncan**

.... **[1]**

(c) Who has the shortest time for the **whole** race?

Choose from   **Daly**   **Gita**   **Sam**   **Duncan**

.... **[1]**

(d) Daly swims 25 metres in 20 seconds.

Calculate Daly's speed. Write down the unit used to measure speed.

The equations on page 2 may help you.

....

....

answer .... unit .... **[3]**

[Total: 6]

Turn over

12 Look at the information about road vehicles.

type of vehicle	van	car	people carrier	4X4	motorbike
average fuel consumption in km per litre	7	11	8	6	20

(a) Which vehicle has the **worst** fuel consumption?

Choose from

van

car

people carrier

4X4

motorbike

.... **[1]**

(b) The car and van have the same power, mass and engines.

But the car has a higher top speed than the van.

Look at the diagrams.
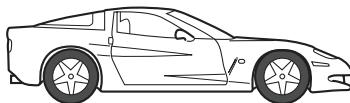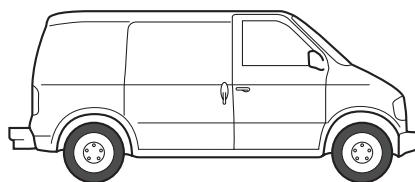
Why does the car have a **higher** top speed?

In your answer write about

• shape of the vehicles

• drag forces.

....

....

.... **[2]**

(c) All these vehicles use a fuel made from fossil fuel.

Name **one** fuel these vehicles could use.

.... **[1]**

(d) Some vehicles can use solar power instead of fuels.

Explain how some vehicles use solar power.

....

....

.... **[2]**
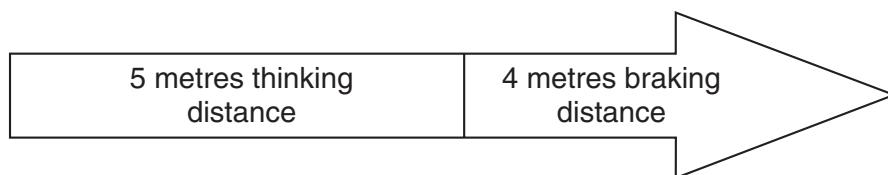
[Total: 6]

Turn over

13 This question is about road safety.

(a) Look at the diagram.

It shows the stopping distance for a car travelling at 6 m/s (15 miles per hour).

5 metres thinking distance	4 metres braking distance

(i) Calculate the total **stopping** distance for the car.

answer .... m **[1]**

(ii) When the car goes faster the **thinking** distance increases.

What will happen to the **braking** distance when the car goes faster?

.... **[1]**

(iii) Write down **one** other thing that increases thinking distance.

.... **[1]**

(b) The car brakes. Look at the diagram.

braking force = 2000 N

4 metres
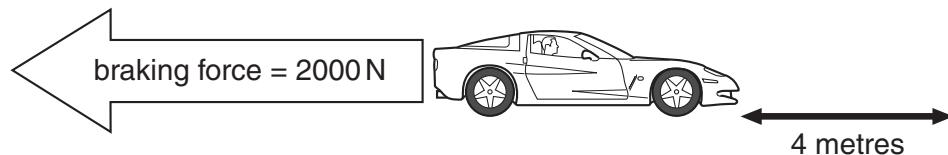
The braking force is 2000 N. The braking distance is 4 m.

Calculate the **work done** by the brakes on the car.

The equations on page 2 may help you.

....

....

answer .... J **[2]**

(c) The brakes on the car absorb the kinetic energy.

What happens to the temperature of the brakes when braking?

.... **[1]**

(d) Cars are fitted with safety features.

    (i) Seatbelts are one safety feature.

       Why must seatbelts be changed after a crash?

       ....

       .... **[1]**

    (ii) Name one **other** safety feature fitted to cars.

       .... **[1]**

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[Total: 8]

</div>

END OF QUESTION PAPER

22

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The Periodic Table of the Elements

Key

| relative atomic mass |
| **atomic symbol** |
| name |
| atomic (proton) number |

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

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.