THIS IS A LEGACY SPECIFICATION

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OCR
RECOGNISING ACHIEVEMENT

Thursday 26 January 2012 – Morning

**GCSE GATEWAY SCIENCE
ADDITIONAL SCIENCE B**

B623/01 Unit 1 Modules B3 C3 P3 (Foundation Tier)

Candidate forename		Candidate surname	

Centre number					Candidate number				

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 **20** pages. Any blank pages are indicated.

Turn over

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 B3

1 (a) The diagram shows a sperm cell.

Why does a sperm cell need a tail?

.... **[1]**

(b) Complete the following sentences.

In sexual reproduction, a sperm cell joins with .... to make a zygote.

The joining of these two cells is called ....

The zygote grows by .... to make new cells.

At first the new cells are all the same but later different types of cells are made.

This process is called .... **[4]**

(c) Our bodies continue to make new cells for the whole of our lives.

This happens even in adults who have stopped growing bigger.

Explain why adults need to make new cells.

....

.... **[1]**

[Total: 6]

Turn over

2 The photograph shows some blood cells.
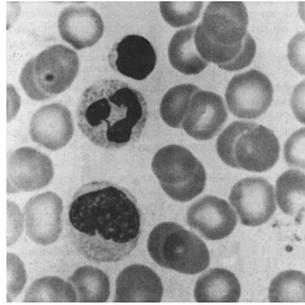
(a) Red blood cells are adapted to carry oxygen.

One way they are adapted is their small size.

This allows them to pass through very small capillaries.

Describe **one other** way red blood cells are adapted to carry oxygen.

....

.... **[1]**

(b) The blood also contains white blood cells.

White blood cells can be produced rapidly if the body is infected.

What would happen if white blood cells were **not** produced rapidly?

.... **[1]**

(c) If a person has heart disease their heart can **not** do its job properly.

  (i) What happens to the flow of blood around your body if your heart can **not** do its job properly?

  .... **[1]**

  (ii) The heart will not do its job properly if the heart muscle is not getting enough oxygen.

  This can be caused by a build-up of a fatty substance in the arteries supplying the heart muscle.

  Write down the name of this fatty substance.

  .... **[1]**

(d) Some people with heart disease need heart transplants but there is a shortage of suitable hearts.

For this reason some scientists have cloned genetically engineered pigs.

The pigs contain some human genes.

If their hearts are given to humans as transplants there is less risk of them being rejected.

   (i) What is meant by **cloning**?

   ....

   .... **[1]**

   (ii) What is meant by **genetic engineering**?

   ....

   .... **[1]**
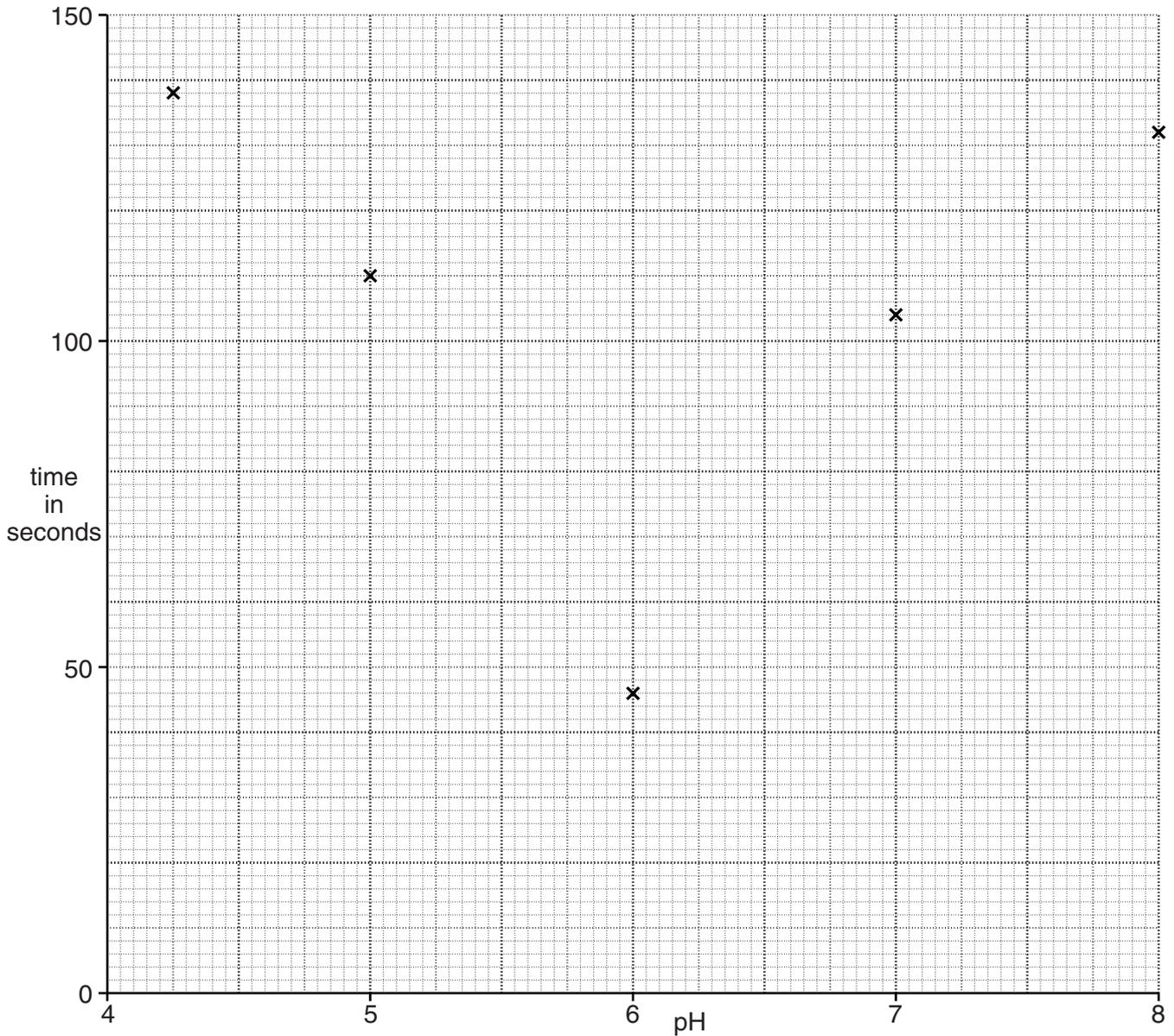
   [Total: 6]

Turn over

3 Rennin is an enzyme that is used to make cheese.

When added to milk, it makes the milk curdle and form a solid.

It does this by making a protein called casein.

(a) Bob and Jane investigate how long it takes rennin to curdle milk at different pHs.

They plot their results on a graph.

(i) Finish the graph by drawing the best curve. **[1]**

(ii) Bob says that the results prove that pH 6 is the optimum pH for rennin.

Is Bob correct? ....

Explain your answer.

....

.... **[1]**

(b) An enzyme called pepsin breaks down casein.

Casein is broken down into smaller molecules called amino acids.
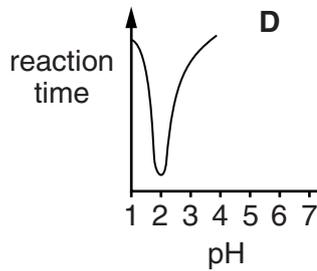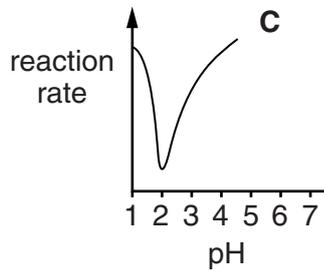
This happens in the stomach.

(i) Describe what happens to the amino acids next.

....

....

.... **[2]**

(ii) Pepsin has an optimum pH of 2.

Look at the graphs.

Which **graph** or **graphs** are correct?
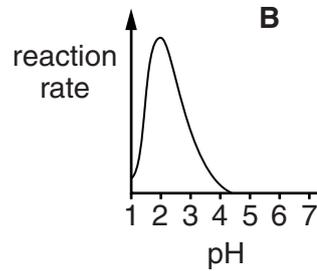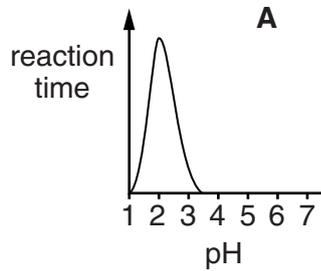
answer .... **[1]**

(c) Rennin is coded for by genes.

Write about the gene for rennin.

In your answer include

  •   what this gene is made of

  •   where this gene is found.

....

....

....

.... **[3]**

[Total: 8]

Turn over

Section B – Module C3

4   Look at the table. It shows the properties of some Group 7 elements.

element	symbol	atomic number	colour	state at room temperature	melting point in °C	boiling point in °C
fluorine	F	9	pale yellow	gas	−220	−188
chlorine	C*l*	17	pale green	....	−101	−35
....	Br	35	red/ brown	liquid	−7	59
iodine	I	53	dark grey	solid	114	184

(a) (i)   The name of the Group 7 element with atomic number 35 is missing from the table.

Write the name of this element in the table.   **[1]**

   (ii)   Complete the table to show the state of chlorine at room temperature.   **[1]**

   (iii)   The atomic number increases down the group.

Describe how the **melting point** and **boiling point** change down the group.

....

....

....

.... **[2]**

(b) Write down **one** use of chlorine.

.... **[1]**

[Total: 5]

5 **(a)** Asif and Jane carry out some flame tests.

They test the chemicals in three bottles.

They know that one bottle contains sodium chloride, another potassium chloride and a third lithium chloride.

The names are missing from the bottles.

Asif and Jane are asked to find out which chemical each bottle contains.

Describe how they do a flame test.

You should include

- what they do

- the results they would get for each chemical.

You may wish to draw a diagram to help your answer.

....

....

....

.... **[3]**

(b) Sodium, potassium and lithium are Group 1 elements.

What is the name given to the Group 1 elements?

.... **[1]**

(c) Sodium carbonate has the formula

$$Na_2CO_3$$

What is the **total number** of **atoms** in this formula?

.... **[1]**

[Total: 5]

Turn over

6 This question is about sulfur.

Use the Periodic Table on the back page to help you to answer these questions.

(a) Find sulfur in the Periodic Table.

   (i) What is the **atomic number** of sulfur?

   .... [1]

   (ii) Write down the name of an element in the same **group** of the Periodic Table as sulfur.

   .... [1]

   (iii) To which **period** in the Periodic Table does sulfur belong?

   .... [1]

(b) Sulfur is found in sulfamic acid.

The formula for sulfamic acid is

$$H_3NSO_3$$

Write down the **names** of the **elements** in sulfamic acid.
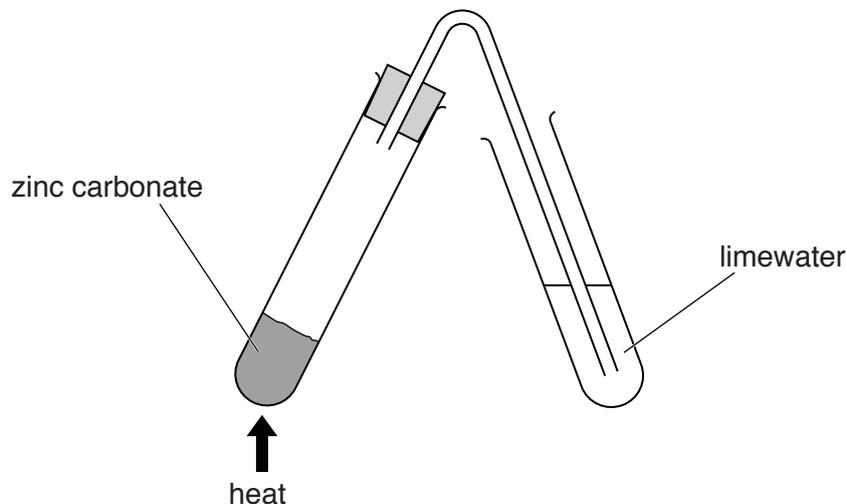
Sulfur has been done for you.

1   sulfur

2   ....

3   ....

4   ....   **[1]**

[Total: 4]

7 Paul and Claire heat zinc carbonate.

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

zinc carbonate

limewater

heat

(a) Look at the word equation for the reaction.

zinc carbonate $\longrightarrow$ zinc oxide + carbon dioxide

(i) What happens to the limewater when carbon dioxide is bubbled through it?

.... **[1]**

(ii) This reaction is a **thermal decomposition** reaction.

Complete the sentence about thermal decomposition.

Choose phrases from this list.

at least two	**broken down**	**built up**
not changed	**one or two**	**three or more**

Thermal decomposition is a reaction in which a substance

is .... into .... different

substances by heat.

[2]

(b) Zinc and iron are transition elements.

Iron(II) sulfate solution reacts with sodium hydroxide solution to make an insoluble solid called iron(II) hydroxide.

Complete the sentences.

Two solutions are mixed. An insoluble solid is made.

This type of solid is called a .... **[1]**

[Total: 4]

Turn over

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

Look at this list of elements.

aluminium	**argon**
calcium	**chlorine**
gold	**helium**
lithium	**oxygen**

Answer the questions.

Choose your answers from the list.

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

The Periodic Table on the back page may help you.

(a) Which element is a transition element?

.... [1]

(b) Which element has an atom with only one electron in its outer shell?

.... [1]

[Total: 2]

Turn over

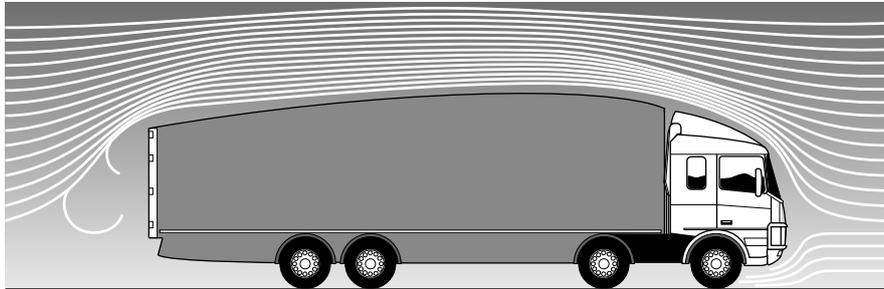## Section C – Module P3

9 Cliff is a lorry driver.

(a) The diagram shows how air flows around his lorry.

The lorry is a new design called a teardrop.

It uses 10% less fuel than a normally-shaped lorry.

Finish the sentences. Choose words from this list.

centrifugal

decreases

frictional

gravitational

increases

stays the same

The shape of the lorry reduces the .... force acting upon the lorry.

This means that the maximum possible speed of the lorry .... **[2]**

(b) The lorry is empty and parked. Cliff starts the lorry.

It takes him 15 s to reach a speed of 50 km/h when his lorry is empty.

If the lorry were fully loaded, what difference would this make?

....

.... **[1]**

(c) Cliff is driving the lorry on a motorway.

He sees the traffic in front is **not** moving. He starts to brake.

(i) Which two factors will affect Cliff's **thinking** distance?

Put ticks (✓) in the boxes next to the **two** correct answers.

the speed of the lorry ☐

the road conditions ☐
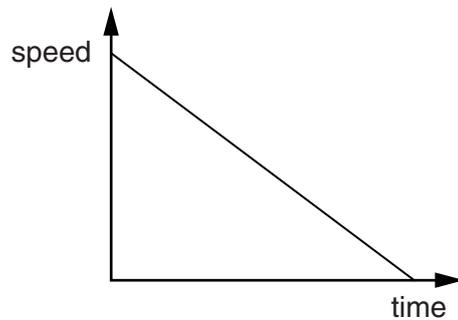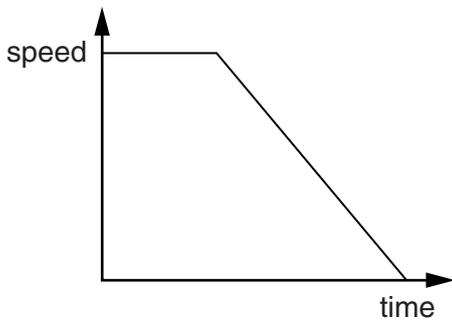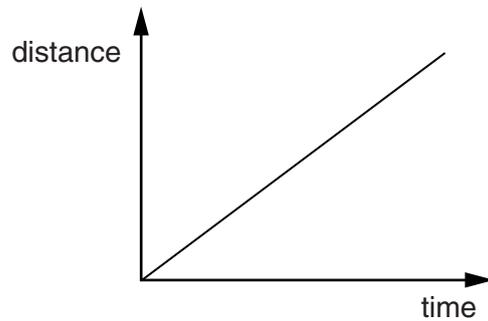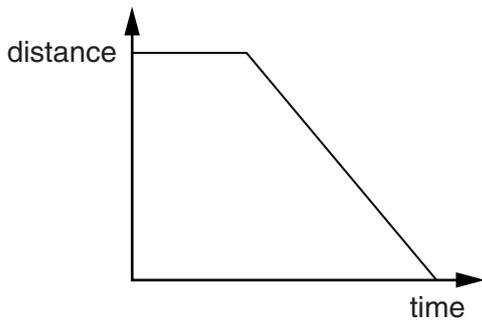
the condition of the brakes ☐

the condition of the tyres ☐

how tired Cliff is ☐

[2]

(ii) Which graph best shows the motion of the lorry from the time Cliff sees the stationary traffic to the time the lorry stops?

Put a (ring) around the correct graph.

[1]

[Total: 6]

Turn over

10 Sandy is working out at the health club.

She is lifting dumbbell weights as fast as she can.

50 N dumbbell
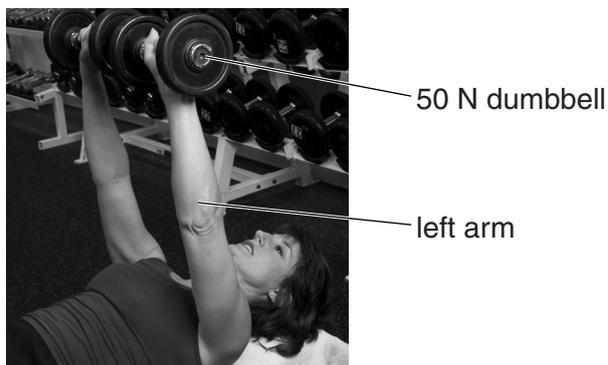
left arm

Each arm lifts a 50 N dumbbell 0.6 m.

This lift takes 0.9 s.

(a) Calculate the **work done** by Sandy's left arm every time she lifts the dumbbell.

The equations on page 2 may help you.

....

....

....

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

(b) Calculate the average **power** developed in Sandy's left arm.

The equations on page 2 may help you.

....

....

....

answer ....W **[2]**

(c) Complete the sentence to describe the energy changes involved.

Sandy's arms are extended. The gravitational potential energy of the dumbbell is at its maximum.

Sandy lowers her arms. The gravitational potential energy .... and the

moving dumbbell gains .... energy. **[2]**

[Total: 7]

11 Ray fastens his seat belt every time he travels in a car.

The seat belt keeps Ray in his seat during a crash. It stops him hitting the windscreen.

It will also help to reduce injury.

(a) Explain how the **seat belt** helps to reduce injury in a crash.

.... **[1]**

(b) Write down two **other** safety features of a car that help to reduce injury in a crash.

....

.... **[2]**

[Total: 3]

12 Most cars use a fuel made from crude oil (a fossil fuel) as their energy source.

(a) Write down the names of **two** fuels used by cars which are made from crude oil.

1 ....

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

(b) Describe **two** ways in which electricity can be used as an energy source for some cars.

....

....

.... **[2]**

[Total: 4]

END OF QUESTION PAPER

18

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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
									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		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		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		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							

Transition elements:

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
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
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
[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	

1 **H** hydrogen 1

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.