OCR
RECOGNISING ACHIEVEMENT

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A216/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

TWENTY FIRST CENTURY SCIENCE

ADDITIONAL SCIENCE A

Unit 2 Modules B5 C5 P5 (Foundation Tier)

WEDNESDAY 18 JUNE 2008

Afternoon
Time: 40 minutes

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

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

CUP/T44371

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 **42**.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.

FOR EXAMINER'S USE		
Qu.	**Max**	**Mark**
1	6	
2	5	
3	3	
4	4	
5	5	
6	3	
7	2	
8	4	
9	5	
10	5	
TOTAL	42	

This document consists of **15** printed pages and **1** blank page.

[Turn over

TWENTY FIRST CENTURY SCIENCE EQUATIONS

Useful Relationships

Explaining Motion

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

momentum = mass × velocity

change of momentum = resultant force × time for which it acts

work done by a force = force × distance moved by the force

change in energy = work done

change in GPE = weight × vertical height difference

kinetic energy = $\frac{1}{2}$ × mass × [velocity]^2

Electric Circuits

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

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

energy transferred = power × time

power = potential difference × current

$$\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

The Wave Model of Radiation

wave speed = frequency × wavelength

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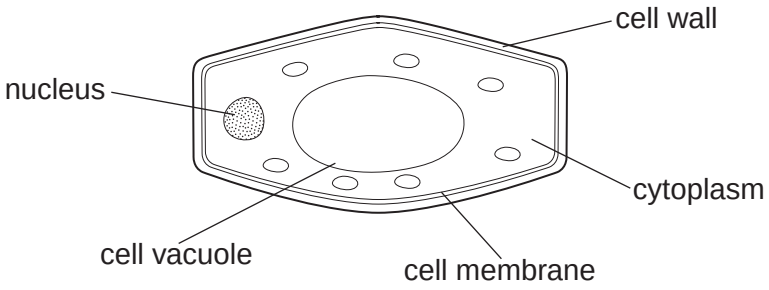
PLEASE DO NOT WRITE ON THIS PAGE

Question 1 starts on page 4

Answer **all** the questions.

1 Mike studies cells in plants and animals.

He draws a typical plant cell.



(a) The genetic code is held in the molecule, DNA.

DNA codes for the production of proteins.

Write the **name** of the correct part of the cell in each box.

Use names from the diagram.

	part of cell
where DNA is held	
where protein is produced	

[2]

(b) Mike is interested in the structure of DNA.

Complete the following sentences about DNA.

Choose words from the list.

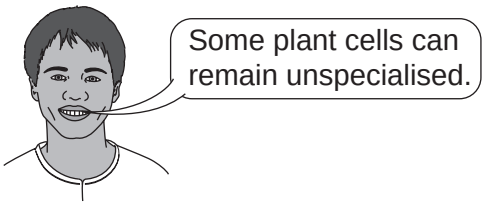
acids **bases** **double helix** **genes** **single strand** **triple helix**

The DNA structure is in the shape of a …… .

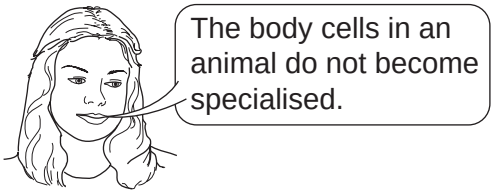
DNA contains four different …… . [2]

(c) Mike asks his friends to describe the differences between plants and animals.

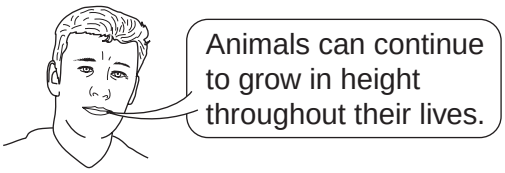
Two gave wrong answers.



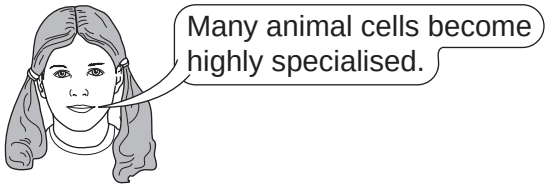
Hassan



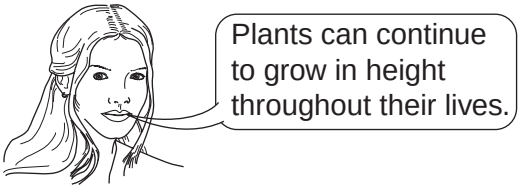
Ruth



Joe



Joss



Lizzie

Which **two** people gave **wrong** descriptions of the differences between plants and animals?

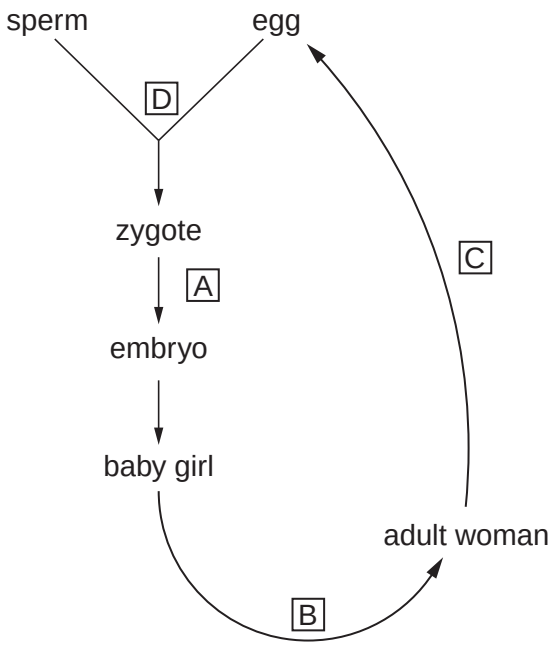
…… and …… [2]

[Total: 6]

2 This baby girl has just been born.

She is part of the human life cycle.

© Mother & Baby Picture Library / EMAP



(a) At which stage, **A**, **B**, **C** or **D**, in the cycle does meiosis take place?

answer …… [1]

(b) The chromosome number in most human body cells is 46.

Put a ring around the number of chromosomes in human cells produced by meiosis.

2 **23** **46** **92** [1]

(c) Mitosis also takes place in the human life cycle.

What happens to the chromosome number when body cells divide by mitosis?

Put a ring around the correct answer.

doubles **halves** **quarters** **stays the same** [1]

(d) One of the stages in the human life cycle is the formation of a zygote.

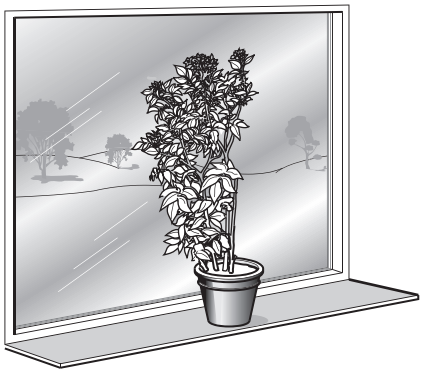
Put ticks (✓) in the boxes to show if the statements about the zygote are **true** or **false**.

The zygote contains …	**true**	**false**
… a unique combination of chromosomes.		
… a set of chromosomes from each parent.		
… only chromosomes from the mother.		
… twice the number of chromosomes found in the sperm.		
… half the number of chromosomes found in the egg.		

[2]

[Total: 5]

3 This plant is growing towards the window.



(a) **(i)** What process causes the plant to grow towards the window?

Put a ring around the correct word.

phototropism **reproduction** **respiration** [1]

(ii) How does the plant benefit from this process?

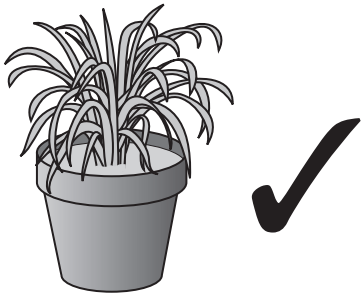
Complete the sentence.

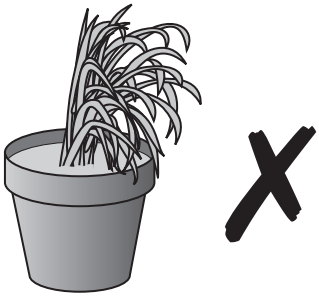
Choose from this list.

carbon dioxide **light** **oxygen** **water**

This process helps the plant to get more …… . [1]

(b) People prefer to buy plants with leaves growing in all directions.

A 

B 

What is the best way of producing plants like **A**?

Put a tick (✓) in the correct box.

grow them with an overhead source of light ☐

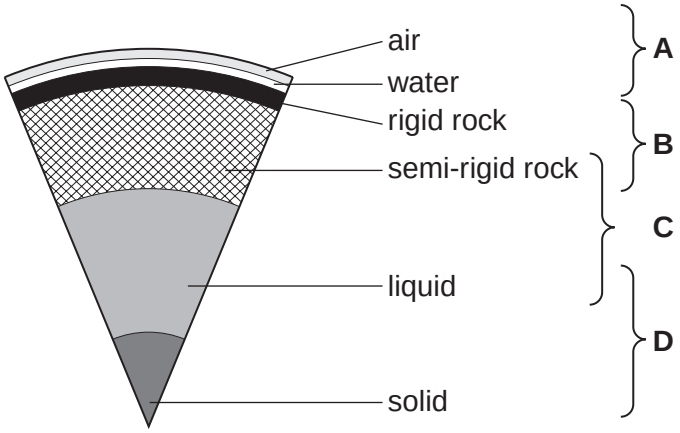
grow them in the dark ☐

grow them next to windows ☐

[1]

[Total: 3]

4 The Earth is made of different layers.



(a) Which layer, **A**, **B**, **C** or **D**, is the lithosphere?

answer …… [1]

(b) Here are some elements which are in the lithosphere.

Put a (ring) around each of the **three** most abundant elements.

aluminium	**chlorine**	**helium**
hydrogen	**silicon**	**oxygen**

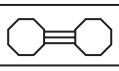
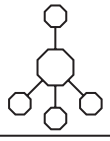
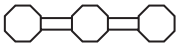
[3]

[Total: 4]

5 The Earth's atmosphere contains different gases.

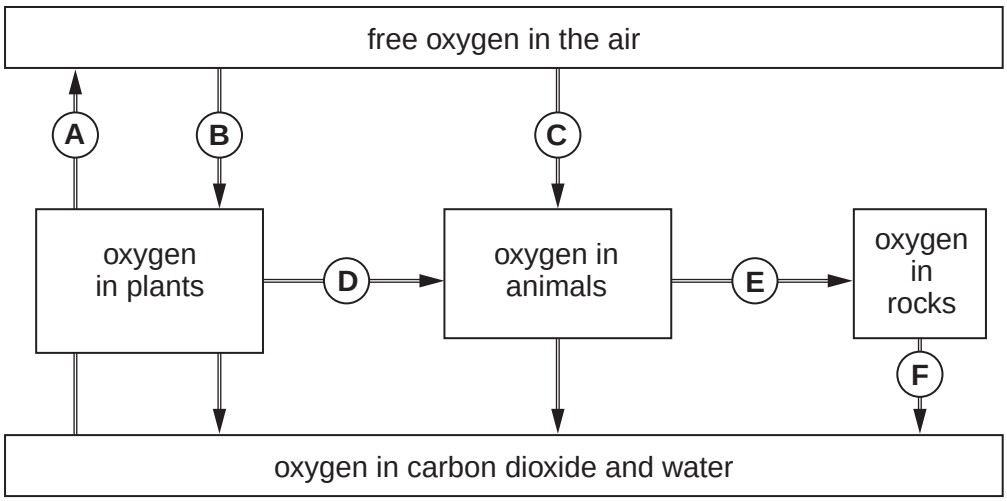
(a) Draw a straight line from the **formula** of each gas to its **name**.

Draw a straight line from the **formula** of each gas to its **structure**.

name	formula	structure
nitrogen	Ar	
argon	N_2	
carbon dioxide	CH_4	
methane	CO_2	

[3]

(b) Tony draws a diagram of an oxygen cycle.



(i) Most of these stages take place fairly quickly.

Which stage, **A**, **B**, **C**, **D**, **E** or **F**, is most likely to keep the oxygen out of the air for millions of years?

answer …… [1]

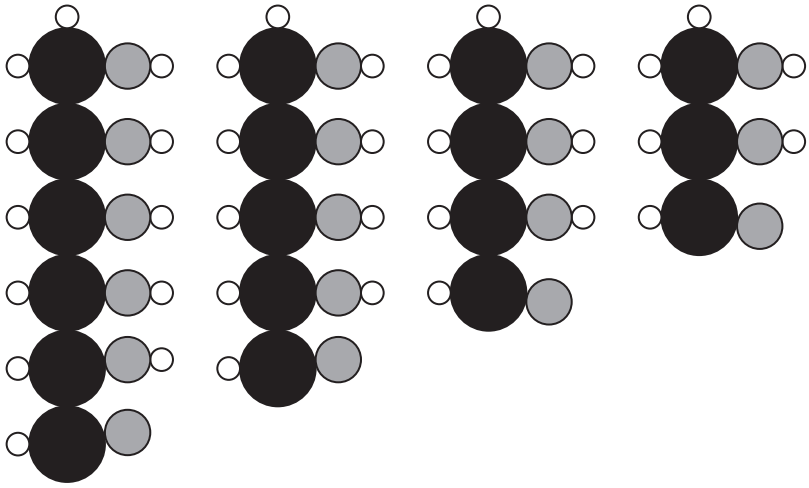
(ii) Give the letter for **one** stage which removes oxygen from the air. ……

Give the letter for **one** stage which puts oxygen into the air. …… [1]

[Total: 5]

6 There are different types of sugar. Each is made from the elements carbon, hydrogen and oxygen.

Here are diagrams of four of them.



$C_6H_{12}O_6$	$C_5H_{10}O_5$		$C_3H_6O_3$
A	**B**	**C**	**D**

(a) Which sugar, **A**, **B**, **C** or **D**, has the most oxygen atoms in one molecule?

answer …… [1]

(b) Put a ring around the symbol below which stands for a **hydrogen** atom.

[1]

(c) What is the molecular formula of sugar **C**? …… [1]

[Total: 3]

7 Some metals are extracted from a metal compound by melting the compound and then electrolysing it.

Which **two** of these substances, when melted, can be electrolysed to produce metals?

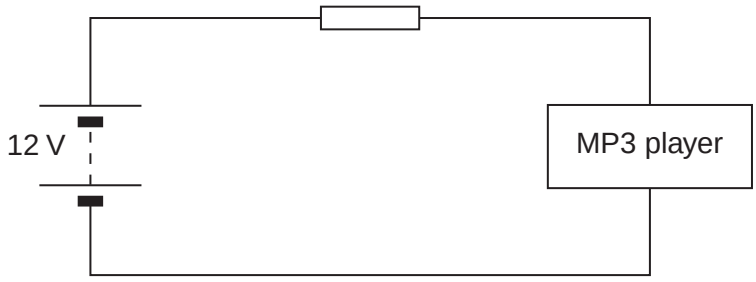
aluminium oxide	**carbohydrate**	**DNA**
protein	**silicon dioxide**	**sodium chloride**

…… and …… [2]

[Total: 2]

8 Jo likes to listen to her MP3 player in the car.

She uses this circuit to connect her MP3 player to the 12 V car battery.



(a) When the MP3 player is switched on, the potential difference across it is 1.5 V and the current in it is 0.05 A.

What is the power of her MP3 player?

Put a ring around the correct answer.

0.033 W **0.075 W** **30 W** [1]

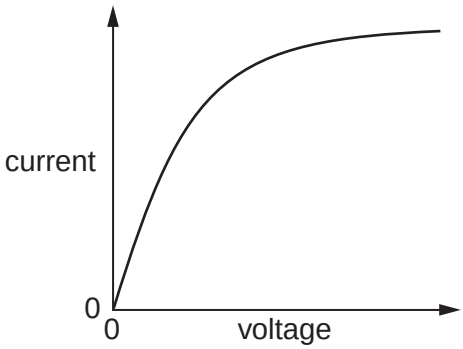
(b) Complete the sentences. Choose words from the list.

charge **power** **resistance** **temperature** **voltage**

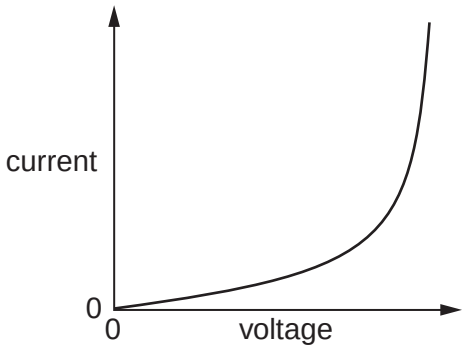
The resistor resists the flow of …… through the MP3 player.

This results in an increase in …… for the resistor. [2]

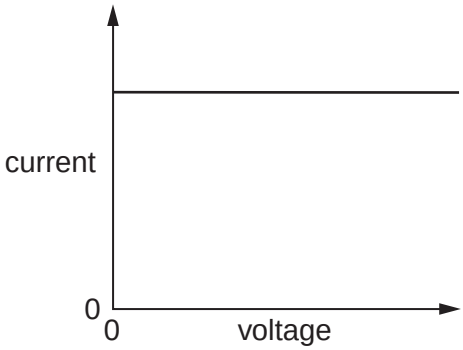
(c) Which of these graphs, **A**, **B**, **C** or **D**, shows how the current in the resistor depends on the voltage across it?



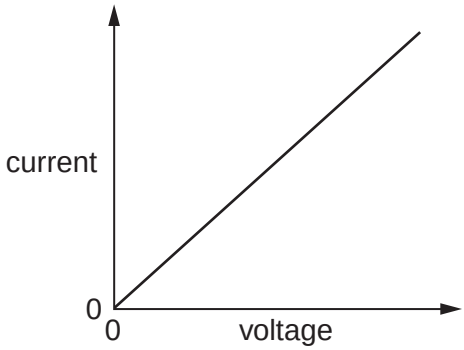
A



B



C

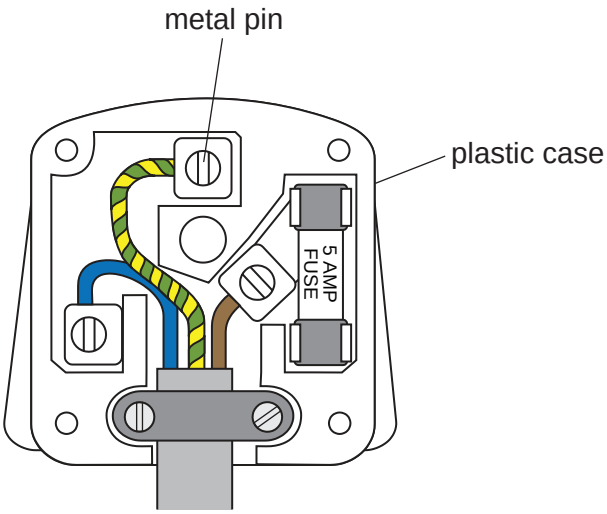


D

answer …… [1]

[Total: 4]

9 Julie investigates the mains plug on her computer.



(a) Draw a straight line from the **start** of each sentence to its correct **end**.

start	**end**
The metal pin ...	... arrives at the plug at 230 V.
The plastic case ...	... has no free electrons for an electric current.
The mains supply ...	... has free electrons to make an electric current.

[2]

(b) Complete the sentences about the mains electricity supply.

Choose from the list.

a.c. **d.c.** **h.t.** **generators** **inductors** **transformers**

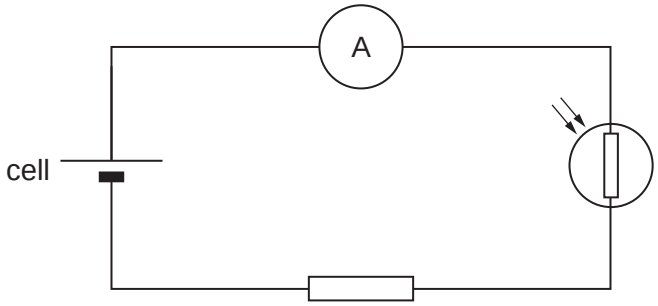
The mains electricity to our homes is …… .

It is made by …… in power stations.

Its voltage can be changed by …… . [3]

[Total: 5]

10 Daniel builds this circuit. It contains an LDR.



(a) Put a (ring) around the LDR. [1]

(b) Draw a straight line from each **component** of the circuit to its **function**.

component	function
cell	has a variable resistance
ammeter	has a constant resistance
LDR	pushes electrons around the circuit
	measures flow of electrons around the circuit

[3]

(c) Complete the sentence. Choose words from the list.

bigger than **smaller than** **the same as**

The current in the ammeter is …… the current in the resistor. [1]

[Total: 5]

END OF QUESTION PAPER

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.