Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GENERAL CERTIFICATE OF SECONDARY EDUCATION

B624/01

GATEWAY SCIENCE

ADDITIONAL SCIENCE B

Unit 2 Modules B4 C4 P4
(Foundation Tier)

MONDAY 25 JANUARY 2010: Afternoon
DURATION: 1 hour

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

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)

READ INSTRUCTIONS OVERLEAF

DC (CW/SW) MEP10245 24482

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.
- 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.
- 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 three.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is 60.

EQUATIONS

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

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

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

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

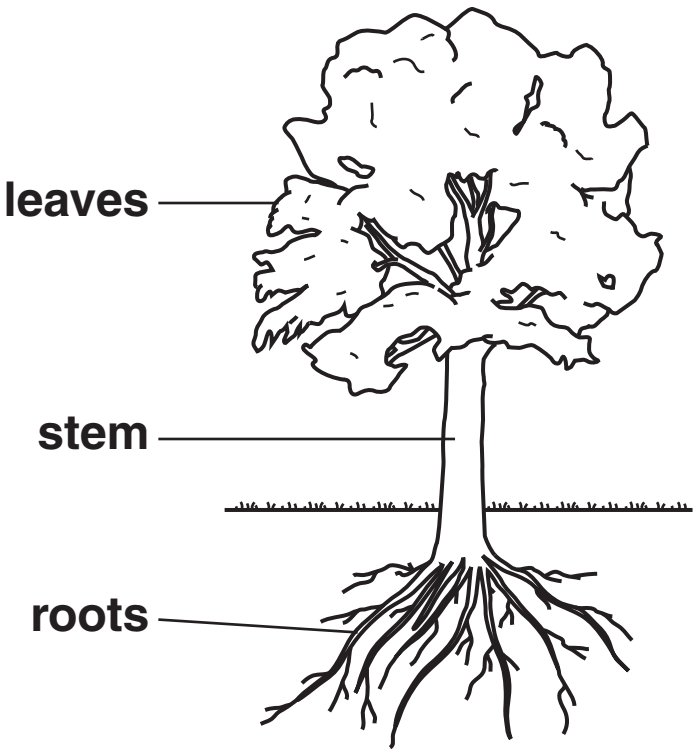
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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

Answer ALL the questions.

SECTION A – MODULE B4

1 Look at the tree.



(a) (i) Where does water enter a tree?

_____ **[1]**

(ii) Where does carbon dioxide enter a tree?

_____ **[1]**

(b) Water and carbon dioxide are used in photosynthesis.

Write down <u>ONE</u> substance that is <u>MADE</u> in photosynthesis.

_____ **[1]**

(c) Different parts of plants have different jobs.

Draw a line to match each job with the correct part of a plant.

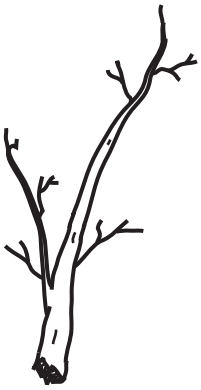
Draw <u>THREE</u> lines only.

JOB	PART OF PLANT
anchorage	flower
photosynthesis	leaf
reproduction	root

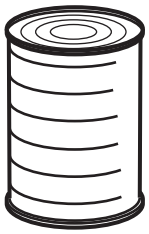
[2]

[Total: 5]

2 (a) Look at some objects left at a rubbish tip.

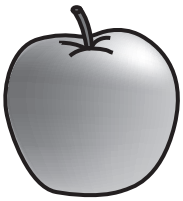


TREE BRANCH



TIN CAN

CAR TYRE



PIECE OF FRUIT

GLASS BOTTLE

Which object will decay the quickest?

Choose your answer from the list.

_____ **[1]**

(b) If bread is left for a few days it can become mouldy. This is an example of decay.

Roy notices that sometimes bread goes mouldy more quickly than at other times.

Write about the factors that affect how quickly bread goes mouldy.

_____

_____

_____

_____ **[3]**

[Total: 4]

3 Ann is in the supermarket. She wants to buy carrots.

She finds two types of carrots.

One type is grown using organic farming methods.

The other type is grown using intensive farming methods.

(a) The organic carrots are grown without using any artificial fertilisers.

Only natural fertilisers such as compost are used.

Describe <u>TWO OTHER</u> ways organic farming methods are different from intensive farming methods.

1 _____

_____

2 _____

_____ [2]

(b) (i) How might carrots be different if they are grown without any fertiliser at all?

_____ [1]

(ii) Natural fertilisers and artificial fertilisers both provide minerals.

How do minerals get into plants?

_____ [1]

(c) Some people think organic farming is better for the environment than intensive farming.

Write down <u>ONE DISADVANTAGE</u> of organic farming.

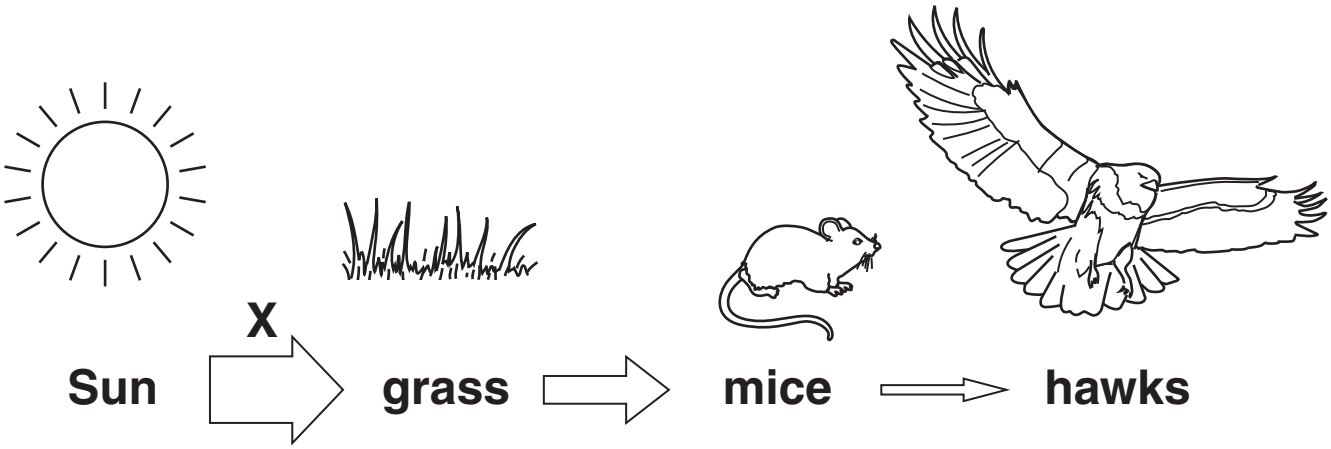
_____

_____ **[1]**

[Total: 5]

4 Look at the food chain.

The numbers show the amount of energy used for growth at each stage of the food chain.



(a) Process X transfers energy from the Sun to the grass.

What is process X?

_____ **[1]**

(b) 2% of the energy in the grass is transferred to the mice.

This is a lower figure than the percentage of energy transferred from the mice to the hawks.

(i) What percentage of the energy in the mice is transferred to the hawks?

answer _____% [2]

(ii) NOT all the energy at one stage of a food chain is transferred to the next.

Write down ONE reason why.

_____ [1]

(iii) The percentage of the energy transferred from the mice to the hawks is more than that transferred from the grass to the mice.

Suggest why.

_____

_____ [1]

(c) Look at the food chain.

A disease reduces the number of hawks.

What is likely to happen to the amount of grass?

_____

Explain your answer.

_____

_____ [1]

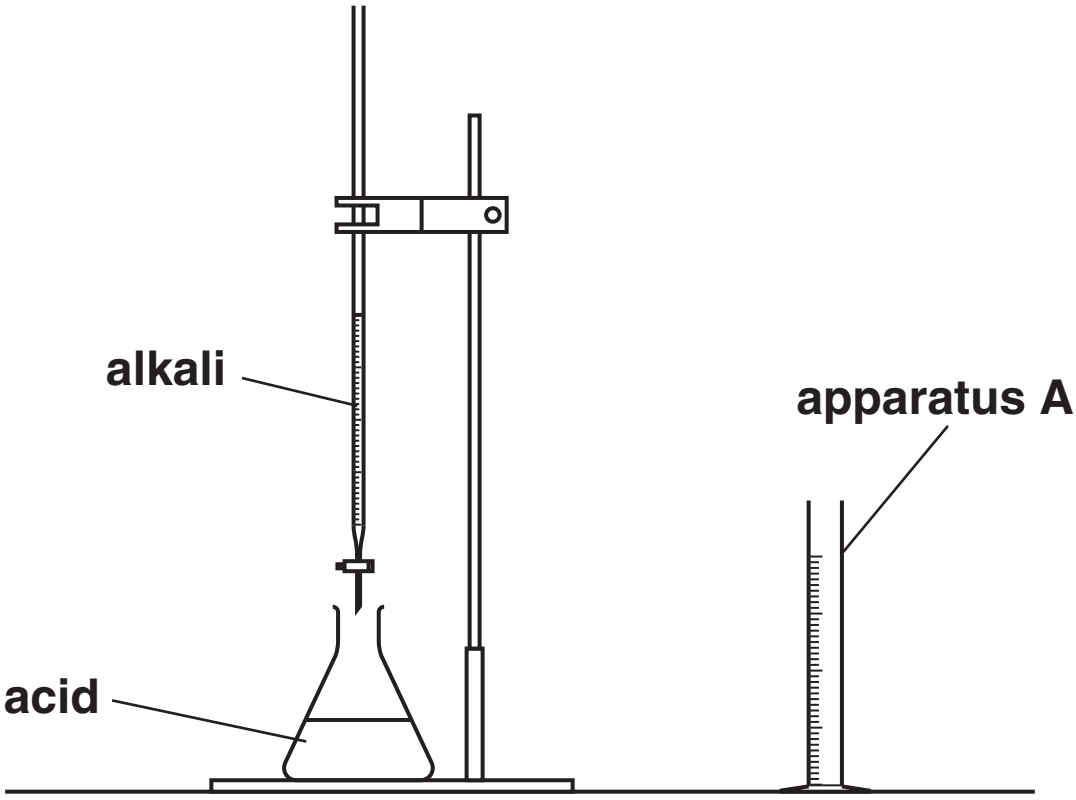
[Total: 6]

SECTION B – MODULE C4

5 This question is about fertilisers.

Fertilisers can be made by NEUTRALISATION.

Look at the diagram. It shows the equipment used.



(a) What is apparatus A?

_____ **[1]**

(b) Complete the word equation to show what happens during neutralisation.

acid + base → _____ + _____

[2]

(c) Potassium hydroxide is an alkali.

What is the pH of potassium hydroxide solution?

Choose from:

1 4 7 13

answer _____ [1]

(d) Nitric acid is an acid.

What is the pH of nitric acid?

Choose from:

2 7 9 13

answer _____ [1]

(e) Potassium hydroxide reacts with nitric acid.

What is the name of the fertiliser made?

_____ [1]

(f) Fertilisers provide essential elements needed for healthy plant growth.

Two of these essential elements are nitrogen and potassium.

Write down the name of the third essential element.

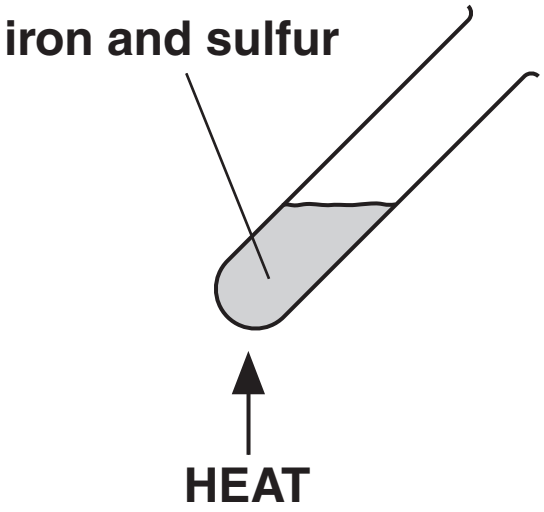
_____ [1]

[Total: 7]

6 This question is about chemical calculations.

Jake and Monty make iron sulfide.

They heat a mixture of iron and sulfur.



Look at the equation for the reaction.

$$Fe + S \rightarrow FeS$$

$$\text{iron} + \text{sulfur} \rightarrow \text{iron sulfide}$$

(a) Calculate the relative formula mass, M_r, of iron sulfide.

The relative atomic mass of iron is 56 and of sulfur is 32.

_____

_____

answer _____ [1]

(b) Jake and Monty start with 5.6 g of iron and 3.2 g of sulfur.

What mass of iron sulfide will they make?

_____ [1]

(c) They make another sample of iron sulfide.

They predict that they will make 9.0 g.

They actually make 7.2 g.

Calculate their percentage yield.

_____

_____

answer _____% [2]

[Total: 4]

7 This question is about chemical processes.

Ammonia is made 24 hours a day, 7 days a week.

(a) What is the name of this TYPE of process?

_____ **[1]**

(b) Finchfield Pharmaceuticals make medicines.

The medicines are made on demand when they are needed.

What is the name of this TYPE of process?

_____ **[1]**

(c) One of the costs of making medicines is the cost of paying the workers.

Write about OTHER costs of making medicines.

_____

_____

_____ **[2]**

[Total: 4]

8 Washing up liquid is used to clean plates.

Washing up liquid contains several ingredients.

Draw a straight line to match each INGREDIENT to its USE.

INGREDIENT	USE
active detergent	thins out the detergent
rinse agent	helps water drain off dishes
water softener	softens hard water
water	cleans dishes

[3]

[Total: 3]

9 Ammonia is made in the Haber process.

Look at the equation.

$$N_2 + 3H_2 \rightleftharpoons 2NH_3$$

(a) Write down the <u>FORMULA</u> of one <u>REACTANT</u>.

_____ **[1]**

(b) One condition used in the Haber process is an iron catalyst.

Write down one <u>OTHER</u> condition used.

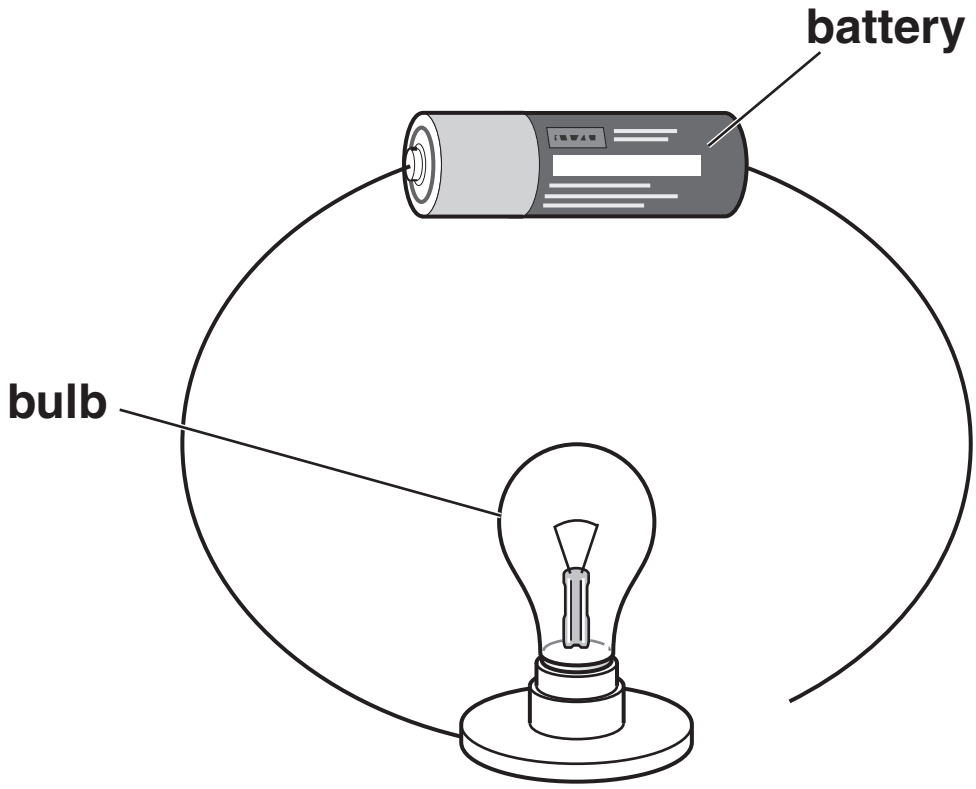
_____ **[1]**

[Total: 2]

SECTION C – MODULE P4

10 Mike sets up the following circuit.

Look at the circuit.



(a) The bulb does NOT light.

Why does the bulb NOT light?

_____ **[1]**

(b) Mike changes his circuit and the bulb lights.

He adds a resistor to the circuit between the battery and the bulb.

(i) What happens to the CURRENT in the circuit?

_____ [1]

(ii) What happens to the BRIGHTNESS of the bulb?

_____ [1]

[Total: 3]

11 (a) Look at the longitudinal wave in a slinky spring.

(i) Which letter represents the centre of a compression?

_____ [1]

(ii) Finish the sentence.

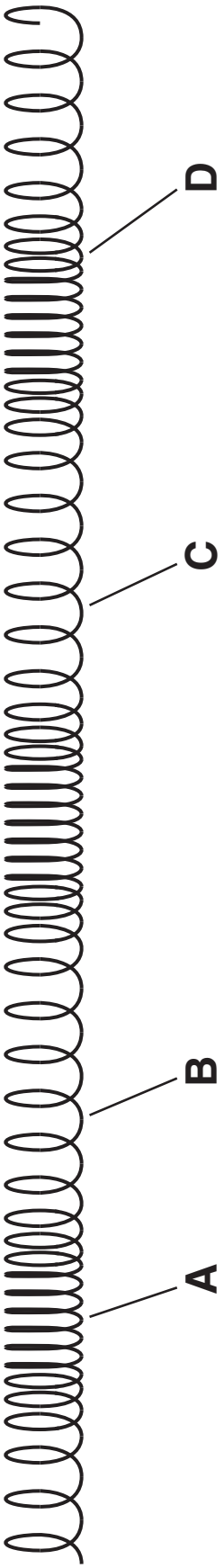
One wavelength is the distance between

letters _____ and _____ .
[1]

(b) Write down ONE other example of a longitudinal wave.

_____ [1]

[Total: 3]



12 This question is about static electricity.

(a) Mel rubs some plastic with a piece of fur.

The plastic and the fur become charged.

What are the two TYPES of charge?

Finish the sentence.

The two types of charge are _____

and _____ . **[2]**

(b) Mel hangs up a charged plastic rod on a cotton thread.

She brings another charged rod towards it.

The rods move apart.

Why do the two rods move apart?

_____ [1]

(c) Photocopiers and laser printers use static electricity to make them work.

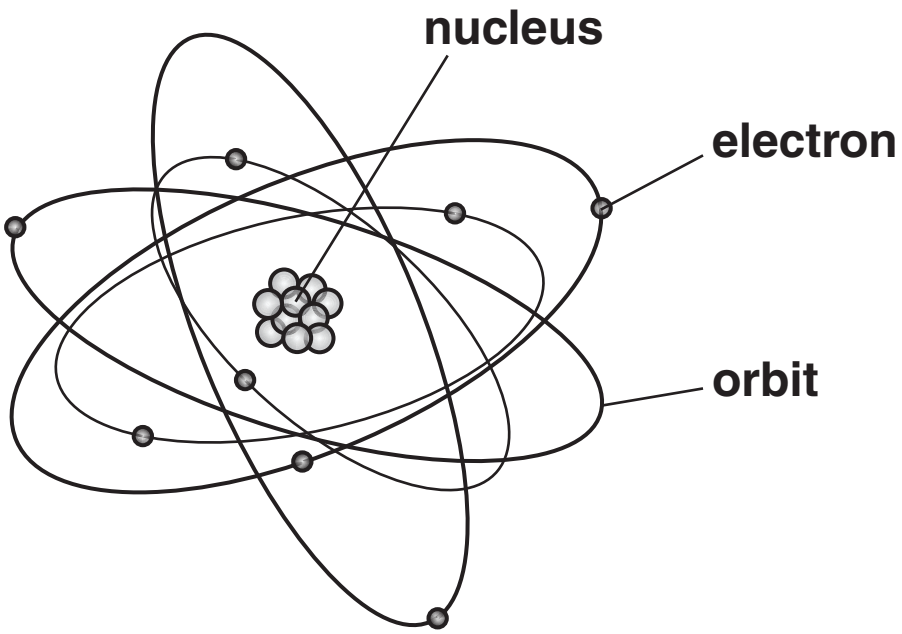
Write down two OTHER uses of electrostatics.

1 _____

2 _____ [2]

[Total: 5]

13 (a) The diagram represents a radioactive atom.



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

ELECTRONS NUCLEUS ORBITS

STABLE UNSTABLE

Radiation comes from the _____ of the atom.

The radioactive atom is _____ . [2]

(b) The radioactivity of an object changes with time.

(i) Sketch a graph to show how the radioactivity changes.

Use these axes.

[1]

(ii) Finish the sentence.

The radioactivity of an object is measured by

the number of _____ per second. [1]

[Total: 4]

14 Radioactive atoms can emit THREE different types of nuclear radiation.

One type is ALPHA (α) radiation.

(a) Write down the names of the OTHER two types of nuclear radiation.

1 _____

2 _____ [2]

(b) Americium-241 does not occur naturally.

It is a source of alpha radiation. It is used in smoke alarms.

(i) Where is americium-241 made?

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

in a lead lined box	☐
in the core of a nuclear reactor	☐
in the path of X-rays	☐
near to another radioactive source	☐

[1]

(ii) **Describe how a smoke detector containing americium-241 works.**

Use ideas about <u>IONISATION</u> to answer the question.

_____

_____

_____

_____

_____ **[2]**

[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.