

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
 GATEWAY SCIENCE  
 ADDITIONAL SCIENCE B**

Unit 1 Modules B3 C3 P3 (Foundation Tier)

**MONDAY 21 JANUARY 2008**

Afternoon  
 Time: 1 hour

Candidates answer on the question paper.

**Additional materials (enclosed):**

None

Calculators may be used.

**Additional materials:** Pencil  
 Ruler (cm/mm)



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.
- Do **not** write outside the box bordering each page.
- 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 60.
- 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	
<b>TOTAL</b>	<b>60</b>	

This document consists of **23** printed pages and **1** blank page.

## 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**  
**BLANK PAGE**

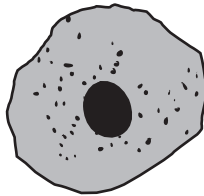
**Question 1 begins on page 4.**

**PLEASE DO NOT WRITE ON THIS PAGE**

Answer **all** the questions.

**Section A – Module B3**

1 (a) Look at the diagram of a cheek cell.



On the diagram, label the nucleus.

[1]

(b) Look at the list.

Put a **ring** around the part of the cell where most chemical reactions take place.

**cell membrane**

**cytoplasm**

**nucleus**

[1]

(c) Chromosomes are found in the nucleus.

Chromosomes are made from a chemical.

Write down the name of this chemical.

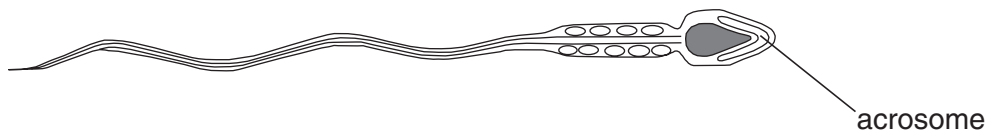
..... [1]

(d) Cells divide so that organisms can grow bigger.

Write down **one other** reason why cells divide.

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

(e) Look at the diagram of a sperm cell.



(i) The acrosome contains a type of chemical.

Write down the name of this type of chemical.

..... [1]

(ii) Describe the job of this chemical in sexual reproduction.

..... [1]

[Total: 6]

2 Gary and Peter are twins.

They both came from the same fertilised egg.



© iStockphoto.com / Galina Barskaya

(a) Finish the sentences about Gary and Peter.

Choose the **best** words from this list.

**clones**

**different**

**identical**

**similar**

**zygotes**

Gary and Peter have ..... genes.

This makes them naturally occurring .....

[2]

(b) Like all infants Gary and Peter are monitored by a health visitor to make sure they are growing normally.

Their masses are measured every three months.

The table shows their masses.

age in months	0	3	6	9	12	15	18	21	24
Gary's mass in kg	2.8	5.2	6.8	8.0	9.0	9.6	10.0	10.3	10.3
Peter's mass in kg	3.0	6.0	8.0	9.6	10.4	11.2	11.8	12.2	12.6

Peter's mass has been plotted on a graph.

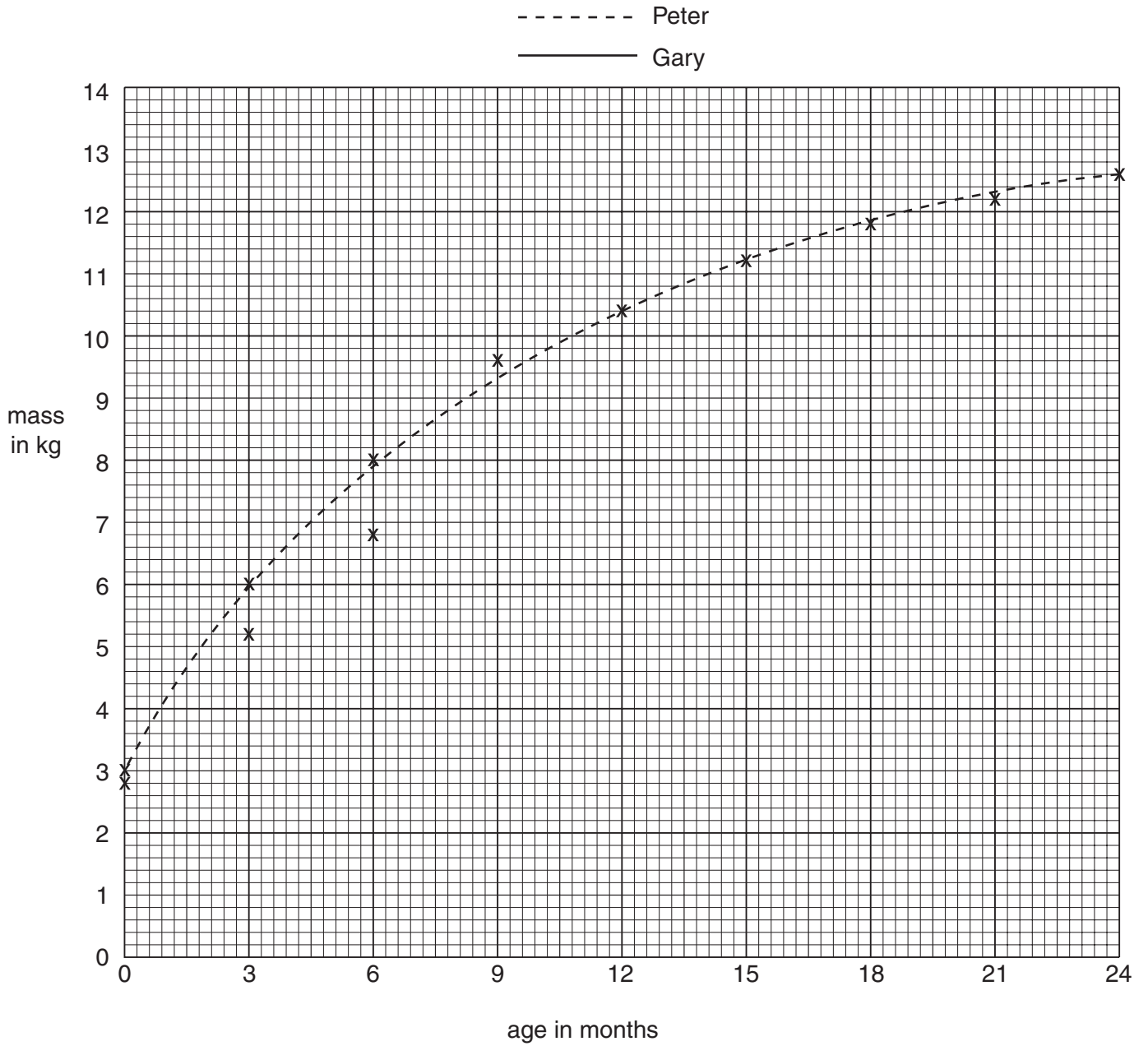
(i) Finish the graph by plotting the mass for Gary.

The first three points have been done for you.

[2]

(ii) Draw the best curve for Gary.

[1]



(c) The health visitor is concerned about Gary.

Suggest why.

.....  
 .....

[1]

[Total: 6]

3 Look at the photograph of a human foetus.



© Dr M.A. Ansary / Science Photo Library

(a) The foetus is attached to the mother by the **placenta**.

Look at the statements.

Which one **best** describes the job of the placenta?

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

to pass oxygen from the foetus to the mother

to pass carbon dioxide from the mother to the foetus

to pass oxygen from the mother to the foetus

to pass waste from the mother to the foetus

[1]

(b) During pregnancy a midwife will check the heart of the foetus.

Write down the job of the heart.

..... [1]

(c) Arteries are a type of blood vessel.

(i) Write down the name of **one other** type of blood vessel.

..... [1]

(ii) One artery takes blood from the heart to the lungs.

A gas leaves the blood in the lungs.

Put a **ring** around the gas that leaves the blood in the lungs.

**carbon dioxide**

**carbon monoxide**

**nitrogen**

**oxygen**

[1]

[Total: 4]



4 Jennifer has a plant growing by the window.

Look at the picture.



Jennifer thinks the plant is growing towards light.

She investigates whether plants do grow towards light.

Here is a list of apparatus Jennifer could use.

- two plants
- two boxes
- scissors

(a) Describe how Jennifer could use the apparatus to prove the plants grow towards light.

You may use a **labelled** diagram to help you.

.....

.....

.....

.....

(b) Jennifer finds out more about the growth of plants.

She finds out that chemicals called hormones control growth.

Plant hormones control other processes in the plants.

Write down **one other** process plant hormones control.

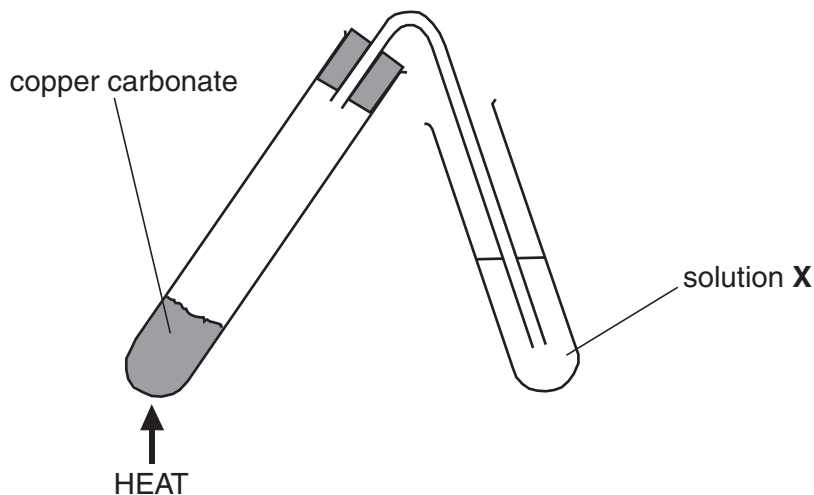
..... [1]

[Total: 4]

Section B – Module C3

5 Fred and Liz heat copper carbonate.

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



(a) This reaction shows **thermal decomposition**.

Complete the sentence about the thermal decomposition of copper carbonate.

Choose phrases or words from the list.

**broken down**

**built up**

**electricity**

**heat**

**light**

**unchanged**

Thermal decomposition is a reaction where copper carbonate

is ..... into two different substances

by .....

[2]

(b) In this reaction the copper carbonate is changed into copper oxide and carbon dioxide.

Write a **word** equation for this reaction.

..... [1]

(c) Solution **X** is limewater.

What happens to limewater when carbon dioxide is bubbled through it?

..... [1]

[Total: 4]

6 This question is about carbon dioxide.

(a) The bonds in carbon dioxide are made up of shared electrons.

What type of bonding is this?

Choose from the list.

**covalent**

**ionic**

**metallic**

answer ..... [1]

(b) What is the state of carbon dioxide at room temperature?

Choose from the list.

**gas**

**liquid**

**solid**

answer ..... [1]

(c) Carbon dioxide has a low melting point.

This is a physical property.

Write down one **other** physical property of carbon dioxide.

..... [1]

[Total: 3]

7 John and Leah do some flame tests.

They test the chemicals in three bottles.

One bottle contains sodium chloride, another potassium chloride and a third lithium chloride.

The labels are missing from the bottles.

John and Leah want to find out which chemical each bottle contains.

(a) 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 labelled diagram to help your answer.

.....

.....

.....

..... [3]

(b) Lithium, sodium and potassium are Group 1 elements.

What is the common name for the Group 1 elements?

Choose from the list.

**alkali metals**

**halogens**

**noble gases**

**transition elements**

answer ..... [1]

[Total: 4]

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

element	molecular formula	colour	state at room temperature
fluorine	F <sub>2</sub>	pale yellow	gas
chlorine	Cl <sub>2</sub>	.....	gas
bromine	Br <sub>2</sub>	red/brown	.....
iodine	I <sub>2</sub>	dark grey	solid
astatine	At <sub>2</sub>	black	solid

- (a) Complete the table to show the **colour** of chlorine and the **state** of bromine at room temperature. [2]

- (b) Which is the most reactive Group 7 element?

..... [1]

- (c) Draw a straight line between each **substance** and its **use**.

You should draw only three lines.

substance	use
chlorine	to flavour food
iodine	to make pesticides and plastics
sodium chloride	to sterilise wounds

[2]

[Total: 5]

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

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

(a) Find sodium, Na, on the Periodic Table.

What is the atomic number of sodium?

..... [1]

(b) Which element has an atomic number of 17?

..... [1]

(c) Look at the formula.



Write down the names of the elements in the formula.

..... and ..... [2]

[Total: 4]



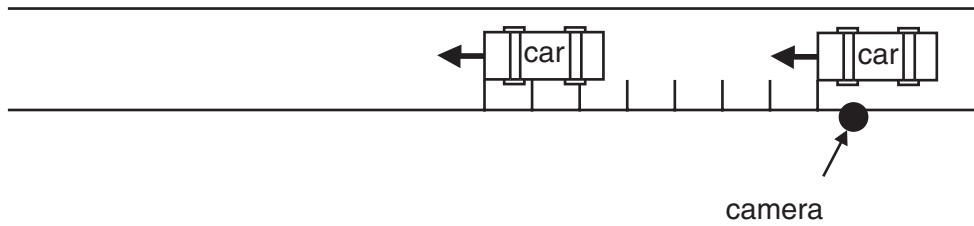
Section C – Module P3

10 This question is about road safety.

(a) There is a speed camera on the road.

There are lines painted on the road near the camera.

Look at the diagram.



The camera flashes twice.

**Two** photographs are taken of a speeding car.

The photographs show the places where the car was.

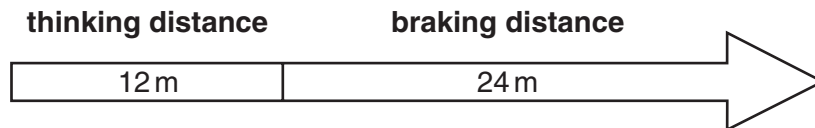
(i) Why are lines painted on the road?

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

(ii) Why does the camera take **two** photographs?

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

(b) Look at the diagram about the stopping distance for a car.



(i) What does **thinking distance** mean?

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

(ii) Higher speed increases the **thinking** distance.

What else will **increase** the thinking distance?

Write down **two** other examples.

1 .....

2 .....

[2]

[Total: 6]

11 Cars have safety features.

(a) How do air bags reduce injuries in a crash?

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

(b) Seatbelts have to be replaced after a crash.

Explain why.

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

(c) Electrically operated windows can be a **passive** safety feature.

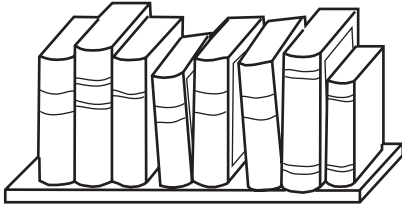
Write down **one** other passive safety feature.

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

[Total: 3]

12 This question is about energy.

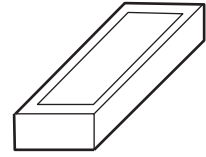
Look at the diagrams.



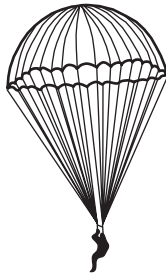
**A**  
books on a shelf



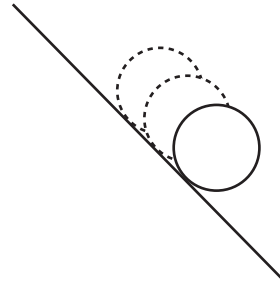
**B**  
climbing steadily  
up a mountain



**C**  
brick on floor



**D**  
parachute falling steadily



**E**  
ball rolling downhill

(a) (i) One of these has **only** potential energy.

Which **one**?

Choose from:      **A**      **B**      **C**      **D**      **E**

.....

[1]

(ii) Two of these have **zero** kinetic energy.

Which **two**?

Choose from:      **A**      **B**      **C**      **D**      **E**

..... and ..... [2]

(iii) One of these is **gaining** kinetic energy.

Which **one**?

Choose from:        **A**        **B**        **C**        **D**        **E**

..... [1]

(iv) One of these **transfers** potential energy **into** kinetic energy.

Which **one**?

Choose from:        **A**        **B**        **C**        **D**        **E**

..... [1]

(b) The mountain climber does **work** when he climbs the mountain.

The mountain climber does 4 000J of work in 100 seconds.

Calculate the **power** of the mountain climber.

Use the equations on page 2 to help you.

.....  
.....

answer ..... W [2]

(c) Look at the diagram of the books on the shelf.

**No** work is being done on the books.

Explain why.

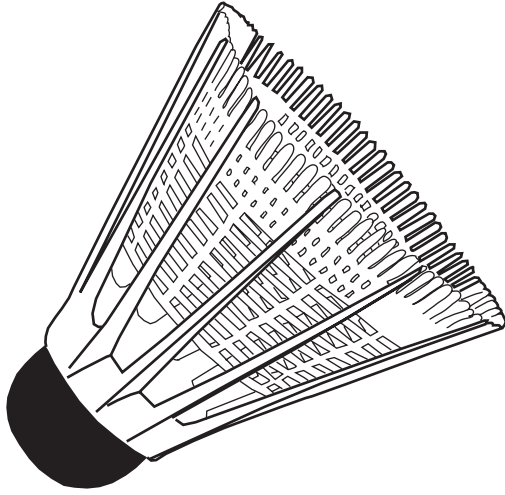
..... [1]

[Total: 8]

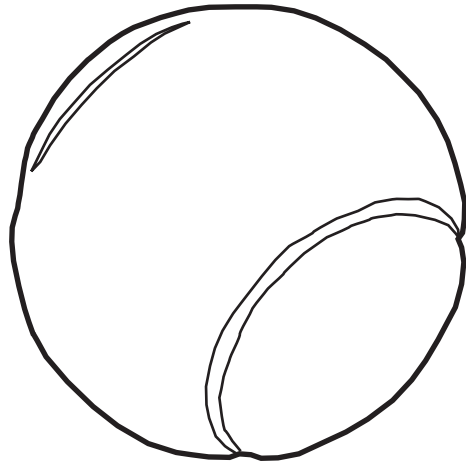
13 This question is about air resistance or drag.

These two objects can be hit with a racquet.

Look at the diagrams.



shuttlecock



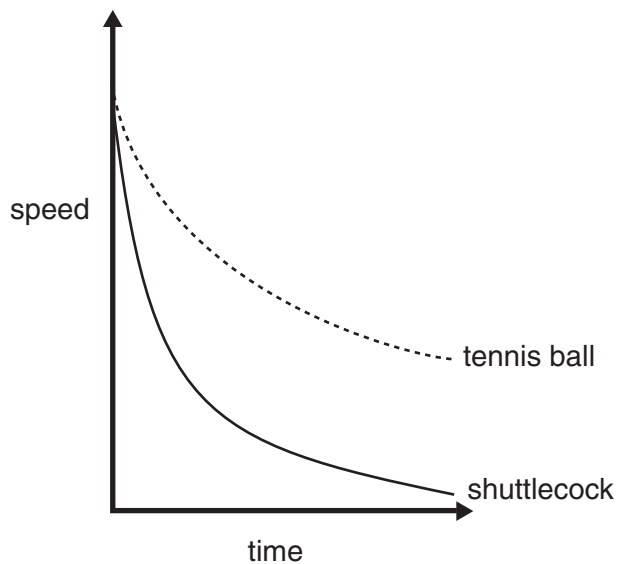
tennis ball

(a) Sally hits the two objects with the same racquet.

She hits them as hard as she can.

They both leave the racquet at the same speed.

Look at the graph of how their speeds change.



(i) The shuttlecock travels slower.

Suggest why.

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

(ii) Sally cannot hit the shuttlecock any harder.

Suggest what Sally could change to make it move **more quickly** through the air.

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

(b) There is no atmosphere in outer space.

This means that the shuttlecock would move further in outer space.

Suggest why.

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

[Total: 3]

**END OF QUESTION PAPER**

---

*Copyright Acknowledgements:*

Q.2 photo                    © iStockphoto.com / Galina Barskaya  
Q.3 photo                    © Dr M.A. Ansary / Science Photo Library

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (OCR) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

# The Periodic Table of the Elements

1	2	3	4	5	6	7	0										
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>Mg</b> magnesium 12	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>P</b> phosphorus 15	16 <b>S</b> sulfur 16	17 <b>Cl</b> chlorine 17	18 <b>Ar</b> argon 18								
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	23 <b>V</b> vanadium 23	24 <b>Cr</b> chromium 24	25 <b>Mn</b> manganese 25	26 <b>Fe</b> iron 26	27 <b>Co</b> cobalt 27	28 <b>Ni</b> nickel 28	29 <b>Cu</b> copper 29	30 <b>Zn</b> zinc 30	31 <b>Ga</b> gallium 31	32 <b>Ge</b> germanium 32	33 <b>As</b> arsenic 33	34 <b>Se</b> selenium 34	35 <b>Br</b> bromine 35	36 <b>Kr</b> krypton 36		
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Zr</b> zirconium 40	41 <b>Nb</b> niobium 41	42 <b>Mo</b> molybdenum 42	43 <b>Tc</b> technetium 43	44 <b>Ru</b> ruthenium 44	45 <b>Rh</b> rhodium 45	46 <b>Pd</b> palladium 46	47 <b>Ag</b> silver 47	48 <b>Cd</b> cadmium 48	49 <b>In</b> indium 49	50 <b>Sn</b> tin 50	51 <b>Sb</b> antimony 51	52 <b>Te</b> tellurium 52	53 <b>I</b> iodine 53	54 <b>Xe</b> xenon 54
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77	78 <b>Pt</b> platinum 78	79 <b>Au</b> gold 79	80 <b>Hg</b> mercury 80	81 <b>Tl</b> thallium 81	82 <b>Pb</b> lead 82	83 <b>Bi</b> bismuth 83	84 <b>Po</b> polonium 84	85 <b>At</b> astatine 85	86 <b>Rn</b> radon 86
[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[261] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1 <b>H</b> hydrogen 1
--------------------------------

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.