OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

ADDITIONAL SCIENCE B

Unit 1 Modules B3 C3 P3 (Foundation Tier)

B623/01

MONDAY 21 JANUARY 2008

Afternoon
Time: 1 hour
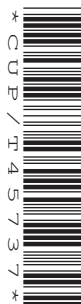
Candidates answer on the question paper.
Additional materials (enclosed):
None

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	
TOTAL	**60**	

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

2

EQUATIONS

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

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

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

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

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

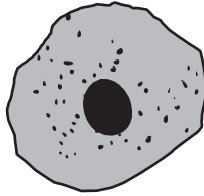$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

3

BLANK PAGE

Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

4

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.
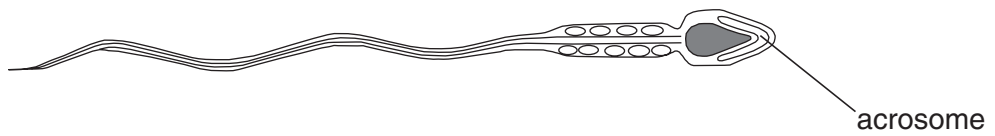
acrosome

   (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

7

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]

- - - - - - - Peter
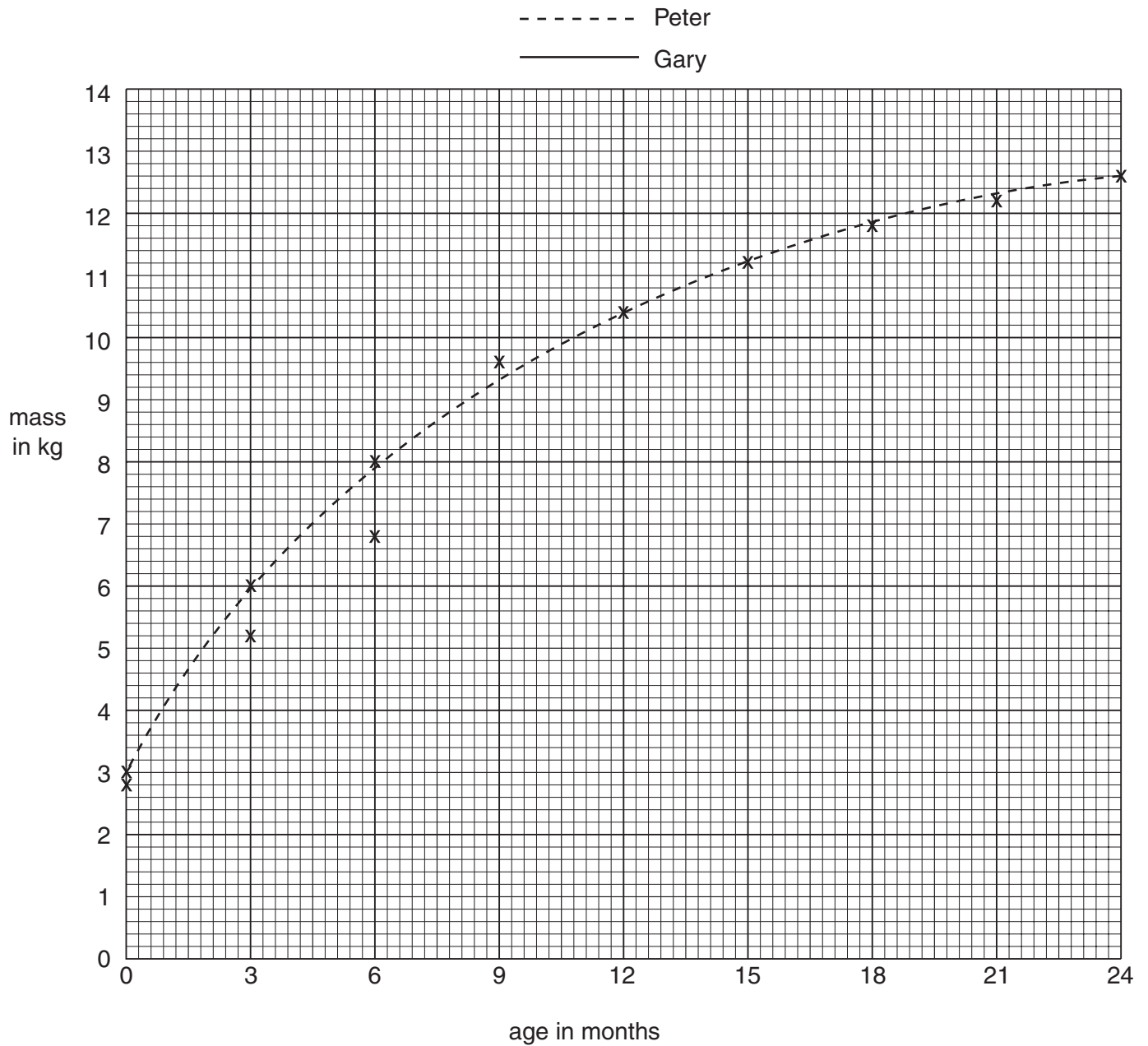
─────────── Gary

(c) The health visitor is concerned about Gary.

   Suggest why.

   ....

   .... [1]

   [Total: 6]

[Turn over

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.

....

....

....

.... [3]

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[Turn over for remainder of question 4

10

(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.

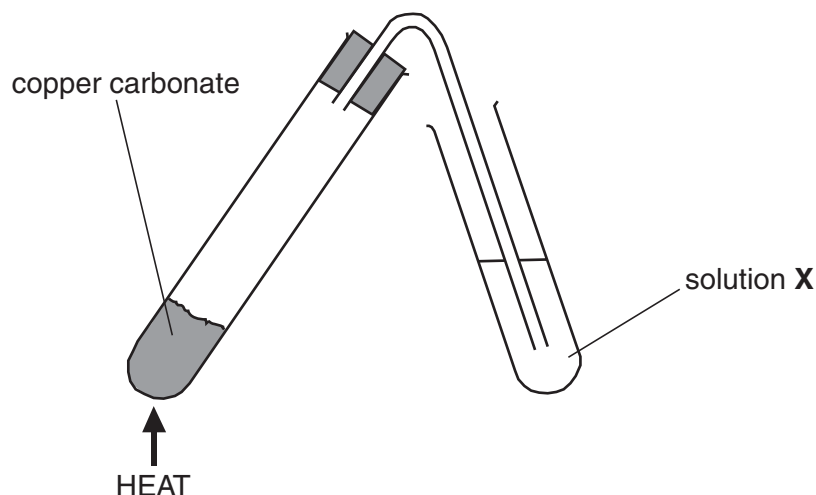Write down **one other** process plant hormones control.

.... [1]

[Total: 4]

11
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]

[Turn over

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]

[Turn over for remainder of question 7

14

(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_2	pale yellow	gas
chlorine	Cl_2	………………………………	gas
bromine	Br_2	red/brown	………………………………
iodine	I_2	dark grey	solid
astatine	At_2	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 |

| iodine |

| sodium chloride |

| to flavour food |

| to make pesticides and plastics |

| to sterilise wounds |

[2]

[Total: 5]

[Turn over

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.

KBr

Write down the names of the elements in the formula.

.... and .... [2]
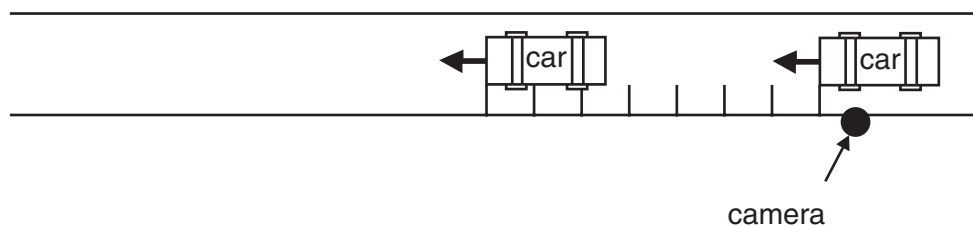
[Total: 4]

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.

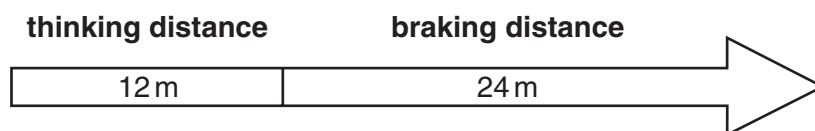   The photographs show the places where the car was.

   (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]

[Turn over for remainder of question 10

18

(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.
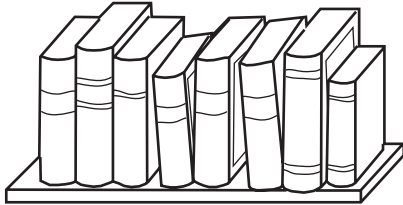
A
books on a shelf

B
**climbing steadily
up a mountain**
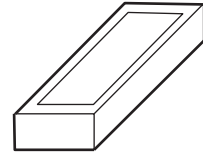
C
brick on floor
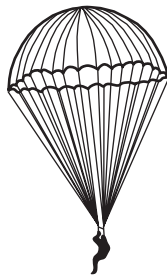
D
parachute falling steadily
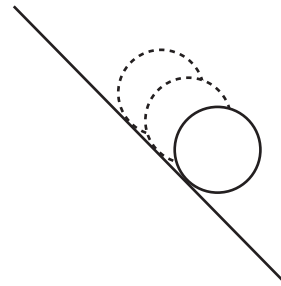
E
ball rolling downhill

(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 4 000 J 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]
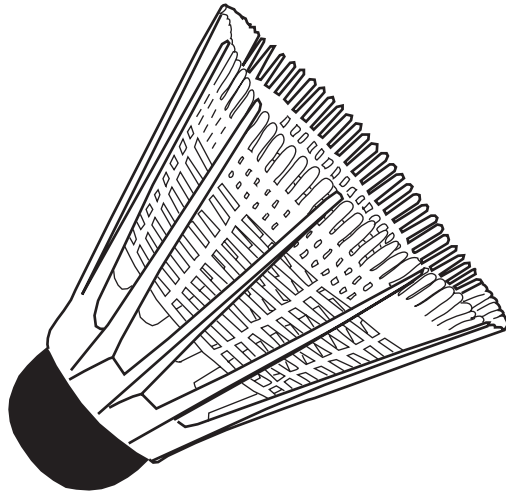
                                                       [Turn over
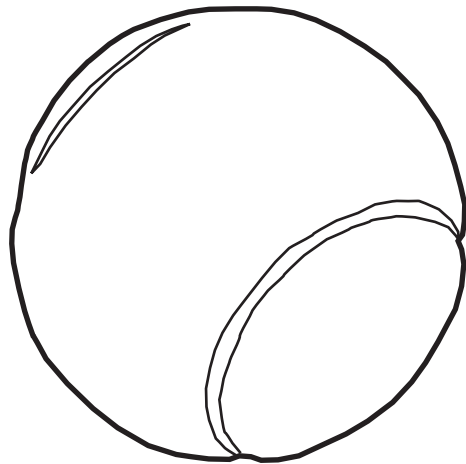
13 This question is about air resistance or drag.

These two objects can be hit with a racquet.
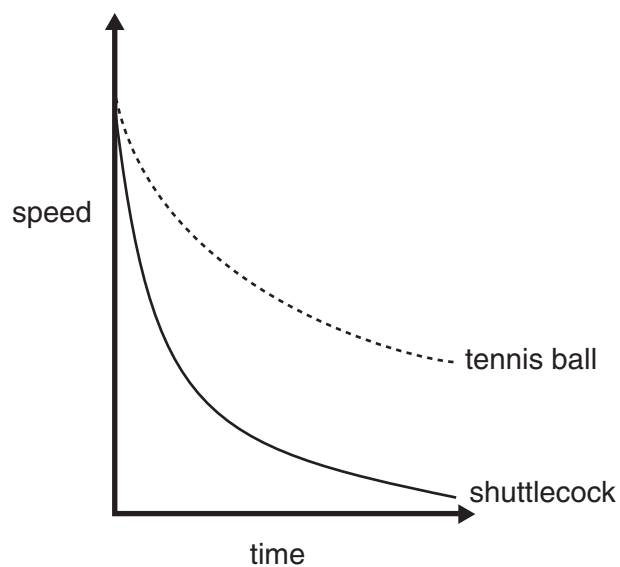
Look at the diagrams.

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

The Periodic Table of the Elements

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

Example:

1
H
hydrogen
1

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	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.