

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B621/01**

**GATEWAY SCIENCE**

**SCIENCE B**

**Unit 1 Modules B1 C1 P1 (Foundation Tier)**

**THURSDAY 13 JANUARY 2011: Morning**

**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**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. Pencil may be used for graphs and diagrams only.**
- **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).**
- **Answer ALL the questions.**

## **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

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

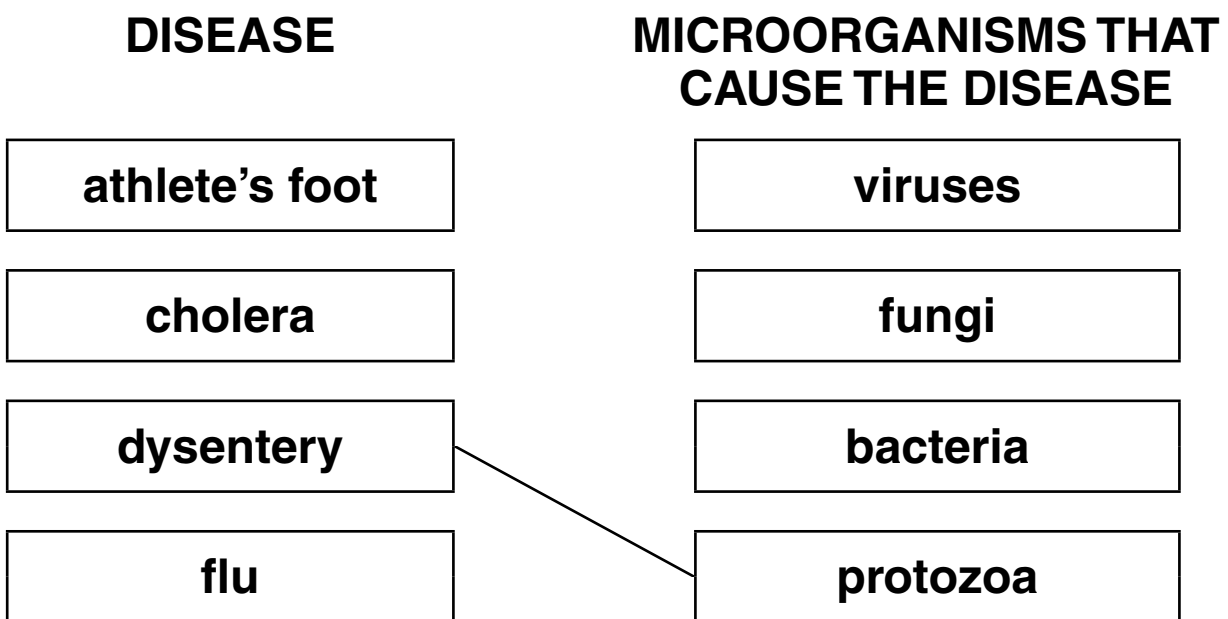
**Answer ALL the questions.**

**SECTION A – MODULE B1**

**1 This question is about disease.**

**(a) (i) Draw straight lines to join each DISEASE to the MICROORGANISMS THAT CAUSE THE DISEASE.**

**One line has been drawn for you.**



**[2]**

**(ii) Finish the sentence about disease-causing microorganisms.**

**Disease-causing microorganisms are called**

\_\_\_\_\_ . **[1]**

**(b) Mosquitoes are insects with piercing mouth parts which they can use to feed on the blood of humans.**

**When mosquitoes feed, microorganisms can enter the human body.**

**Which body defence usually stops these microorganisms entering the body?**

\_\_\_\_\_ [1]

**(c) Mosquitoes can spread a disease called malaria.**

**How do mosquitoes spread malaria from one human to another?**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(d) The map shows areas of the world where humans are at high risk from malaria.**



- Countries or areas where malaria transmission occurs**
- Countries or areas with limited risk of malaria transmission**

**Humans who live in EUROPE are NOT at high risk from malaria.**

**Suggest why.**

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**[2]**

**(e) Malaria causes a fever.**

**During a fever the body temperature is very high and this may cause death.**

**How can a high body temperature cause death?**

\_\_\_\_\_ [1]

**[Total: 8]**

**2 lasu is five years old. He lives in an African country called Ethiopia.**

**lasu suffers from a disorder called kwashiorkor.**

**He is much smaller than a healthy child of his age.**

**His diet lacks an important nutrient needed for growth.**

**(a) (i) Which nutrient is needed to prevent a child having kwashiorkor?**

\_\_\_\_\_ [1]

**(ii) The recommended daily average (RDA) intake for this nutrient can be calculated.**

**lasu has a body mass of 16.0 kg.**

**Calculate lasu's RDA intake for this nutrient using the formula**

$$\text{RDA in g} = 0.75 \times \text{body mass in kg}$$

**Show your working.**

\_\_\_\_\_  
\_\_\_\_\_

**lasu's RDA = \_\_\_\_\_ g [1]**



**(b) Sickle cell anaemia is another disorder that is common in Africa.**

**This disorder is NOT caused by a poor diet.**

**What causes sickle cell anaemia?**

\_\_\_\_\_ [1]

**[Total: 3]**

**3 This question is about drugs.**

**(a) Put ticks (✓) in the boxes next to the TWO correct statements.**

**depressants cause muscle development**

**pain killers block nerve impulses**

**performance enhancers can help athletes run faster**

**stimulants decrease brain activity**

**[2]**

**(b) The drug morphine is often used to relieve severe pain.**

**If morphine is taken for a long time it can cause ADDICTION.**

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

\_\_\_\_\_

\_\_\_\_\_ **[1]**

- (ii) Morphine is available only on prescription because it is addictive.**

**Suggest ONE OTHER reason why morphine is available only on prescription.**

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[1]

**[Total: 4]**

**4 Steve is a 23 year old white male.**

**Look at the list of Steve's characteristics.**

**BLOOD GROUP**

**BODY MASS**

**EYE COLOUR**

**HAIR STYLE**

**HEIGHT**

**INTELLIGENCE**

**SCARS**

**(a) Write down TWO of Steve's characteristics that can ONLY be inherited.**

**Choose your answers from the list.**

**answer \_\_\_\_\_ and \_\_\_\_\_ [1]**

**(b) (i) Steve is 1.90 m tall and has a mass of 89.0 kg.**

**Steve's height and mass can be used to calculate his body mass index (BMI).**

**Calculate Steve's body mass index (BMI) using the formula**

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

**Show your working.**

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**Steve's BMI = \_\_\_\_\_ [2]**

**(ii) People with a BMI in the range of 18.5 to 25 are described as being NORMAL.**

**What word is used to describe someone with a BMI below 18.5?**

\_\_\_\_\_ [1]

**(c) Steve has to wear glasses when he is reading books close-up.**

**He does not have to wear glasses when he is watching a football match.**

**What is this condition called?**

\_\_\_\_\_ [1]

**[Total: 5]**

## SECTION B – MODULE C1

5 Look at the food label found on a box of cake-mix.

**INGREDIENTS:**

**Wheat flour, Cane juice, Sugar,  
Vanilla flavouring, Sodium  
hydrogencarbonate, Cornstarch,  
Sea salt, Citric acid (E300)**

The cake-mix contains sodium hydrogencarbonate.

The sodium hydrogencarbonate makes the cake rise.

Sodium hydrogencarbonate breaks down when heated.

Sodium carbonate, carbon dioxide and water are made.

(a) (i) Write a WORD equation for this reaction.

\_\_\_\_\_ [1]

(ii) Why does sodium hydrogencarbonate make cakes rise?

\_\_\_\_\_ [1]

(b) (i) The cake-mix contains an ANTIOXIDANT.

What is the job of an antioxidant?

\_\_\_\_\_ [1]

**(ii) Antioxidants are an example of a FOOD ADDITIVE.**

**Write down the name of one other TYPE of food additive.**

\_\_\_\_\_ [1]

**[Total: 4]**

**6 Energy is transferred during chemical reactions.**

**Chemical energy can be transferred to:**

**ELECTRICAL ENERGY**

**HEAT**

**LIGHT**

**SOUND**

**(a) Complete the sentences. Use words from the list.**

**(i) When natural gas burns, MOST chemical energy is transferred to**

\_\_\_\_\_ . **[1]**

**(ii) In a car battery, chemical energy is transferred**

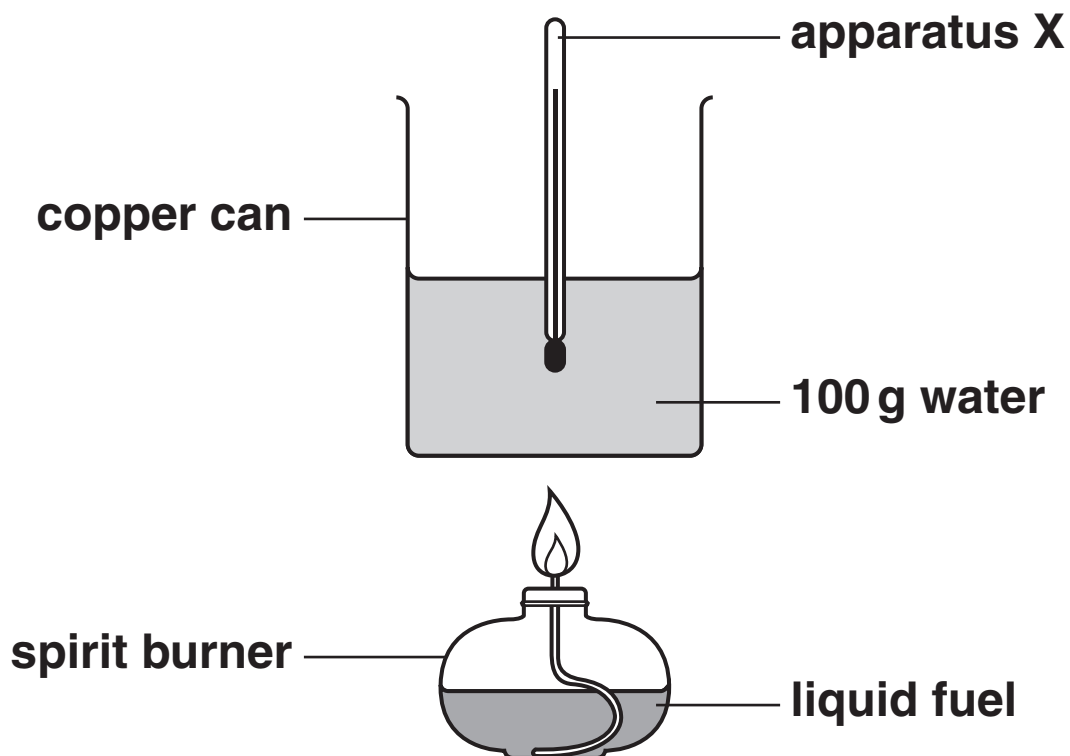
to \_\_\_\_\_ . **[1]**



**(b) Zoe and Olivia test three fuels.**

**Look at the diagram.**

**It shows the apparatus they use to measure the energy given out by the fuels.**



**(i) What is the name of apparatus X?**

\_\_\_\_\_ [1]

(ii) Look at the table. It shows their results.

<b>fuel</b>	<b>temperature of water at start in °C</b>	<b>temperature of water at end in °C</b>	<b>mass of fuel burned in grams</b>
<b>meths</b>	<b>18</b>	<b>38</b>	<b>1.1</b>
<b>propanol</b>	<b>22</b>	<b>42</b>	<b>0.9</b>
<b>petrol</b>	<b>16</b>	<b>36</b>	<b>0.6</b>

Which fuel gives out the MOST energy for each gram of fuel used?

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Explain your answer.

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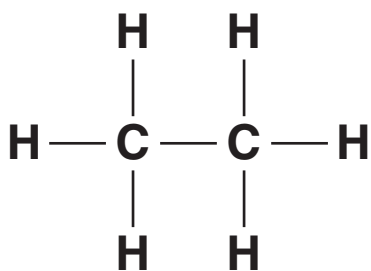
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[3]

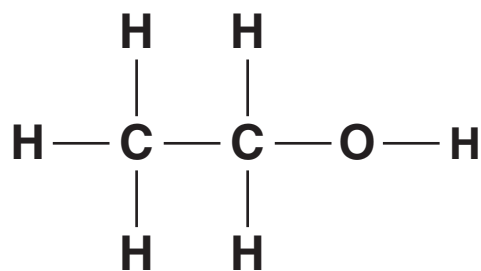
[Total: 6]

**BLANK PAGE**

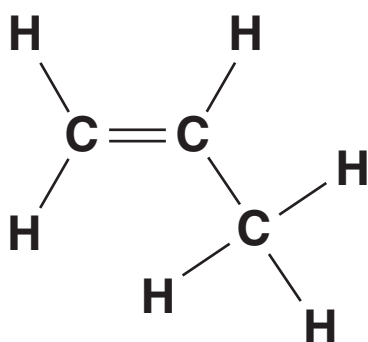
7 Look at the displayed formulas of some compounds.



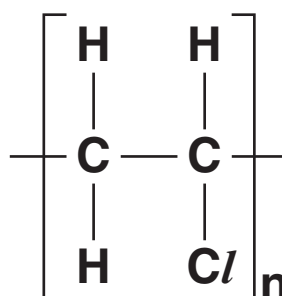
ETHANE



ETHANOL



PROPENE



POLY(CHLOROETHENE)

(a) (i) Write down the name of an **ALKANE**.

Choose from the compounds above.

\_\_\_\_\_ [1]

(ii) Write down the name of an **ALKENE**.

Choose from the compounds above.

\_\_\_\_\_ [1]

**(b) Look at the displayed formula of ethane.**

**Ethane is a hydrocarbon.**

**Write down the names of the TWO elements chemically combined in a hydrocarbon.**

\_\_\_\_\_ and \_\_\_\_\_ [1]

**(c) Poly(chloroethene) is a polymer. It is made by POLYMERISATION.**

**What are the conditions needed for polymerisation?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

**[Total: 5]**

**8 This question is about fuels.**

**(a) A gas from the air is needed when fuels burn.**

**Write down the NAME of this gas.**

\_\_\_\_\_ [1]

**(b) Complete combustion needs lots of air.**

**The complete combustion of a hydrocarbon fuel makes water and a gas.**

**Write down the NAME of this gas.**

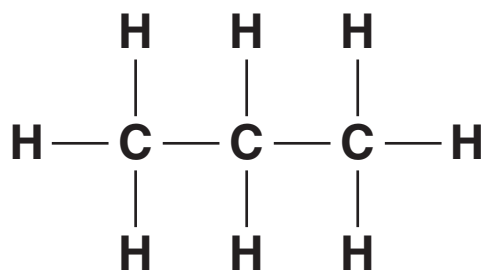
\_\_\_\_\_ [1]

**(c) Incomplete combustion makes carbon monoxide.**

**Why is this a problem?**

\_\_\_\_\_ [1]

**(d) Propane is a hydrocarbon fuel.**



**PROPANE**

**(i) How many carbon atoms are there in one molecule of propane?**

\_\_\_\_\_ [1]

**(ii) What is the total number of atoms in one molecule of propane?**

\_\_\_\_\_ [1]

**[Total: 5]**

## SECTION C – MODULE P1

9 Britain is going digital.

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

ANALOGUE

ELECTROMAGNETIC

INFRARED

LONGITUDINAL

RADIATED

REFLECTED

Television signals are changing from

\_\_\_\_\_ to digital.

Television signals use radio waves.

Radio waves are an example of

\_\_\_\_\_ radiation.

Television signals can be \_\_\_\_\_

from the Earth's atmosphere.

[3]

[Total: 3]



**10 Microwaves have many uses.**

**(a) Microwaves are used to cook food.**

**When microwaves are absorbed, they cause food to heat up.**

**There is a substance in food that absorbs microwaves.**

**Write down the name of this substance.**

\_\_\_\_\_ [1]

**(b) Microwaves are also used to transmit mobile phone signals.**

**Many children use mobile phones.**

**Some people have concerns about the HEALTH of children using mobile phones.**

**Describe TWO of these concerns.**

**1** \_\_\_\_\_

**2** \_\_\_\_\_ [2]

**[Total: 3]**

**11 Houses can be insulated in different ways.**

**(a) Double glazing reduces energy loss through windows.**

**Marie CANNOT fit double glazing into her house.**

**She can still reduce the energy loss through windows without turning the heating down.**

**Suggest ONE way she can do this.**

\_\_\_\_\_

\_\_\_\_\_ [1]

**(b) Marie has fibreglass put in her loft.**

**This reduces energy loss.**

**(i) Explain why fibreglass reduces energy loss by CONDUCTION.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

**(ii) Marie pays £250 for the fibreglass in her loft.**

**She will save £50 every year on her energy bills.**

**Calculate the payback time.**

---

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**answer \_\_\_\_\_ years [1]**

**(c) Marie puts aluminium foil behind her radiators.**

**This reflects radiation back into the room.**

**What type of radiation does she want to reflect back into the room?**

**Choose from:**

**INFRARED**

**GAMMA RAYS**

**ULTRAVIOLET**

**VISIBLE LIGHT**

**X-RAYS**

**answer \_\_\_\_\_ [1]**

**[Total: 5]**

**12 Diane wants to get a suntan.**

**(a) What type of radiation causes a suntan?**

\_\_\_\_\_ [1]

**(b) What might happen to Diane if she spends too long in the sun?**

\_\_\_\_\_ [1]

**(c) Diane uses sun block to protect herself from the sun.**

**She knows that she can safely spend 15 minutes in the sun without sun block.**

**She uses sun block with a sun protection factor (SPF) of 20.**

**How many minutes can she safely spend in the sun using this sun block?**

\_\_\_\_\_  
\_\_\_\_\_

**answer \_\_\_\_\_ minutes [1]**

**[Total: 3]**

**13 A long time ago, messages were sent using runners or horse riders.**

**Later it became possible to use signalling lamps to send messages.**

**(a) Communication using light is better than using runners or horse riders.**

**What is one ADVANTAGE of using light signals in this way?**

\_\_\_\_\_ [1]

**(b) Light messages must be sent using a code.**

**Describe how light signals are used to send messages in Morse code.**

\_\_\_\_\_  
\_\_\_\_\_ [2]

**[Total: 3]**

**14 Jamie takes his orange juice out of the fridge.**

**He puts it into a glass.**

**(a) What is the likely temperature of the orange juice when he takes it from the fridge?**

**Put a ring around the BEST answer.**

**-10 °C**

**4 °C**

**20 °C**

**100 °C**

**[1]**

**(b) Jamie leaves the juice on the table for a while before he drinks it.**

**What happens to the temperature of the juice?**

\_\_\_\_\_ **[1]**

**(c) The fridge uses energy.**

**Write down the UNIT of energy.**

\_\_\_\_\_ **[1]**

**[Total: 3]**

**END OF QUESTION PAPER**

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# 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>C</b> carbon 6	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>P</b> phosphorus 15	16 <b>O</b> oxygen 8	17 <b>F</b> fluorine 9	18 <b>Ar</b> argon 18
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12	27 <b>Al</b> aluminium 13	28 <b>Si</b> silicon 14	31 <b>P</b> phosphorus 15	32 <b>S</b> sulfur 16	35.5 <b>Cl</b> chlorine 17	40 <b>Ar</b> argon 18
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Ca</b> calcium 20	45 <b>Sc</b> scandium 21	48 <b>Ti</b> titanium 22	51 <b>V</b> vanadium 23	52 <b>Cr</b> chromium 24	55 <b>Mn</b> manganese 25	56 <b>Fe</b> iron 26
85 <b>Rb</b> rubidium 37	88 <b>Sr</b> strontium 38	89 <b>Y</b> yttrium 39	90 <b>Zr</b> zirconium 40	91 <b>Zr</b> zirconium 40	93 <b>Nb</b> niobium 41	96 <b>Mo</b> molybdenum 42	101 <b>Ru</b> ruthenium 44	103 <b>Rh</b> rhodium 45	106 <b>Pd</b> palladium 46
133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	178 <b>Hf</b> hafnium 72	181 <b>Ta</b> tantalum 73	184 <b>W</b> tungsten 74	186 <b>Re</b> rhenium 75	190 <b>Os</b> osmium 76	192 <b>Ir</b> iridium 77	195 <b>Pt</b> platinum 78
[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
119 <b>Fr</b> francium 119	120 <b>Ra</b> radium 120	121 <b>Ac*</b> actinium 121	122 <b>Th</b> thorium 122	123 <b>Pa</b> protactinium 123	124 <b>U</b> uranium 124	125 <b>Np</b> neptunium 125	126 <b>Pu</b> plutonium 126	127 <b>Am</b> americium 127	128 <b>Cm</b> curium 128
209 <b>Bi</b> bismuth 209	210 <b>Po</b> polonium 210	211 <b>At</b> astatine 211	212 <b>Rn</b> radon 212	213 <b>Fr</b> francium 213	214 <b>Ra</b> radium 214	215 <b>Ac</b> actinium 215	216 <b>Rn</b> radon 216	217 <b>At</b> astatine 217	218 <b>Rn</b> radon 218
108 <b>Hg</b> mercury 80	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48	112 <b>Cd</b> cadmium 48
65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30	65 <b>Zn</b> zinc 30
79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34	79 <b>Se</b> selenium 34
122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51	122 <b>Sb</b> antimony 51
127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53	127 <b>I</b> iodine 53
[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86
Elements with atomic numbers 112-116 have been reported but not fully authenticated									

1  
**H**  
hydrogen  
1

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.