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RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B621/01

SCIENCE B

Unit 1 Modules B1 C1 P1 (Foundation Tier)

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)

Thursday 13 January 2011
Morning

Duration: 1 hour

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. 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.
- Do **not** write in the bar codes.

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 two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

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EQUATIONS

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

wave speed = frequency × wavelength

power = voltage × current

energy (kilowatt hours) = power (kW) × time (h)

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Question 1 begins on page 4.

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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.

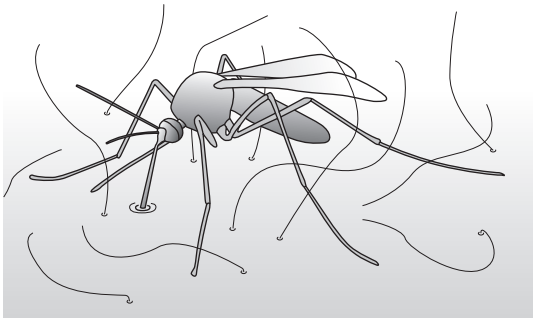
disease	**microorganisms that cause the disease**
athlete's foot	viruses
cholera	fungi
dysentery	bacteria
flu	protozoa

[2]

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

Disease-causing microorganisms are called ..... . **[1]**

(b) The picture shows a mosquito feeding on blood.



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]**

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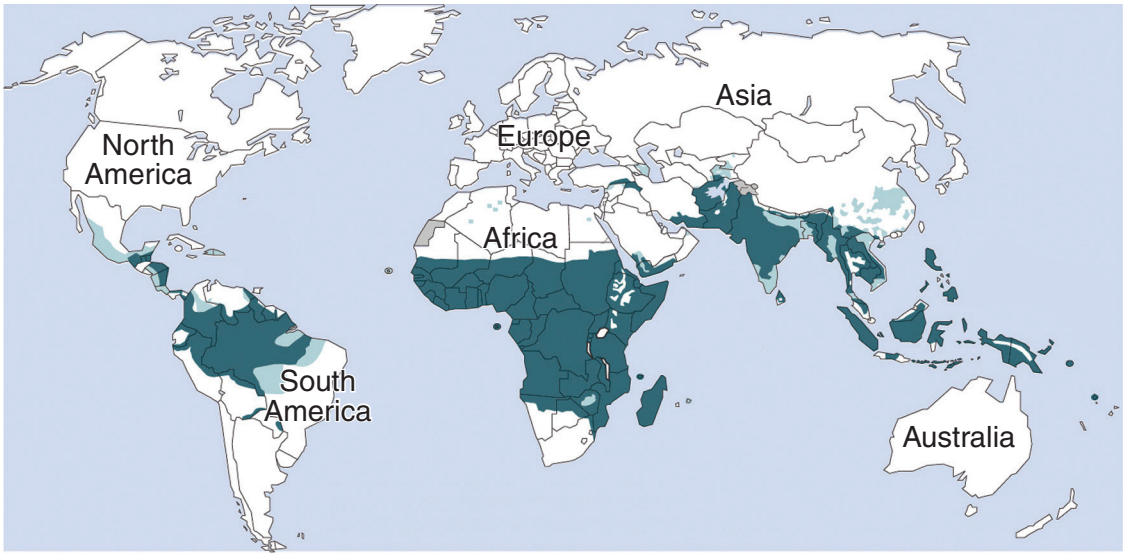
(d) The map shows areas of the world where humans are at high risk from malaria.



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.

.....

.....

..... **[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]

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2 Look at the picture of Iasu.

He is five years old and lives in an African country called Ethiopia.

Iasu 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.

Iasu has a body mass of 16.0 kg.

Calculate Iasu's RDA intake for this nutrient using the formula

RDA in g = 0.75 × body mass in kg

Show your working.

.....

.....

Iasu'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]

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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.

.....

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

[Total: 4]

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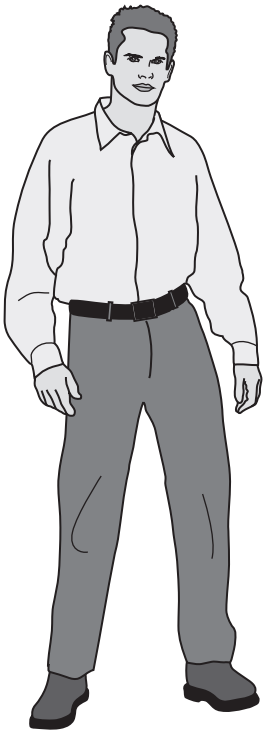
4 Look at the picture of Steve.



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]**

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(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.

.....

.....

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]

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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]

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Question 6 begins on page 12.

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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

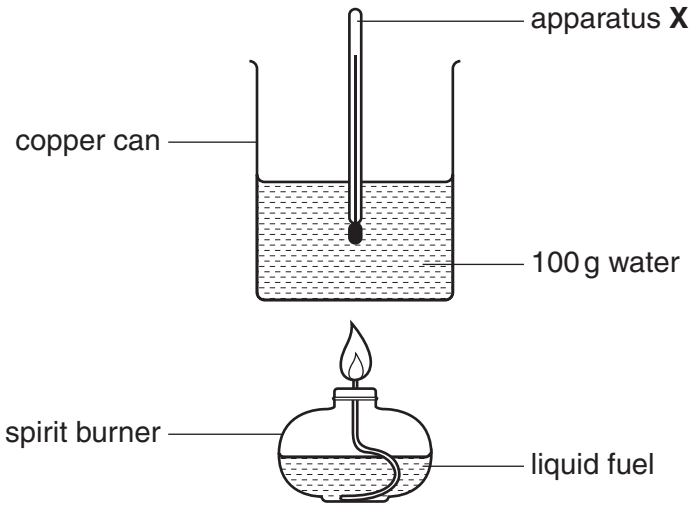
..... . **[1]**

(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]**

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

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

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

.....

Explain your answer.

.....

..... **[3]**

[Total: 6]

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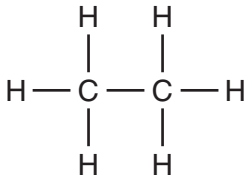
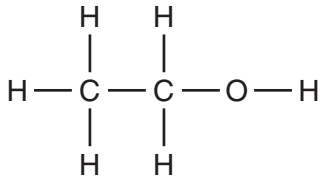
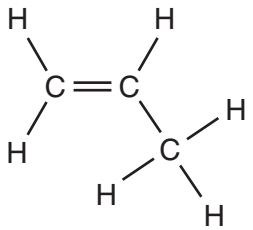
7 Look at the displayed formulas of some compounds.



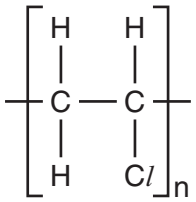
ethane



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]

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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.

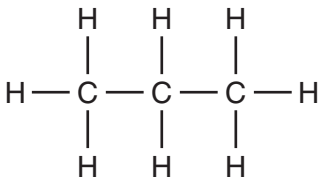
..... **[1]**

(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]

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Section C – Module P1

9 Britain is going digital.

An image has been removed due to third party copyright restrictions.

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]

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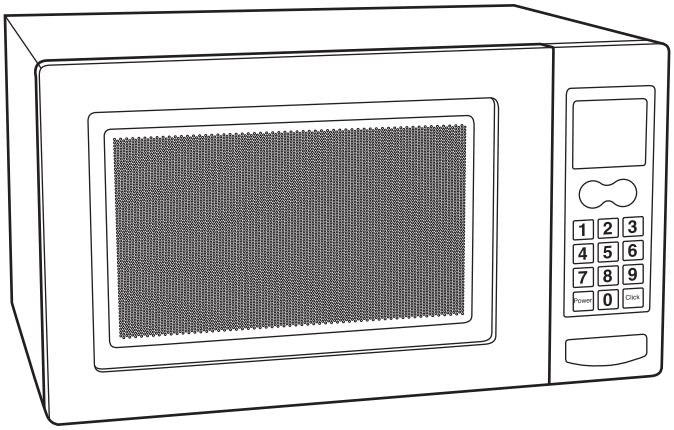
10 Microwaves have many uses.

(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]

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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.

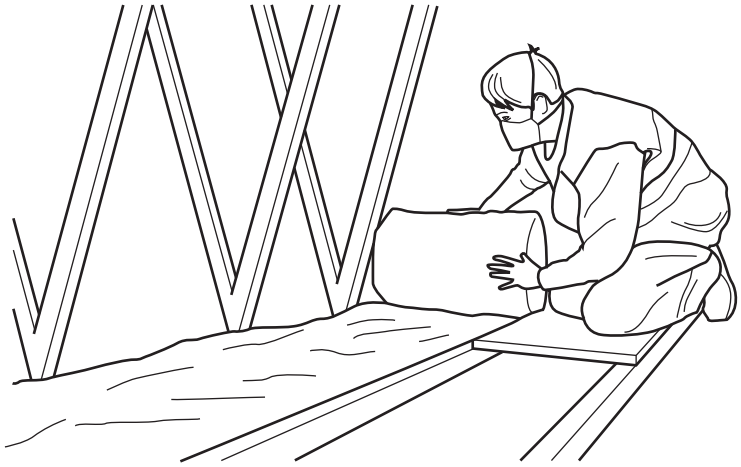
Suggest **one** way she can do this.

.....

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

(b) Marie has fibreglass put in her loft.

This reduces energy loss.



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

.....

.....

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

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

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

Calculate the payback time.

.....

.....

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]

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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]

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

The picture shows Sheila using a signalling lamp.

(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]

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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

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

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						

**** 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.

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