

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

B621/01

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	
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Centre number						Candidate number				
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MODIFIED LANGUAGE

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.

EQUATIONS

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

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

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

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

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Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

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.

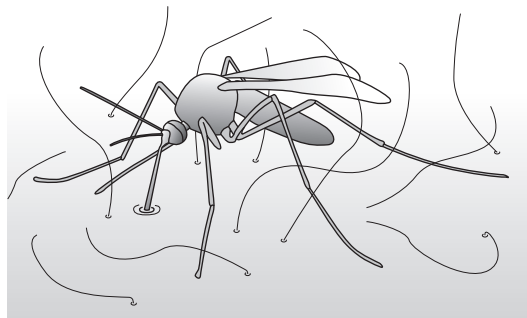
disease	microorganisms that cause the disease
athlete's foot	viruses
cholera	fungi
dysentery	bacteria
flu	protozoa

[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?

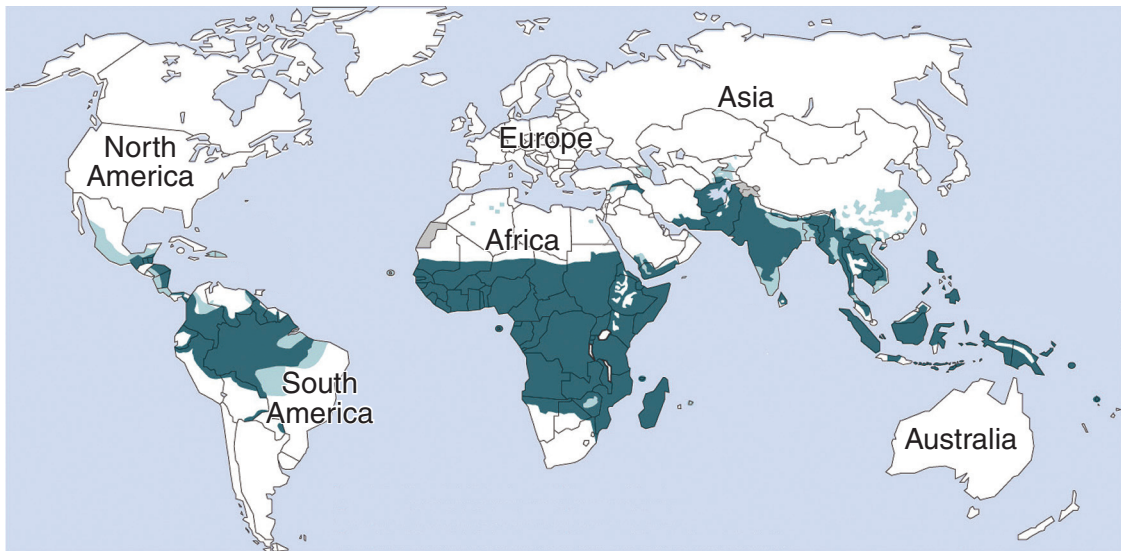
..... [1]

(c) Mosquitoes can spread a disease called malaria.

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

.....
..... [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.

.....
.....
..... [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 Look at the picture of lasu.



He is five years old and 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 does addiction mean?

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

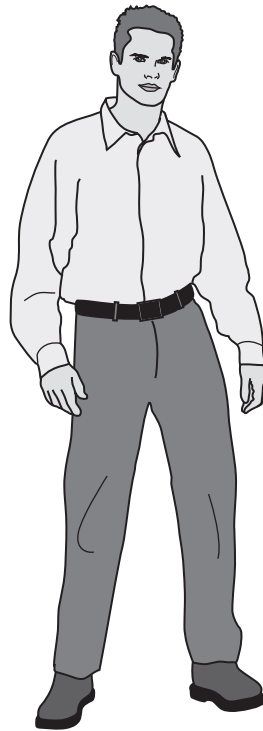
(ii) Morphine is available only on prescription because it is addictive.

Suggest **one other** reason why morphine is available only on prescription.

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

[Total: 4]

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]

(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]

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]

11
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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]

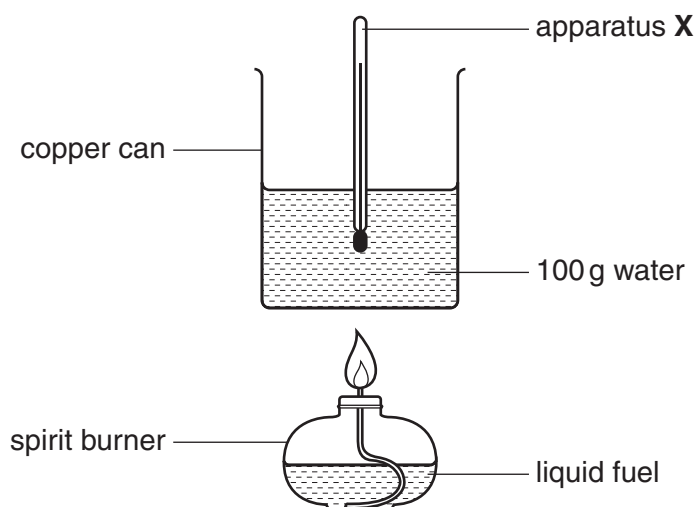
(ii) In a car battery, chemical energy is transferred to

[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]

(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?

.....

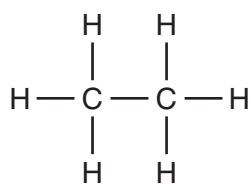
Explain your answer.

.....

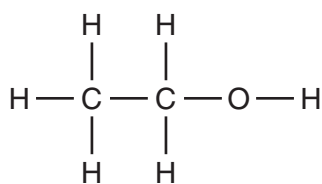
..... [3]

[Total: 6]

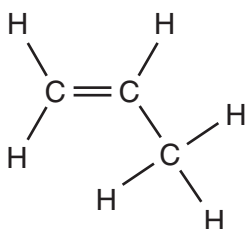
7 Look at the displayed formulas of some compounds.



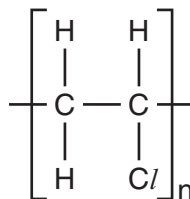
ethane



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.

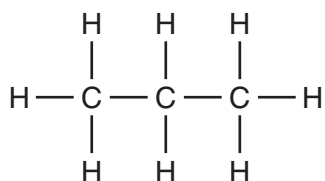
..... [1]

(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.

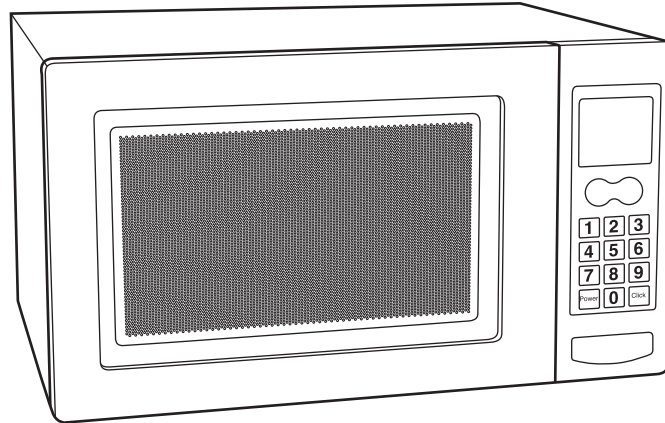
Television signals can be from the Earth's atmosphere.

[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.

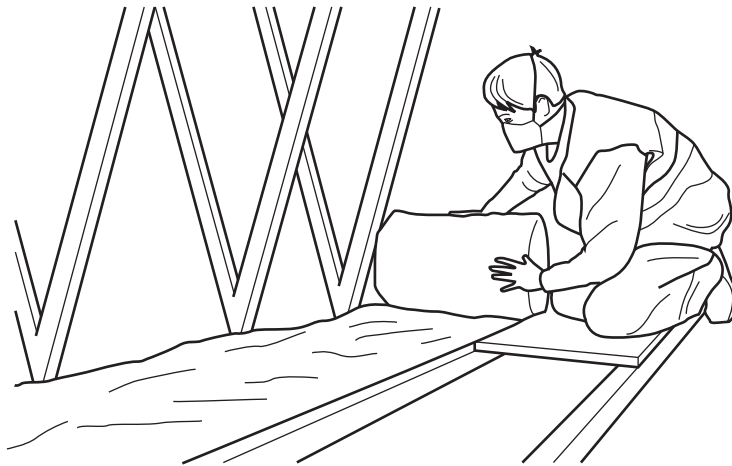
She can still reduce the energy loss through windows without turning the heating down.

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.

.....
.....

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.

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]

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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