

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
ADDITIONAL SCIENCE B

B624/01

Unit 2 Modules B4 C4 P4
(Foundation Tier)

Wednesday 10 June 2009
Afternoon

Duration: 1 hour

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)



| | | | |
|--------------------|--|-------------------|--|
| Candidate Forename | | Candidate Surname | |
|--------------------|--|-------------------|--|

| | | | | | | | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|
| Centre Number | | | | | | Candidate Number | | | | |
|---------------|--|--|--|--|--|------------------|--|--|--|--|

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

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 **20** pages. Any blank pages are indicated.

EQUATIONS

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

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

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

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

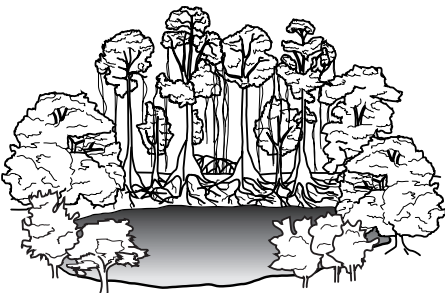
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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

Answer **all** the questions.

Section A – Module B4

1 Read this newspaper article carefully.



The blue hole

Scientists have just discovered a deep, blue hole in a forest in the Bahamas.

The hole is full of water and is about 35 metres deep.

At the surface the water is pure. Deeper into the hole, it becomes more and more salty and contains less oxygen.

At the bottom of the hole scientists have found the bodies of animals and plants that have not decayed. They are thousands of years old.

“The plants are so well preserved they still have green chloroplasts” said one scientist.

(a) (i) When animals and plants die, their bodies usually decay.

This is done by decomposers such as **bacteria**.

Write down **one other** group of decomposer organisms.

..... [1]

(ii) The decomposers can **not** decay the dead animals and plants at the bottom of the hole.

Write down **one** reason why.

..... [1]

(b) The scientist says that the plants still have green chloroplasts.

(i) Which part of a plant usually contains most chloroplasts?

..... [1]

(ii) What process takes place inside green chloroplasts?

..... [1]

(iii) Where does the energy for this process come from?

..... [1]

[Total: 5]

Turn over

- 2 (a) Different parts of a plant do different jobs.

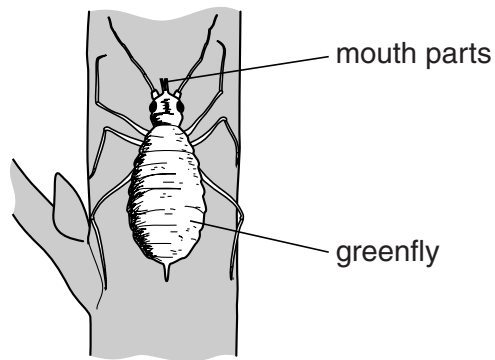
Draw lines to join each **part** of the plant with the **job** that it does.

Draw **three** lines.

| part | job |
|--------|-----------------------|
| flower | support and transport |
| stem | reproduction |
| root | absorbing minerals |

[2]

- (b) The diagram shows a greenfly feeding from the stem of a tomato plant.



The greenfly pushes a hollow tube into one of the tissues in the plant stem.

It can then take sugar from this tissue.

Suggest which tissue the greenfly is most likely to pierce to get the sugar solution.

Put a **ring** around the answer in this list.

epidermis palisade phloem xylem

[1]

(c) Tomato plants are often grown in glasshouses.

Suggest **one** reason why tomatoes usually grow better in glasshouses.

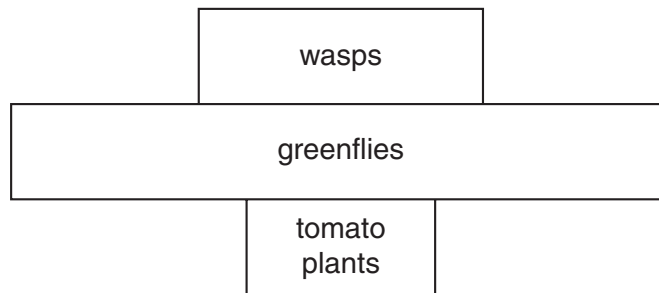
..... [1]

(d) The plants produce fewer tomatoes when greenflies feed on them.

A gardener releases some wasps into his glasshouse.

The wasps eat the greenflies.

(i) The following diagram gives information about the food chain in the glasshouse.



Write down the name of this type of diagram.

..... [1]

(ii) The greenflies are pests.

The wasps eat the greenflies.

Put a tick (✓) in the box next to the term which describes this.

- biological control
- chemical control
- intensive control
- pesticide control

[1]

[Total: 6]

3 Plants need minerals to grow.

They usually get these minerals from the soil.

Some soils however do **not** contain enough minerals.

(a) Farmers can add a type of substance to the soil to give plants more minerals.

Put a ring around the type of substance that they use.

fertiliser herbicide pesticide sugar

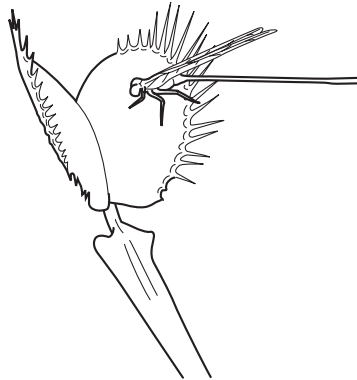
[1]

(b) Some plants can **not** get enough minerals from the soil.

Their leaves are adapted to trap insects.

They digest the insects to get the minerals they need.

One plant that does this is the venus fly trap.



The venus fly trap does not get enough nitrates from the soil.

Instead it gets nitrogen compounds from the insects.

(i) Write down **one other** mineral that plants need.

..... [1]

(ii) What do plants look like if they do not get enough nitrates?

..... [1]

(iii) Most plant leaves are **not** adapted to catch insects.

The leaves are adapted for photosynthesis by being broad and thin.

Explain how these adaptations help with photosynthesis.

Leaves are broad because

Leaves are thin because

[2]

[Total: 5]

4 Anil is growing some lettuce plants in his garden.

Normally they look like the plants in the first diagram.



Anil goes outside on a hot day to look at the lettuce plants.

They look different.



(a) The plants look different because they have lost water.

What term describes how plants look when they have lost water?

..... [1]

(b) Anil then waters the ground around his lettuce plants.

In twenty minutes the leaves of the lettuce plants have returned to normal.

Explain how watering the soil can have this effect on the leaves.

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

[Total: 4]

Section B – Module C4

5 This question is about fertilisers.

(a) Look at the diagram. It shows the label on a bag of fertiliser.

It shows there are three elements in this fertiliser.

One of these elements is nitrogen.

Write down the **names** of the other **two** elements.

Use the Periodic Table on the back page to help you.

P is

K is

[2]



(b) Ammonium nitrate, NH_4NO_3 , is a fertiliser.

(i) Anna makes some ammonium nitrate crystals.

She uses ammonia solution and an acid.

Write down the **name** of the acid.

..... [1]

(ii) What is the relative formula mass (M_r) of ammonium nitrate, NH_4NO_3 ?

The relative atomic mass (A_r) of H is 1, of N is 14 and of O is 16.

.....

.....

relative formula mass is [1]

[Total: 4]

6 This question is about washing powders.

(a) Link each **ingredient** to the **job it does**.

Draw **three** straight lines.

| ingredient | job it does |
|-------------------|--|
| bleach | lifts dirt to clean clothes |
| brightener | makes clothes look 'whiter than white' |
| detergent | removes coloured stains |
| | softens the water |

[3]

(b) Suggest a reason, other than cost, why it is good to wash clothes at **40 °C** rather than at **50 °C**.

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

(c) Another way of cleaning clothes is to use a dry cleaning solvent.

What is meant by **dry** cleaning?

..... [1]

[Total: 5]

7 This question is about water.

(a) Look at the picture.

It shows a river flowing over land.

A river is a water resource.



Write down **two** other water resources.

1

2 [2]

(b) River water may contain many substances before it is purified.

The water may contain **pesticides**.

The pesticides get into the river from the land.

Suggest how pesticides get into the river.

..... [1]

(c) Water may contain chloride ions.

Silver nitrate solution is used to test for chloride ions.

A coloured solid is formed.

What colour solid is made when silver nitrate solution is added to chloride ions?

Choose from the list.

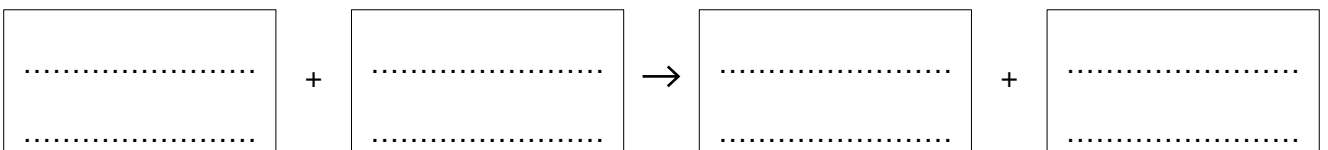
- black**
- cream**
- yellow**
- red**
- white**

answer [1]

(d) Sodium chloride reacts with silver nitrate.

Sodium nitrate and silver chloride are made.

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



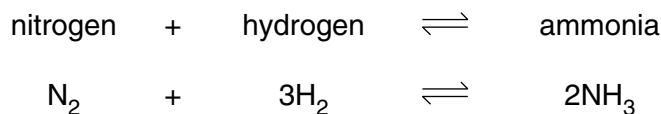
[1]

[Total: 5]

Turn over

8 Look at the equation.

It shows the reaction to make ammonia.



(a) (i) Write down the name of a **compound** in the equation.

..... [1]

(ii) Write down the **total** number of atoms in one molecule of ammonia, NH₃.

..... [1]

(iii) What does the symbol \rightleftharpoons mean?

..... [1]

(b) Ammonia is made by the Haber process.

The Haber process runs 24/7 and so does not stop.

What is the name of a process that runs 24/7?

Choose from the list.

batch

chromatography

continuous

pharmaceutical

answer [1]

(c) One of the costs of making ammonia is the cost of the energy used.

Write about other costs of **making** ammonia.

.....

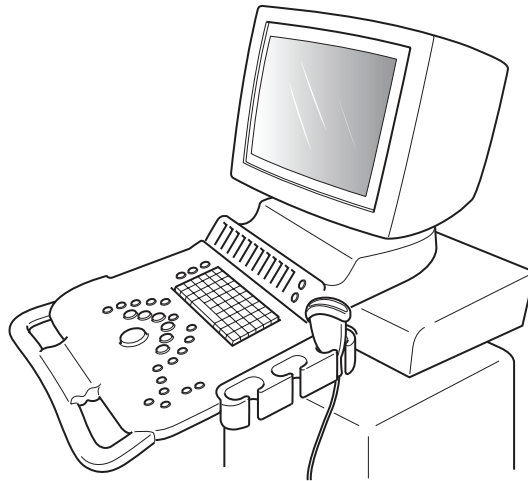
.....

..... [2]

[Total: 6]

Section C – Module P4

9 **Ultrasound** is used in hospitals.



(a) Ultrasound is a high frequency sound wave.

What **type** of wave is ultrasound?

..... [1]

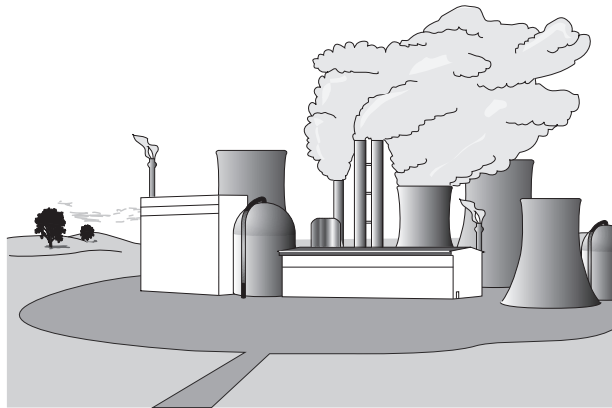
(b) Write down **two uses** of ultrasound in hospitals.

1

2 [2]

[Total: 3]

10 Nuclear power stations produce electricity.



(a) Write down the name of the **nuclear fuel** used in these power stations.

..... [1]

(b) The nuclear reaction in these power stations is called a **chain reaction**.

When a nuclear bomb explodes a chain reaction also takes place.

How is the reaction different in a nuclear bomb?

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

[Total: 2]

11 Electromagnetic radiation is used in hospitals.

(a) Paul works in a hospital. He X-rays patients.

What is Paul's job called?

..... [1]

(b) Charlotte uses gamma radiation on patients.

What is gamma radiation used for in hospitals?

..... [1]

(c) Nuclear radiation comes from the **centre** of the atom.

Write down the scientific **name** for the centre of the atom.

..... [1]

[Total: 3]

12 This question is about static electricity.

(a) Complete the sentences.

Choose your answers from the list.

conductors

direct

insulators

magnetic

metals

negative

positive

When two are rubbed together they become charged.

The two types of static charge are and [3]

(b) Static electricity can be dangerous when refuelling an aircraft.

Suggest why.

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

(c) Static electricity can also be useful.

It is used in hospitals.



A doctor can **restart** a patient's **heart**.

He puts the paddles on the patient's chest.

The paddles are charged.

Describe what happens next.

In your answer write about

- how the heart restarts
- the precautions taken.

.....

.....

.....

..... [2]

[Total: 6]

13 A hair dryer is an electrical appliance.

(a) The hair dryer has a fuse in the plug.

Why does it need a fuse?

..... [1]

(b) The plug has two wires.

(i) What is the colour of the insulation on the **live** wire?

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

black

brown

green

green and yellow

yellow

[1]

(ii) What is the name of the wire with **blue** insulation?

..... [1]

(c) The hair dryer is **double insulated**.



It is not earthed.

Explain why the hair dryer is not earthed.

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

(d) The hair dryer is connected to a 230V mains supply.

The current through the hair dryer is 5A.

Calculate the **resistance** of the hair dryer.

The equations on page 2 may help you.

.....
.....

answer ohms [2]

[Total: 6]

END OF QUESTION PAPER



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The Periodic Table of the Elements

| | | | | | | | | | | | | | | | | | |
|--------------------------------------|------------------------------------|---------------------------------------|--|--------------------------------------|---|--------------------------------------|--------------------------------------|---|---|--|---|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|--------------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 0 | | | | | | | | | | |
| 7 Li lithium 3 | 9 Be beryllium 4 | 11 Na sodium 11 | 12 C carbon 6 | 13 Al aluminium 13 | 14 N nitrogen 7 | 15 P phosphorus 15 | 16 O oxygen 8 | 17 F fluorine 9 | 18 Ar argon 18 | | | | | | | | |
| 19 K potassium 19 | 20 Ca calcium 20 | 23 V vanadium 23 | 24 Cr chromium 24 | 25 Mn manganese 25 | 26 Fe iron 26 | 27 Co cobalt 27 | 28 Ni nickel 28 | 29 Cu copper 29 | 30 Zn zinc 30 | 31 Ga gallium 31 | 32 Ge germanium 32 | 33 As arsenic 33 | 34 Se selenium 34 | 35 Br bromine 35 | 36 Kr krypton 36 | | |
| 37 Rb rubidium 37 | 38 Sr strontium 38 | 40 Ca calcium 20 | 41 Zr zirconium 40 | 42 Nb niobium 41 | 43 Tc technetium [98] | 44 Ru ruthenium 44 | 45 Rh rhodium 45 | 46 Pd palladium 46 | 47 Ag silver 47 | 48 Cd cadmium 48 | 49 In indium 49 | 50 Sn tin 50 | 51 Sb antimony 51 | 52 Te tellurium 52 | 53 I iodine 53 | 54 Xe xenon 54 | |
| 55 Cs caesium 55 | 56 Ba barium 56 | 57 La* lanthanum 57 | 72 Hf hafnium 72 | 73 Ta tantalum 73 | 74 W tungsten 74 | 75 Re rhenium 75 | 76 Os osmium 76 | 77 Ir iridium 77 | 78 Pt platinum 78 | 79 Au gold 79 | 80 Hg mercury 80 | 81 Tl thallium 81 | 82 Pb lead 82 | 83 Bi bismuth 83 | 84 Po polonium 84 | 85 At astatine 85 | 86 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 | | | | | | |

| | |
|---|---------------------------|
| 1 | H 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.