OCR
RECOGNISING ACHIEVEMENT

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GENERAL CERTIFICATE OF SECONDARY EDUCATION **B624/01**

GATEWAY SCIENCE

ADDITIONAL SCIENCE B

Unit 2 Modules B4 C4 P4 (Foundation Tier)

WEDNESDAY 11 JUNE 2008 Afternoon

Time: 1 hour

CUP/T52481

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.
- 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 **20** printed pages.

[Turn over

EQUATIONS

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

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

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

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

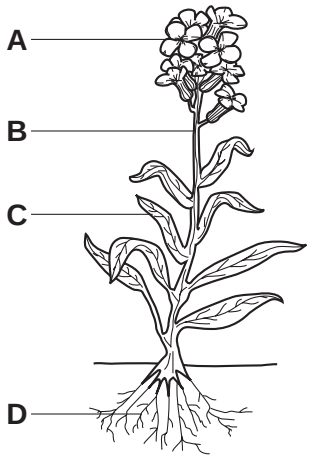
$$\text{power} = \frac{\text{work done}}{\text{time}}$$

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

Answer **all** the questions.

Section A – Module B4

1 Look at the diagram of a plant.



(a) The table shows the jobs of some of the plant parts.

Finish the table by writing the correct letter next to the job it does.

job it does	plant part
reproduction	
anchorage	

[2]

(b) The plant photosynthesises.

The plant needs chloroplasts for photosynthesis.

Describe the job of chloroplasts during photosynthesis.

.....

.....[1]

(c) Water is lost from the plant by evaporation from the leaves.

Describe how water moves from the soil to the leaves.

.....

.....

.....[2]

[Total: 5]

2 Kathy grows her own tomato plants.

(a) The soil Kathy uses does not have enough nitrate.
Some of her plants show signs of nitrate deficiency.

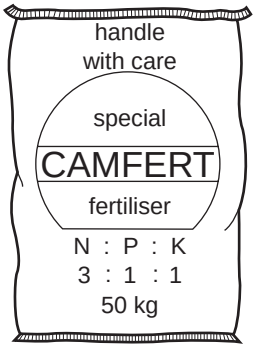
Describe **two** signs of nitrate deficiency the plants would show.

1 .....

2 .....[2]

(b) Kathy decides to use fertiliser on her soil.

Look at the picture of the bag of fertiliser.



The bag contains nitrogen.

Write down the **name** of one **other** element shown on the bag.

.....[1]

(c) Kathy adds 1000 g of fertiliser to some water.
The fertiliser contains 3% nitrogen.

Work out how many grams of nitrogen she uses.
Put a ring around the correct answer.

0.3 g **3 g** **30 g** **300 g** **3000 g** [1]

(d) The plants grown by Kathy use the nitrates.

What do the plants make using the nitrates?

.....[1]

(e) Kathy has grown too many tomatoes to eat all at once.

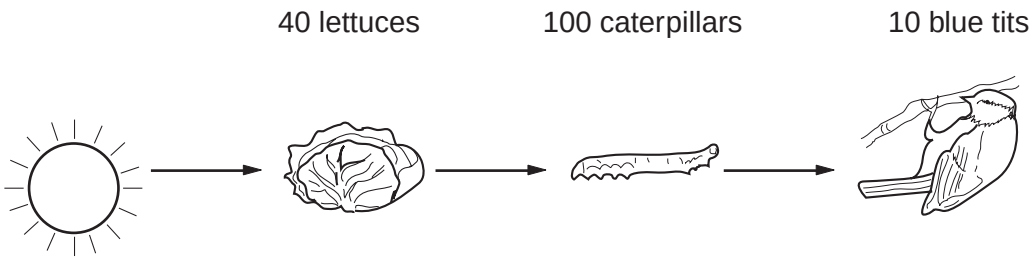
Suggest **two** ways she could preserve the tomatoes.

1 .....

2 .....[2]

[Total: 7]

3 Look at the diagram. It shows a food chain.



(a) The lettuces are producers. They make biomass.

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

.....

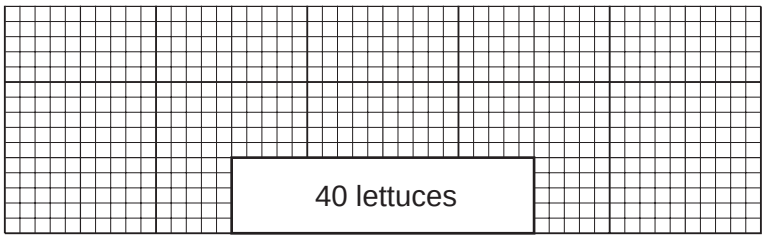
.....[1]

(ii) What is the source of energy for the lettuce plants?

.....[1]

(b) **(i)** Finish the pyramid of **numbers** to include the caterpillars and blue tits.

Make sure the bars are drawn to scale.



[1]

(ii) A pyramid of **biomass** for this food chain would be a different shape.

Describe how the shape would be different.
You may use a diagram to help you answer.

.....

.....[1]

(c) Energy is 'lost' from each stage of the food chain.

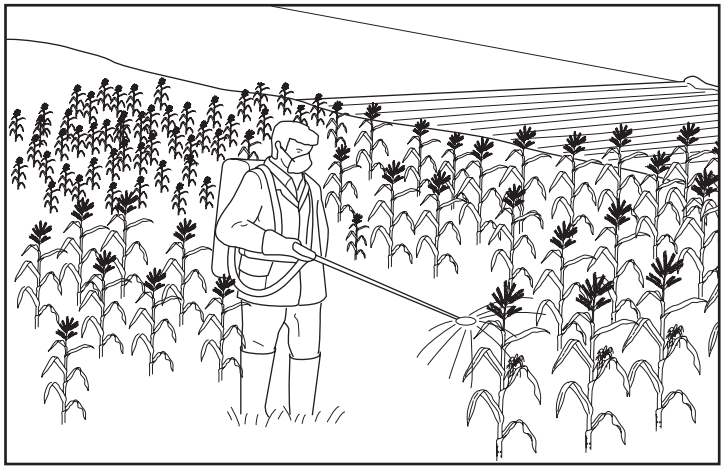
Write down **one** way in which energy is lost.

.....[1]

[Total: 5]

4 Look at the picture.

It shows a farmer spraying crops with chemicals.



(a) The farmer uses different chemicals to do different jobs.

Draw a straight line from each **chemical** to its **job**.

chemical	job
fungicide	kills weeds
herbicide	kills beetles
insecticide	kills fungus

[2]

(b) Some farmers control pests without using chemicals.

Ladybirds can be used to eat pests called aphids.

Write down the name given to this type of pest control.

.....[1]

[Total: 3]

Section B – Module C4

5 This question is about acids and alkalis.

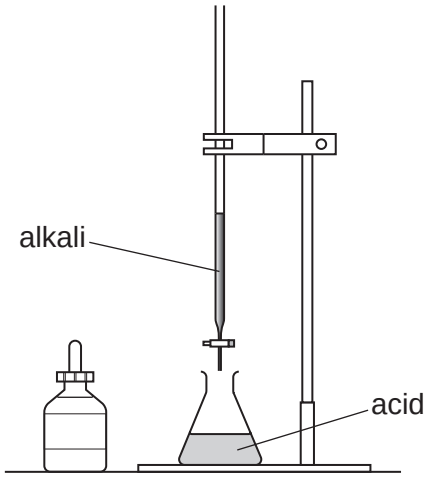
(a) Solutions can be acidic, alkaline or neutral.

Match each **type of solution** to its **pH**.

type of solution	pH
acidic	more than 7
alkaline	less than 7
neutral	7

[2]

(b) Look at the diagram. It shows the apparatus used to neutralise an acid with an alkali.



What happens to the pH number of the acid as the alkali is added?

Choose from the list.

increases

decreases

stays the same

answer .....

Explain your answer.

.....[2]

[Total: 4]

6 Julie works for a drugs company.

She is making a new medicine to treat heart disease.

(a) Julie has to consider the costs involved in making the medicine.

One of these is the cost of electricity and gas.

Write about **another** cost involved in making the medicine.

.....[1]

(b) One of the chemicals needed to make the medicine is extracted from a plant.

Describe **one** way chemicals can be extracted from plants.

Your answer should include

- what is done to the plant
- how the chemical is removed
- how the chemical is purified.

You may wish to draw a diagram.

.....

.....

.....

.....

.....[3]

(c) Medicines are made on demand when they are needed.

Write down the name of this type of process.

Choose from the list.

batch

continuous

purification

neutralisation

answer ..... [1]

[Total: 5]

7 This question is about chemical calculations.

(a) Find magnesium on the Periodic Table on page 20.

What is the **relative atomic mass** of magnesium?

.....[1]

(b) Calcium hydroxide has the formula $Ca(OH)_2$.

Calculate the relative formula mass (M_r) of calcium hydroxide.

(The relative atomic mass (A_r) for Ca = 40, for O = 16 and for H = 1.)

.....

.....

.....

answer ..... [1]

(c) Look at the equations.

They show what happens when calcium carbonate is heated.

calcium carbonate → calcium oxide + carbon dioxide

$CaCO_3 \rightarrow CaO + CO_2$

(i) Janice heats 50 g of calcium carbonate.

What is the **total** mass of calcium oxide and carbon dioxide made?

.....[1]

(ii) Janice heats **60 g** of calcium carbonate instead of **50 g**.

How does the mass of calcium oxide she makes change?

Choose from the list.

increases

decreases

stays the same

answer ..... [1]

[Total: 4]

8 This question is about drinking water.

Source: iStockphoto.com

(a) There are different types of water resources in the United Kingdom.

One water resource is a river.

Write down the name of **one other** water resource.

.....[1]

(b) The water in rivers sometimes contains pollutants.

One pollutant found in river water is nitrates from fertilisers.

Write down **one other** possible pollutant of river water.

.....[1]

(c) Drinking water is chlorinated before it is used.

Explain why.

.....[1]

[Turn over for the remainder of question 8

(d) Drinking water can contain chloride ions.

Chloride ions react with silver nitrate solution.

A precipitate called silver chloride is made.

(i) What is the colour of the precipitate of silver chloride?

Choose from the list.

blue

cream

white

yellow

answer ..... [1]

(ii) Silver nitrate reacts with sodium chloride.

Sodium nitrate and silver chloride are made.

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

.....[1]

[Total: 5]

9 Look at the list. It shows some **uses** of chemicals.

car batteries

cleaning clothes

cutting tools

making fertilisers

(a) Write down **one** use of diamond.

Choose from the list.

answer ..... [1]

(b) Write down **one** use of ammonia.

Choose from the list.

answer ..... [1]

[Total: 2]

Section C – Module P4

10 **(a)** Static electricity can be useful in paint spraying.

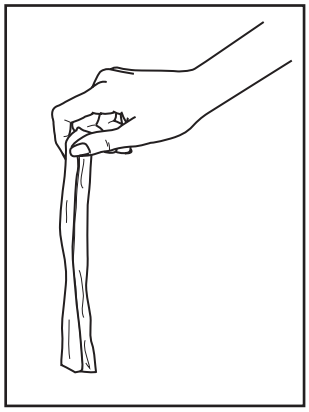
Write down one **other** use of static electricity.

.....

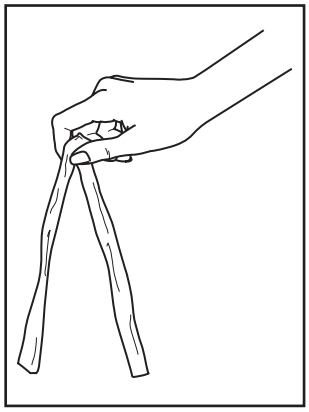
.....[1]

(b) Look at the pictures.

Petra holds two strips of polythene in her hand.



When she rubs the strips with a duster, the two strips move apart.



Explain why the two strips move apart.

In your answer, write about

- charges
- forces.

.....

.....

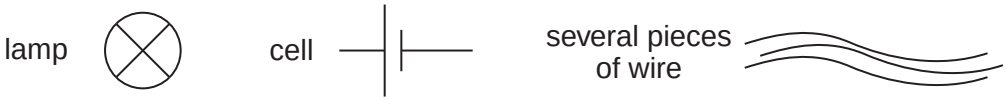
.....

.....

.....[3]

[Total: 4]

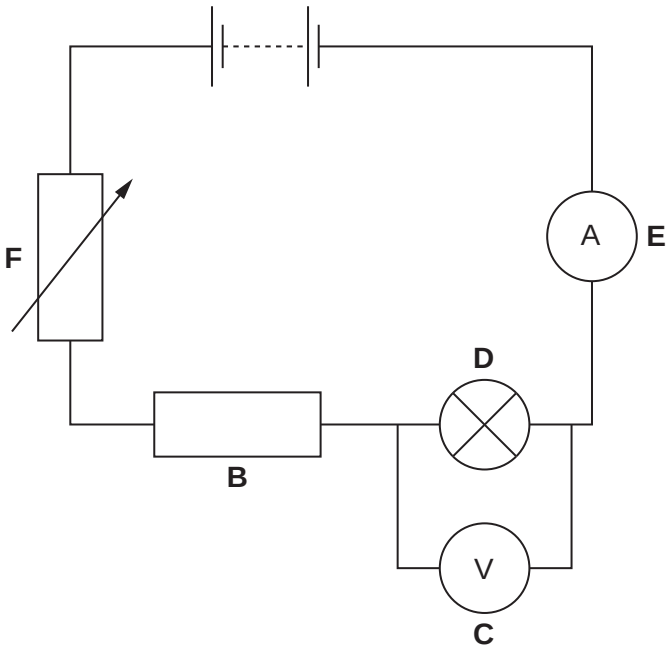
11 **(a)** Chris is given the following pieces of equipment.



Draw a circuit diagram to show how she could make the lamp light up.

[1]

(b) **(i)** Chris builds this circuit.



She changes the **current** flowing in the circuit.

Which component does she use to change the current in the circuit?

Choose from **B**, **C**, **D**, **E** or **F**.

answer ..... [1]

[Turn over for the remainder of question 11

(ii) Chris takes the readings on the two meters.

The reading on the ammeter is 0.5 A.

The reading on the voltmeter is 3 V.

Calculate the resistance of the lamp.

The equations on page 2 may help you.

.....

.....

answer ..... ohms [2]

(c) Chris has a metal toaster.

Look at the photograph.

Chris wants to make sure that she does not get an electric shock.

One of the wires in the plug stops the metal toaster from becoming live.

Which one?

Choose from the list.

earth

live

neutral

answer ..... [1]

(d) The toaster has a fuse in its plug.

Chris says “the fuse controls the current flowing in the circuit”.

Ryan says “the fuse provides power for the circuit”.

Tammy says “the fuse makes the toaster safer to use”.

Who is correct?

Choose from the list.

Chris

Ryan

Tammy

answer ..... [1]

[Total: 6]

12 This question is about waves.

(a) Look at the lists of the features of longitudinal waves and their descriptions.

Draw straight lines to link each **feature** with its **description**.

feature	description
amplitude	where the particles are furthest apart
wavelength	the shortest distance between two compressions
frequency	a measure of the loudness of the wave
rarefaction	the number of waves every second

[3]

(b) Ultrasound is a **longitudinal** wave.

It is used in medicine for measuring blood flow.

Write down **one other** use of ultrasound in medicine.

.....[1]

[Total: 4]

13 This question is about radioactivity.

(a) Vernon measures the radioactivity of a material using a counter.

The counter has a reading of 79 counts per second.

Complete the sentence.

The counter has detected 79 radioactive …… per second. [1]

(b) Which part of the atom does radioactivity come from?

.....[1]

(c) Radioactive sources are used in some smoke detectors.

Which sort of radioactive source is used in smoke detectors?

Choose from the list.

alpha

beta

gamma

answer ..... [1]

(d) **(i)** Radiation is used to treat cancer in hospitals.

Which sort of radiation is used?

Choose from the list.

alpha

beta

gamma

answer ..... [1]

(ii) When treating cancer, doctors make sure that patients get the right amount of radiation.

They check the strength (activity) of the source each time that it is used.

Suggest why doctors need to check the strength of the source each time it is used.

.....

.....[1]

(e) The reaction which gives out energy in a nuclear reactor is a **controlled** chain reaction.

Write down **one** example of an **uncontrolled** chain reaction.

.....

.....[1]

[Total: 6]

END OF QUESTION PAPER

The Periodic Table of the Elements

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						

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.