

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

**B622/01**

Unit 2 Modules B2 C2 P2 (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)

**Wednesday 15 June 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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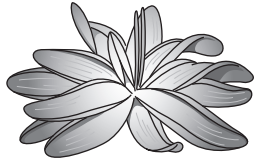
**Question 1 begins on page 4.**

**PLEASE DO NOT WRITE ON THIS PAGE**

Answer **all** the questions.

**Section A – Module B2**

1 Michaela finds two types of plants growing near her school.



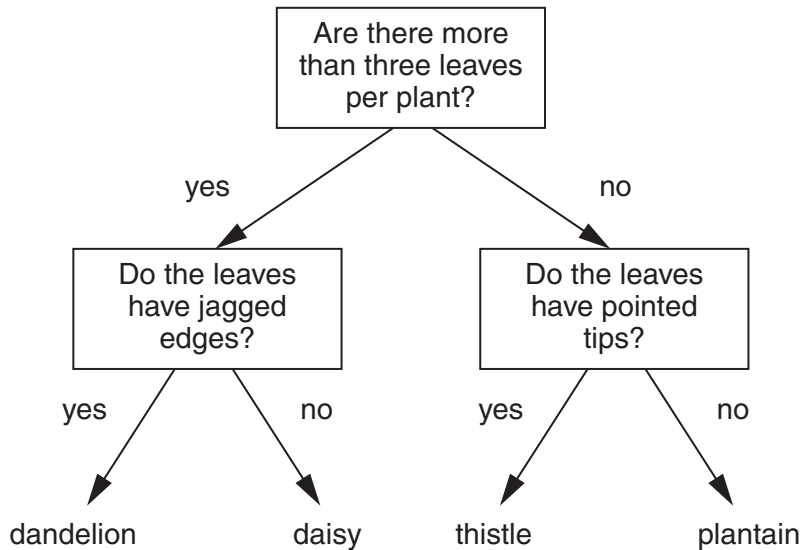
**plant A**



**plant B**

(a) She wants to identify the two plants.

Her teacher writes a key to help her to do this.



Use the key to identify plants **A** and **B**.

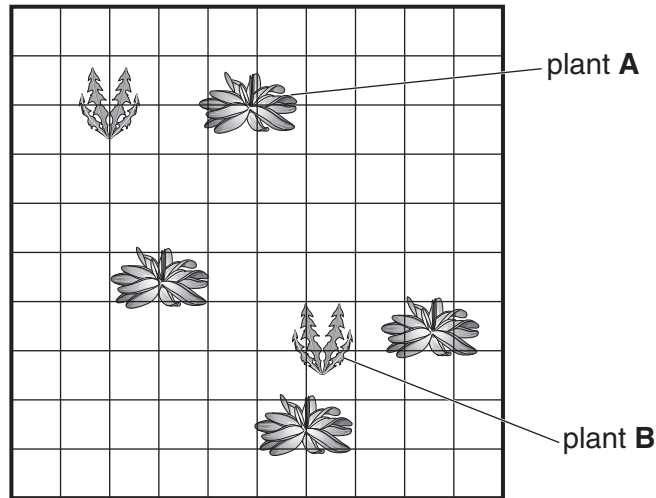
plant **A** is a .....

plant **B** is a .....

[2]

(b) Michaela then wants to estimate how many there are of each type of plant.

The equipment she uses to count the plants is a square grid.



(i) What is the name of the square grid that Michaela uses?  
 ..... [1]

(ii) Michaela thinks that the two types of plant might compete with each other.  
 Write down **one** thing that they might compete for.  
 ..... [1]

(iii) Michaela thinks that plant **A** is out-competing plant **B**.  
 Look at the diagram.  
 What evidence is there for her idea?  
 ..... [1]

(c) Michaela makes some notes about how the two plants make food.  
 Complete the sentences by writing one word in each space.  
 The two plants make food by a process called .....  
 They need a green chemical called..... to make food.  
 The process makes sugar and releases a gas called .....  
 The plants make more food and grow faster in the summer because there is more  
 .....

[4]  
**[Total: 9]**

2 Polar bears live in the arctic.

Polar bears are predators.

They feed on seals that live under the ice.



(a) Polar bears have white fur.

Suggest why their fur is white.

..... [1]

(b) Polar bears have small ears.

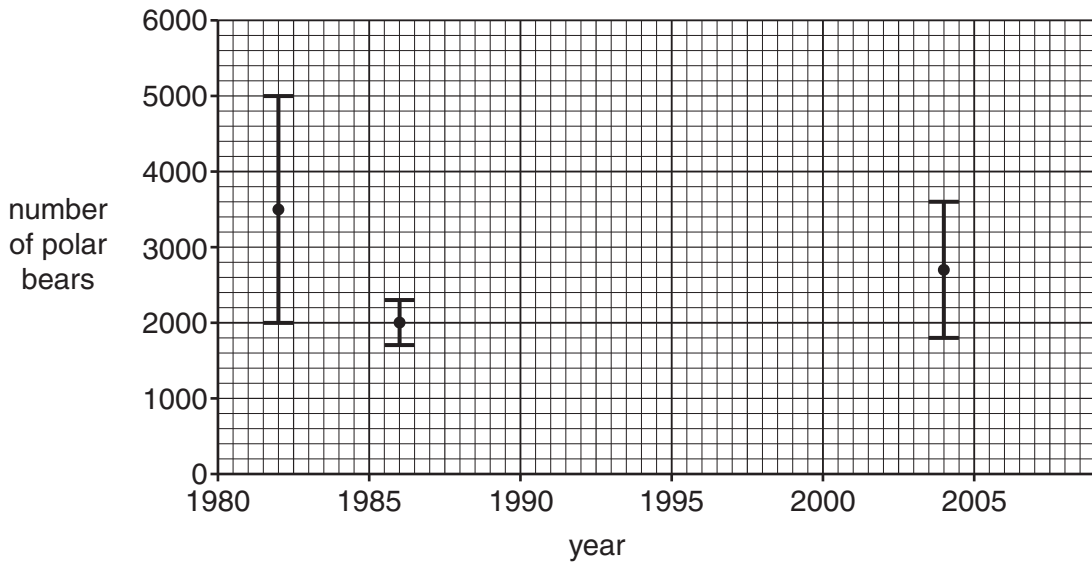
How does this help them to live in the arctic?

..... [1]

(c) Scientists are worried that the number of polar bears might be going down.

There have been very few attempts to count the number of polar bears.

The graph shows the results of three studies in one large area in the arctic.



(i) The three studies give different possible ranges for the number of polar bears.

Write down the largest and smallest possible number of polar bears found by any of the studies.

largest number .....

smallest number .....

[1]

(ii) What name is given to an area where an organism such as a polar bear lives?

Choose your answer from the list.

- climate      community      habitat      population**

answer ..... [1]

(d) The level of carbon dioxide in the air is increasing.

Scientists are worried that this might cause polar bears to become **endangered**.

(i) What does endangered mean?

..... [1]

(ii) Suggest how the increasing level of carbon dioxide could affect the polar bears.

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

[Total: 7]

3 Scientists have recently discovered some fossil bones in Georgia in Eastern Europe.

The fossils are 1.8 million years old.

They may be from a human ancestor.

The scientists have modelled what they think the human ancestor looked like when it was alive.



(a) Which **two** groups did the human ancestor belong to?

Draw **one** line to link the correct group in **column one** to the correct group in **column two**.

column one	column two
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">vertebrate</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">fish</div>
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">invertebrate</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">amphibian</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">bird</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">mammal</div>

[1]

(b) Only the bones have been preserved as fossils.

Why have the other parts of the body **not** become fossils?

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

(c) Most scientists agree that modern humans have less hair on their bodies than this ancestor.

One explanation for this is about fleas that can live in hair and feed on blood.

Modern humans may have evolved less hair because this means they have fewer fleas.

What word is used to describe the type of feeding relationship between fleas and humans?

..... [1]



(d) Scientists disagree over which species this human ancestor belongs to.

Some of the fossil bones look like those of *Homo habilis*, a human ancestor that lived in Africa.

Some of the fossil bones look like those of *Homo erectus*, which also lived in Africa.

Which of these statements about classifying the human ancestor is correct?

Put a tick (✓) in the box next to the correct statement.

It could be in either species because members of a species are not all identical.

It cannot be in either species because members of the same species always live in the same place.

It should be named *Homo habilis*, even though it has more features in common with *Homo erectus*.

[1]

[Total: 4]

**10**  
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Section B – Module C2

4 Pam investigates the properties of iron and aluminium.

Look at the table. It shows her results.

property	iron	aluminium
magnetism	magnetic	non magnetic
ease of corrosion	rusts	.....
electrical conduction	good	.....
malleability	.....	bends easily

(a) Complete the table. [3]

(b) Iron rusts.

Complete the sentence about rusting.

Iron needs ..... and ..... to rust. [2]

(c) Copper is another metal.

It is used to make electrical wires because it is a good conductor of electricity.

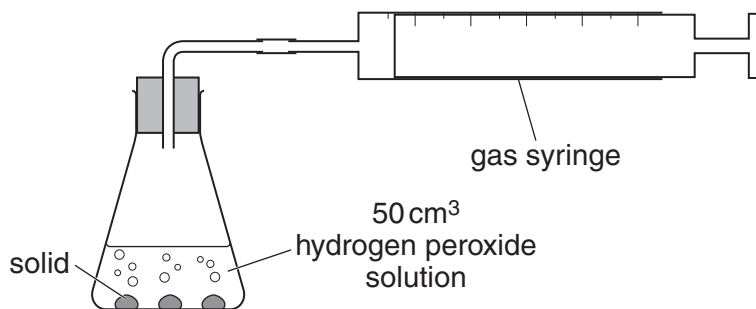
Suggest one **other** reason why copper is used to make electrical wires.

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

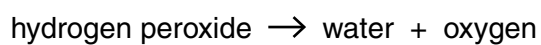
[Total: 6]

5 Louise and Mike investigate the decomposition of hydrogen peroxide solution.

Look at the diagram. It shows the apparatus they use.



Look at the word equation for the reaction.



On its own, hydrogen peroxide solution reacts very slowly.

A solid must be added to make the reaction faster.

Louise and Mike add **different** solids to hydrogen peroxide solution.

They work out the rate of the reaction each time.

Look at their results.

solid added	mass of solid at start in g	mass of solid at end in g	relative rate of reaction
none	–	–	1
<b>A</b>	0.2	0.1	10
<b>B</b>	0.3	0.2	5
<b>C</b>	0.1	0.1	10
<b>D</b>	0.2	0.2	1

(a) Which solid **does not change** the rate of the reaction?

Choose **A, B, C** or **D**.

answer .....

[1]

(b) Which solid is acting as a **catalyst** for this reaction?

Choose **A, B, C** or **D**.

answer .....

Explain your answer.

.....

.....

..... [3]

[Total: 4]

6 Limestone, marble and granite are rocks used in buildings.



(a) Write down the name of another material used in buildings.

..... [1]

(b) Place limestone, marble and granite in order of hardness.

Write the hardest rock first.

hardest .....

.....

softest .....

[1]

(c) Limestone is heated with clay.

Write down the name of the substance made.

..... [1]

(d) Limestone and marble are made of the same chemical.

Write down the name of this chemical.

Choose from

**aluminium oxide**

**calcium carbonate**

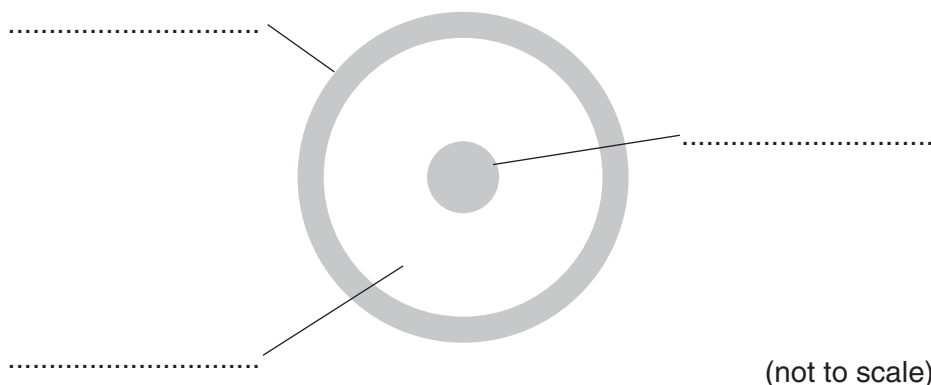
**calcium oxide**

**copper sulfate**

answer ..... [1]

[Total: 4]

7 Look at the diagram. It shows the structure of the Earth.



(a) Label the diagram. Use words from this list.

**core**

**crust**

**mantle**

[2]

(b) Write down the name of the main metal present in the core.

..... [1]

[Total: 3]

**8** Air sometimes contains pollutants.

Look at the table. It shows some common pollutants and the problems they cause.

<b>pollutant</b>	<b>problem caused</b>
oxides of nitrogen	photochemical smog
carbon monoxide	.....
sulfur dioxide	.....

(a) Complete the table.

[2]

(b) Calcium carbonate is used to decrease sulfur dioxide pollution.

The formula of calcium carbonate is



What is the total number of **atoms** in this formula?

..... [1]

[Total: 3]



Section C – Module P2

9 Sizewell is a nuclear power station in Suffolk.

The power station is next to the sea.



Nuclear power stations produce waste.

(a) Write down **one** reason why the waste is harmful.

..... [1]

(b) Finish the sentence.

Power stations are often built by the sea because they .....

..... [1]

(c) The electricity produced by a nuclear power station is transmitted around the country.

This is done at very **high voltages**.

Explain why.

.....

..... [1]

(d) What is the unit of electrical power?

Choose from

**amp      ohm      volt      watt**

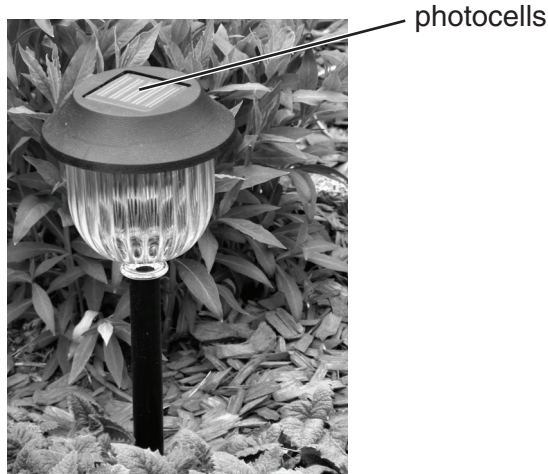
answer ..... [1]

[Total: 4]

10 Charlie has solar lamps in her garden.

The Sun shines onto the photocells. These are on top of the solar lamps.

The electricity produced charges batteries in the solar lamp.



(a) Finish the sentences by choosing the **best** words from this list.

**alternating**

**area**

**constant**

**direct**

**heat**

**light**

**volume**

A photocell transfers ..... energy from the Sun into electricity.

The electrical power produced depends on the ..... of the photocell.

The LED in the lamp works with ..... current.

[3]

(b) Write down one **disadvantage** of using photocells to provide electricity.

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

(c) The current through the LED in the lamp is 0.02 A. The voltage from the batteries is 3V.

Calculate the power of the LED.

The equations on page 2 may help you.

.....  
.....

answer ..... [2]

[Total: 6]

11 About 65 million years ago an asteroid collided with the Earth.

Some scientists think this caused the dinosaurs and other living things to become extinct.



(a) Describe two **other** things that happened as a result of the asteroid colliding with the Earth.

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

(b) Some asteroids and comets are called Near Earth Objects (NEOs).

Scientists **monitor** Near Earth Objects.

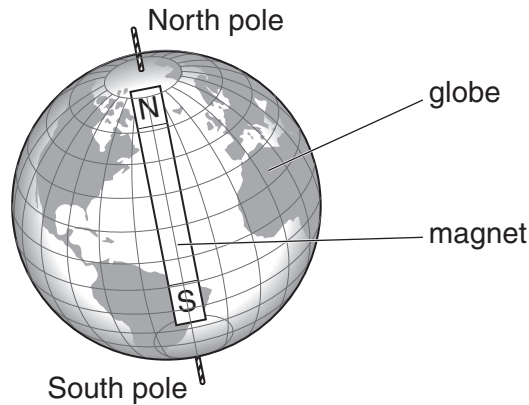
Explain why.

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

[Total: 3]

12 Alan's science teacher makes a model of the Earth.

He places a magnet inside a globe.



(a) Alan wants to plot the direction of the magnetic field around the model.

What piece of equipment should he use?

..... [1]

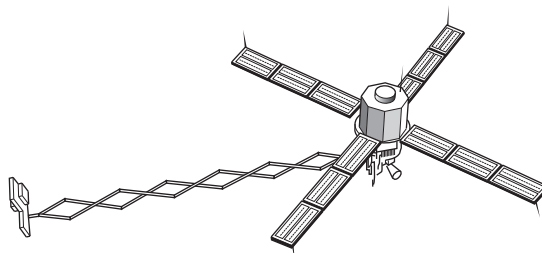
(b) The Earth and magnetic materials have magnetic fields around them.

What else can cause a magnetic field?

..... [1]

(c) Magsat is an artificial satellite that orbits the Earth.

It monitors the Earth's magnetic field.



Write about **two other** uses of artificial satellites.

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

[Total: 4]

13 Scientists who work near radioactive material wear a film badge.



(a) The badge measures exposure to each type of nuclear radiation.

Finish the sentence.

The three types of nuclear radiation are **alpha**, ..... and ..... [1]

(b) Write down two **precautions** a scientist should use when handling radioactive material.

1 .....

2 ..... [2]

[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>Ne</b> neon 10								
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	21 <b>Sc</b> scandium 21	22 <b>Ti</b> titanium 22	23 <b>V</b> vanadium 23	24 <b>Cr</b> chromium 24	25 <b>Mn</b> manganese 25	26 <b>Fe</b> iron 26	27 <b>Co</b> cobalt 27	28 <b>Ni</b> nickel 28	29 <b>Cu</b> copper 29	30 <b>Zn</b> zinc 30	31 <b>Ga</b> gallium 31	32 <b>Ge</b> germanium 32	33 <b>As</b> arsenic 33	34 <b>Se</b> selenium 34	35 <b>Br</b> bromine 35	36 <b>Kr</b> krypton 36
37 <b>Rb</b> rubidium 37	38 <b>Sr</b> strontium 38	39 <b>Y</b> yttrium 39	40 <b>Zr</b> zirconium 40	41 <b>Nb</b> niobium 41	42 <b>Mo</b> molybdenum 42	43 <b>Tc</b> technetium [98]	44 <b>Ru</b> ruthenium 44	45 <b>Rh</b> rhodium 45	46 <b>Pd</b> palladium 46	47 <b>Ag</b> silver 47	48 <b>Cd</b> cadmium 48	49 <b>In</b> indium 49	50 <b>Sn</b> tin 50	51 <b>Sb</b> antimony 51	52 <b>Te</b> tellurium 52	53 <b>I</b> iodine 53	54 <b>Xe</b> xenon 54
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77	78 <b>Pt</b> platinum 78	79 <b>Au</b> gold 79	80 <b>Hg</b> mercury 80	81 <b>Tl</b> thallium 81	82 <b>Pb</b> lead 82	83 <b>Bi</b> bismuth 83	84 <b>Po</b> polonium 84	85 <b>At</b> astatine [210]	86 <b>Rn</b> radon [222]
87 <b>Fr</b> francium 87	88 <b>Ra</b> radium 88	89 <b>Ac*</b> actinium 89	104 <b>Rf</b> rutherfordium [261]	105 <b>Db</b> dubnium [262]	106 <b>Sg</b> seaborgium [266]	107 <b>Bh</b> bohrium [264]	108 <b>Hs</b> hasium [277]	109 <b>Mt</b> meitnerium [268]	110 <b>Ds</b> darmstadtium [271]	111 <b>Rg</b> roentgenium [272]	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1	<b>H</b> hydrogen 1
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relative atomic mass
atomic symbol
name
atomic (proton) number

Key

\* 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.