

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
TWENTY FIRST CENTURY SCIENCE
ADDITIONAL SCIENCE A**

A216/01

Unit 2 Modules B5 C5 P5
(Foundation Tier)

**Friday 23 January 2009
Morning**

Duration: 40 minutes

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	
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Centre Number						Candidate Number				
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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.
- The total number of marks for this paper is **42**.
- A list of physics equations is printed on page 2.
- The Periodic Table is printed on the back page.
- This document consists of **16** pages. Any blank pages are indicated.

FOR EXAMINER'S USE	
1	4
2	4
3	6
4	5
5	5
6	4
7	5
8	4
9	5
TOTAL	42

TWENTY FIRST CENTURY SCIENCE EQUATIONS**Useful Relationships****Explaining Motion**

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

$$\text{momentum} = \text{mass} \times \text{velocity}$$

$$\text{change of momentum} = \text{resultant force} \times \text{time for which it acts}$$

$$\text{work done by a force} = \text{force} \times \text{distance moved by the force}$$

$$\text{change in energy} = \text{work done}$$

$$\text{change in GPE} = \text{weight} \times \text{vertical height difference}$$

$$\text{kinetic energy} = \frac{1}{2} \times \text{mass} \times [\text{velocity}]^2$$

Electric Circuits

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

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

$$\text{energy transferred} = \text{power} \times \text{time}$$

$$\text{power} = \text{potential difference} \times \text{current}$$

$$\text{efficiency} = \frac{\text{energy usefully transferred}}{\text{total energy supplied}} \times 100\%$$

The Wave Model of Radiation

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

Question 1 starts on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

1 The outer layers of the Earth are made of four 'spheres', the atmosphere, the biosphere, the hydrosphere and the lithosphere.

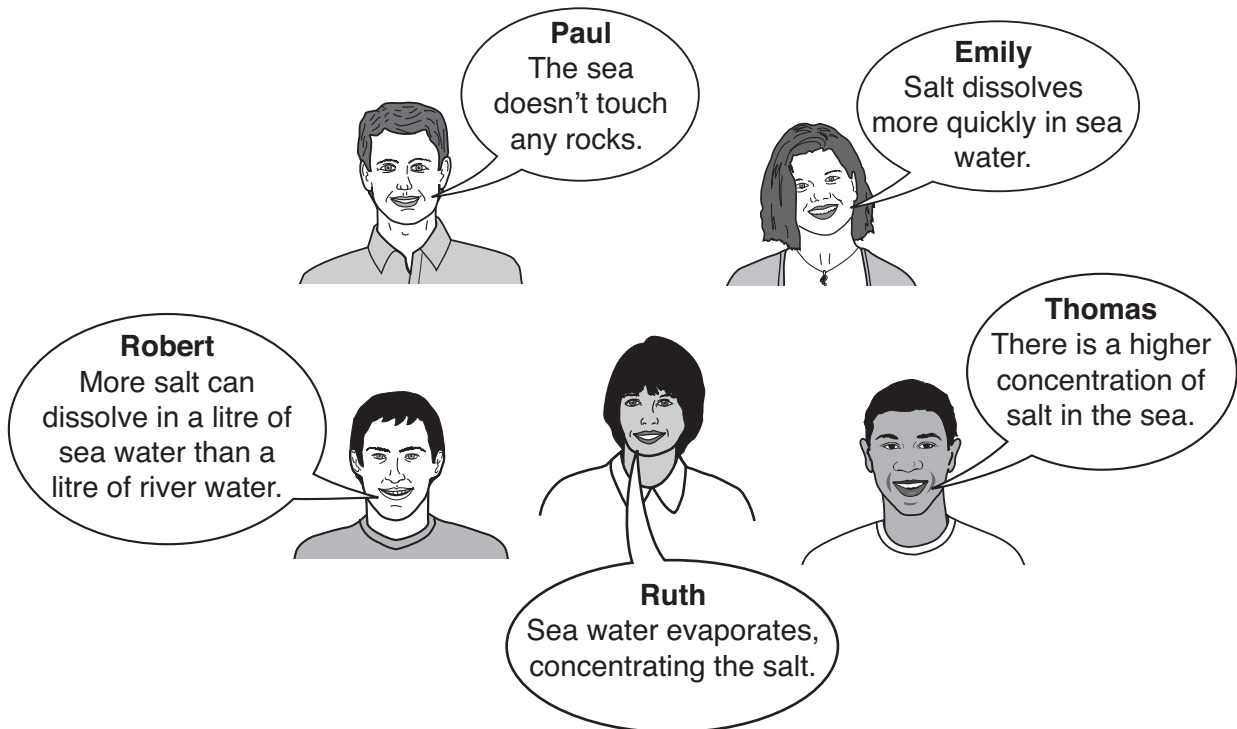
(a) Put a tick (✓) on each row of the table to show where you mainly find each of the following substances.

substance	mostly in atmosphere	mostly in biosphere	mostly in hydrosphere	mostly in lithosphere
liquid water				
sand				
carbon dioxide gas				

[2]

(b) Mary knows that rivers dissolve salt from rocks and carry it down to the sea.

She asks her friends why sea water tastes more salty than river water.

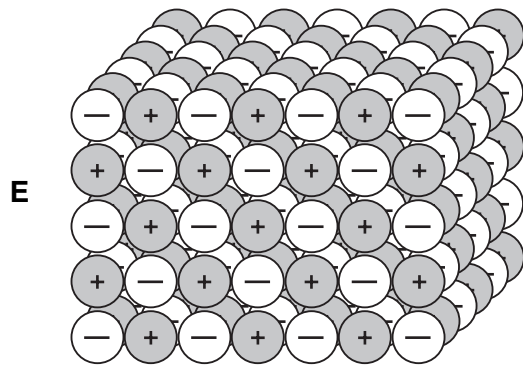
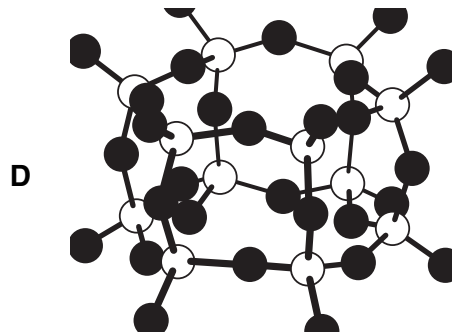
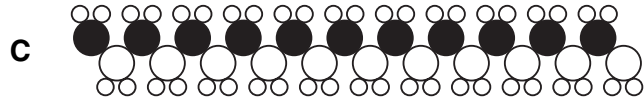
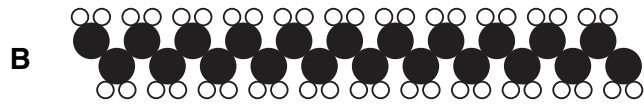


Only two of these friends make statements that explain why the sea is saltier than the rivers. Which two?

answers and [2]

[Total: 4]

2 Mary draws some chemical structures **A**, **B**, **C**, **D** and **E**.



(a) Which structure, **A**, **B**, **C**, **D** or **E**, is most likely to contain a chain of carbon atoms?

answer..... [1]

(b) Which structure, **A**, **B**, **C**, **D** or **E**, will have the lowest boiling point?

answer..... [1]

(c) Which structure, **A**, **B**, **C**, **D** or **E**, is part of a covalent giant structure?

answer..... [1]

(d) Which structure, **A**, **B**, **C**, **D** or **E**, is part of an ionic giant structure?

answer..... [1]

[Total: 4]

Turn over

3 Electric wires are usually made of copper because copper is a good electrical conductor.

(a) How do copper wires conduct electricity?

Put a tick (✓) in the box next to the **best** answer.

Atoms move through the copper wires.

Electrons move through the copper wires.

Ions move through the copper wires.

[1]

(b) Here are some stages in the production of a length of copper wire.

They are in the **wrong** order.

- A extract the mineral
- B make the wire
- C extract copper from its compound
- D use the wire
- E purify the metal

(i) Fill in the boxes to show the correct order.

The last one has been done for you.

				D
--	--	--	--	---

[2]

(ii) Old copper wires often get coated with solder.
Solder is made of different metals.
Soldered copper wires can be recycled.

Here are some possible stages in the recycling of soldered copper wire.

- A make the wire
- B extract copper from its compound
- C use the wire
- D purify the metal

Which of these sequences shows recycling?

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

CBA

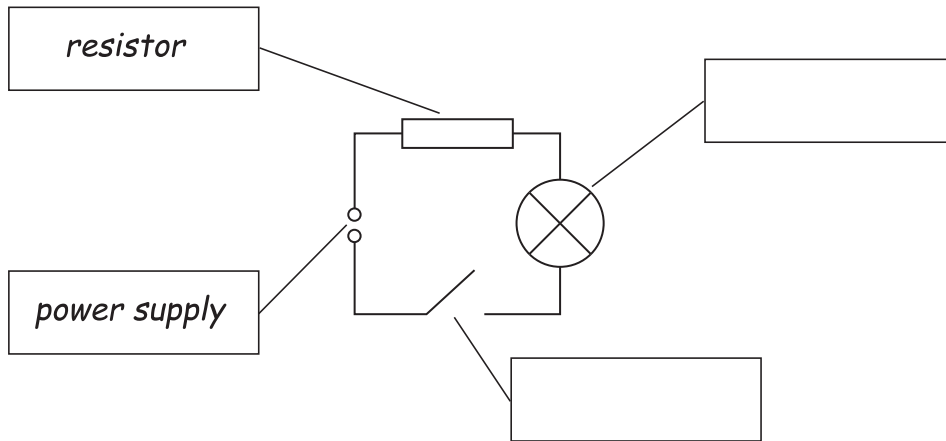
CDA

CBD

CDB

[1]

4 Geoff builds this circuit.



(a) The circuit contains four components.

Two of them have been labelled.

Write the labels for the other two in the boxes. Choose from this list.

- ammeter cell lamp LDR switch voltmeter**

[2]

(b) Finish the sentences below.

Choose words from this list.

- charge current order parallel power series voltage**

The circuit has the components connected in

This means that the for each component will be the same.

[2]

(c) The circuit contains a resistor.

What effect does the resistor have in the circuit?

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

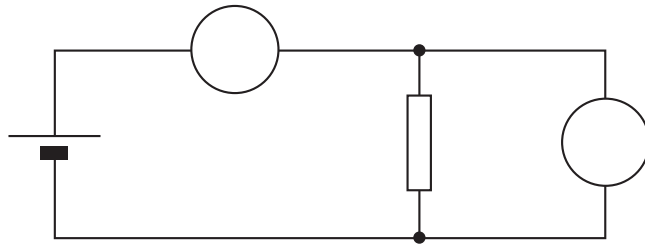
- It removes free electrons from the circuit.
- It reduces the flow of charge through the circuit.
- It increases the energy of the charge which passes through.
- It provides a potential difference to push the charge through.

[1]

[Total: 5]

5 Isla uses this circuit to test a resistor.

She measures the current and the voltage.



(a) The meters in the diagram are not labelled.

Write the correct letter into each circle.

Choose from the list.

- A C P V W**

[2]

(b) The cell provides a potential difference for the circuit.

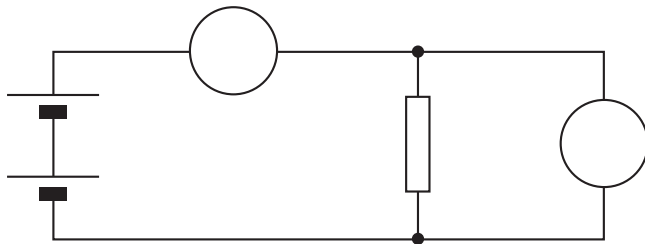
Which of these is another word for potential difference?

Put a ring around the answer.

- charge current power voltage**

[1]

(c) Isla puts another cell in her circuit, as shown below.



What is the effect of the extra cell?

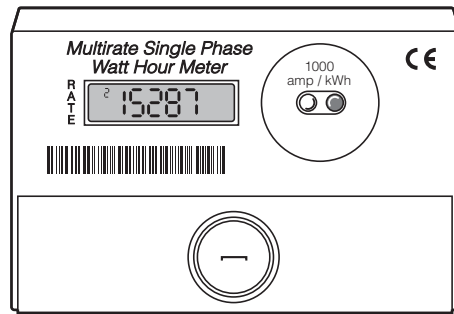
Put a tick (✓) in the correct box for each row.

	decreases	increases	stays the same
effect on the potential difference			
effect on the current			

[2]

[Total: 5]

- 6 Lucinda reads her electricity meter.



- (a) Why is the energy transfer measured in kilowatt-hours instead of joules?

Put a tick (✓) in the box next to the **best** reason.

The joule is a very small amount of energy.

It tells you how much electricity is being used moment by moment.

Each type of energy transfer has its own special unit of measurement.

The meter design can't be adapted to measure energy transfers in joules.

[1]

- (b) Lucinda uses her 2.1 kW heater for 3 hours. Each kilowatt-hour costs 8p.

- (i) What is the correct way of calculating how many pence it costs to use the heater?

Put a **ring** around the answer.

$$2.1 \times 3 \times 8$$

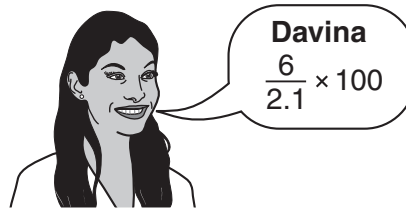
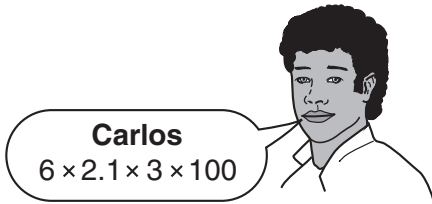
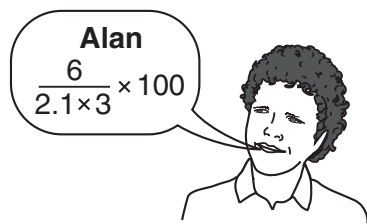
$$\frac{2.1}{3} \times 8$$

$$\frac{3}{2.1} \times 8$$

[1]

(ii) The 2.1 kW heater produces 6 kWh of heat energy in 3 hours.

Who has the correct way of calculating the percentage efficiency of the heater?



answer [1]

(c) Complete the sentence. Choose a word from the list.

charge power resistance voltage

Lucinda's electricity meter measures the energy transferred as passes through the heater.

[1]

[Total: 4]

7 (a) Here are some statements about genes and DNA.

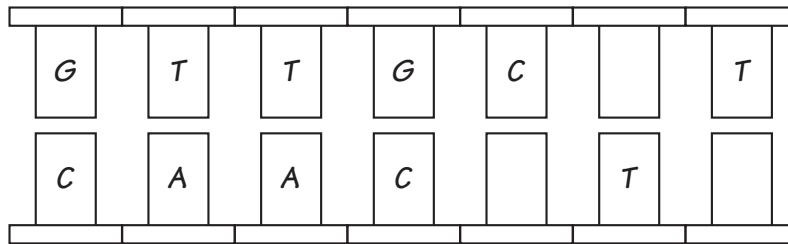
Put a tick (✓) in the box next to the **two** correct statements.

- Genes are made of chromosomes.
- Genes are made of DNA.
- Genes are found in the cell membrane.
- DNA is a set of instructions for making proteins.
- There are three pairs of bases in DNA.

[2]

(b) DNA is made up of two strands, linked by bases **A**, **G**, **T** and **C**.
 These bases always pair up in the same way.
 The diagram shows part of a DNA molecule.

Complete the diagram by writing **A**, **G**, **T** or **C** to identify the unlabelled bases.



[2]

(c) Different cells in an organism can have different functions.

Which of these statements explains why?

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

- Different cells contain different genes.
- Cells lose some genes when they become specialised.
- Genes that are not needed are switched off.
- All the genes in a specialised cell are switched on.

[1]

[Total: 5]

8 This question is about the cell cycle.

(a) The statements **A** to **E** are about either mitosis or meiosis.

- A** produces cells identical to the parent cells
- B** produces cells with only half the number of chromosomes
- C** produces gametes
- D** produces cells with a full set of paired chromosomes
- E** is a process within the cell cycle

Put the letters **A**, **B**, **C**, **D**, and **E** in the correct column of the table to show whether they refer to **mitosis** or **meiosis**.

mitosis	meiosis

[2]

(b) These sentences are about the cell cycle.

They are in the wrong order.

- A** The cell divides to form two new cells.
- B** The numbers of organelles in the cell increase.
- C** Copies of the chromosomes separate and move to opposite ends of the cell.
- D** The two strands of DNA separate so that the chromosomes can be copied.

Put the letters **A**, **B**, **C** and **D** in the correct order in the boxes.

The first one has been done for you.

B			
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[2]

[Total: 4]

- 9 Mike is a gardener. He grows geranium plants on his windowsill.



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- (a) He notices that the plants all grow towards the window.

- (i) What is this process called?

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

photography

photosynthesis

phototropism

[1]

- (ii) How does this process benefit the geranium plants?

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

allows plants to get more light

allows plants to get more water

allows plants to get more carbon dioxide

[1]

- (b) Mike is growing a geranium plant from a cutting.
He cuts a piece of stem from a mature plant.
He puts the cutting into water until it grows roots.
He then plants the cutting in compost.

(i) Which of these statements explain why this method works?

Put a tick (✓) in the boxes next to the **two** correct answers.

- | | |
|---|--------------------------|
| All plant cells are unspecialised. | <input type="checkbox"/> |
| Some plant cells are unspecialised. | <input type="checkbox"/> |
| Some phloem cells turn into root cells. | <input type="checkbox"/> |
| Unspecialised cells turn into root cells. | <input type="checkbox"/> |
| Roots can develop from any part of the plant. | <input type="checkbox"/> |

[2]

(ii) Which statement best describes the new plant Mike has grown?

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

- | | |
|---|--------------------------|
| It is only part of a plant. | <input type="checkbox"/> |
| It is a complete plant that is a clone of the parent plant. | <input type="checkbox"/> |
| It is a complete plant that is different from the parent plant. | <input type="checkbox"/> |
| The new plant can grow leaves but not flowers. | <input type="checkbox"/> |

[1]

[Total: 5]

END OF QUESTION PAPER

