

**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

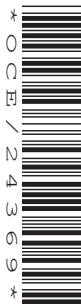
**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)

**Monday 18 January 2010**  
**Morning**

**Duration: 1 hour**



Candidate Forename						Candidate Surname					
Centre Number						Candidate Number					

**MODIFIED LANGUAGE**

**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 **24** pages. Any blank pages are indicated.

2

**EQUATIONS**

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

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

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

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

**3**

**BLANK PAGE**

**Question 1 begins on page 4.**

**PLEASE DO NOT WRITE ON THIS PAGE**

Answer **all** the questions.

**Section A – Module B2**

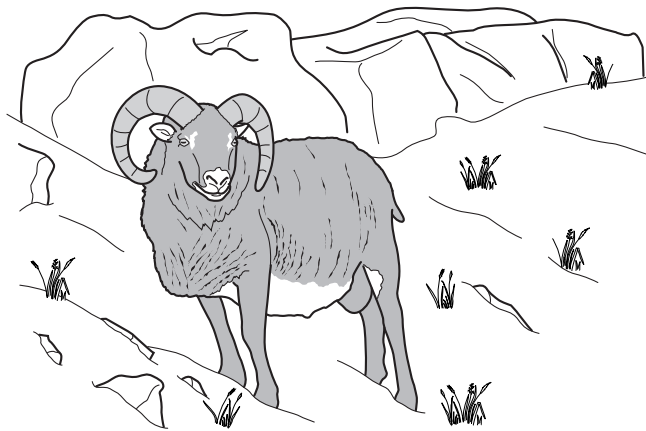
**1** Read the information carefully.

Hirta is a small island in the north of Scotland.

The island is cold and is covered in rocky hills.

Many sheep live on the island.

They all have a thick wool coat and sharp hooves.



Scientists have studied these sheep over many years.

Usually only the largest sheep survive the winter.

Now the scientists are finding that the average mass of sheep on the island is going down.

**(a)** The sheep are adapted to their environment and can live on this island.

Complete the sentences to show how.

The sheep have a thick wool coat to .....

.....

The sheep have sharp hooves to .....

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

**(b)** The sheep on the island are all competing with each other.

Write down **one** thing that they are competing for.

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

5

- (c) Smaller sheep are now surviving the winter.

This may be because the average temperature of the Earth is increasing.

Complete these sentences about this increase in temperature.

The increase in the average temperature of the Earth

is called .....

It is caused by the increased release of the gas..... into the air.

One reason for the increased release of this gas is that the human population

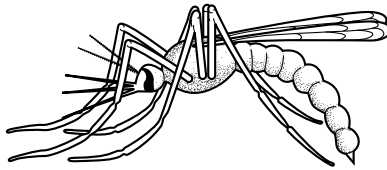
is .....

[3]

[Total: 6]

6

- 2 Mosquitoes are small organisms that do not have a backbone.



*Culex pipiens* is the scientific name for a type of mosquito.

This type of mosquito feeds on the blood of live birds.

- (a) What type of organism is a mosquito?

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

an animal and an invertebrate

☐

a plant and an invertebrate

☐

an animal and a vertebrate

☐

a plant and a vertebrate

☐

[1]

- (b) Tunnels for underground trains were dug under London many years ago.



A group of *Culex pipiens* mosquitoes were trapped in the tunnels. They have lived there ever since.

The mosquitoes now feed on the blood of mice in the tunnels.

Complete these sentences by using words from the list.

**class      community      habitat      population**

The tunnels formed a new ..... for organisms to live in.

The mice and mosquitoes that live together in the underground tunnels are

called a .....

[2]

- (c) Scientists have recently trapped some mosquitoes from the tunnels.

They mated them with *Culex pipiens* mosquitoes from above ground.

After studying the offspring, the scientists decided to give the mosquitoes living in the tunnels a new scientific name, *Culex molestus*.

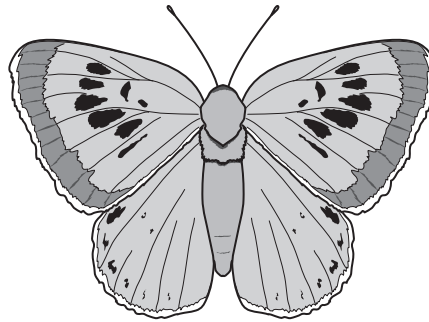
Suggest why the scientists have given the mosquitoes a new scientific name.

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

[Total: 5]

- 3 The Large Blue is a butterfly which lives in certain areas of England.

These areas contain patches of bare ground where ants live.



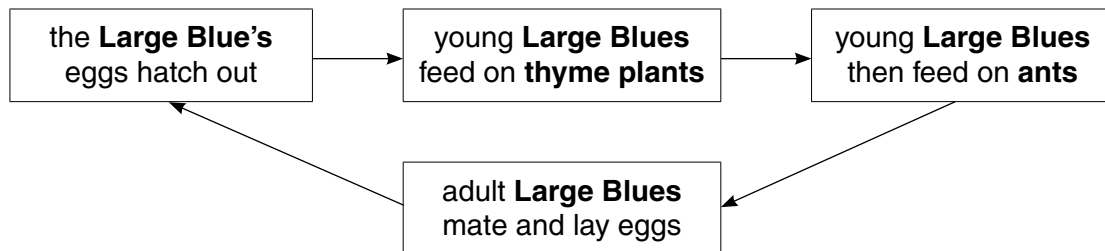
By 1974 the Large Blue had become an **endangered** species.

- (a) What does endangered mean?

..... [1]

- (b) Scientists tried to find out why the Large Blue had become endangered.

They looked at the Large Blue's life cycle.



Choose names of organisms from the life cycle to finish these sentences.

The organisms that make food by photosynthesis are .....

The organisms that are prey organisms are .....

[2]



9

(c) The scientists counted the number of Large Blues, thyme plants, grass plants and ants in an area.

(i) What piece of equipment would the scientists use to collect adult Large Blues for counting?

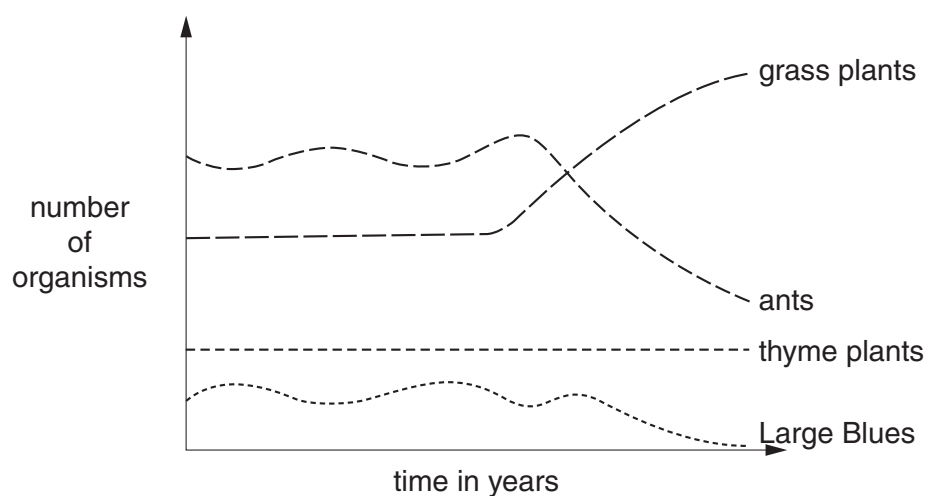
Put a ring around the correct answer in this list.

net      pit-fall trap      pooter      quadrat

[1]

(ii) The scientists counted the organisms regularly over several years.

The graph shows their results.



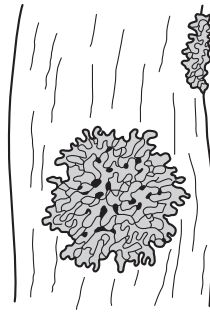
Suggest what caused the Large Blue to become endangered.

Use information from the **life cycle** and the **graph** to help you.

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

[Total: 6]

- 4 Lichens are organisms that usually live on walls and tree trunks.



They consist of fungi that have small organisms called algae living inside them.

The algae make their own food by photosynthesis.

They need a green chemical to do this.

Some of this food is passed to the fungi.

- (a) What is the name of the green chemical?

..... [1]

- (b) Write down the name of the food substance made by photosynthesis.

..... [1]

- (c) Lichens do **not** grow well on trees or walls that are close to towns or factories.

Suggest why this is.

..... [1]

[Total: 3]

## Section B – Module C2

- 5 Look at the picture of a car.



- (a) Steel is used to make the car body.

Write down the names of **two** other materials, which are used to make cars.

1 .....

2 ..... [2]

- (b) Steel is an alloy of iron.

Steel is used instead of iron to make the car body.

Explain why.

.....

.....

..... [2]

- (c) The car is painted.

Write down **two** reasons why the car is painted.

1 .....

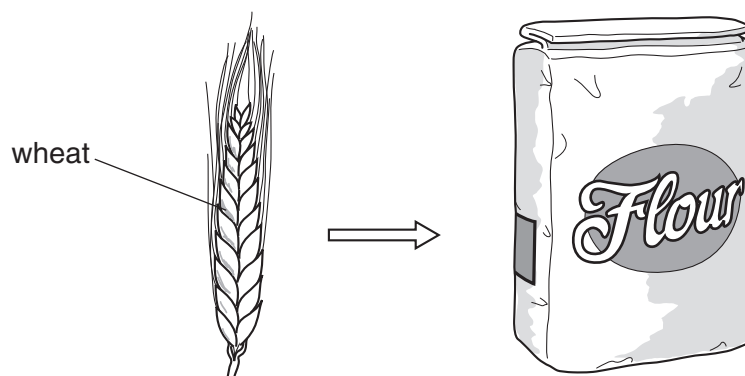
2 ..... [2]

[Total: 6]

12

- 6 Large grains (lumps) of wheat are changed into a fine powder.

The fine powder is called flour.



- (a) Between 1987 and 1997 there were 129 explosions in flour mills in America.

An explosion is a very fast chemical reaction.

Describe what is made during an explosion.

..... [1]

- (b) Flour and wheat react with oxygen.

Powdered flour reacts more quickly than lumps of wheat.

Explain why.

Use ideas about collisions between particles.

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

[Total: 3]

13

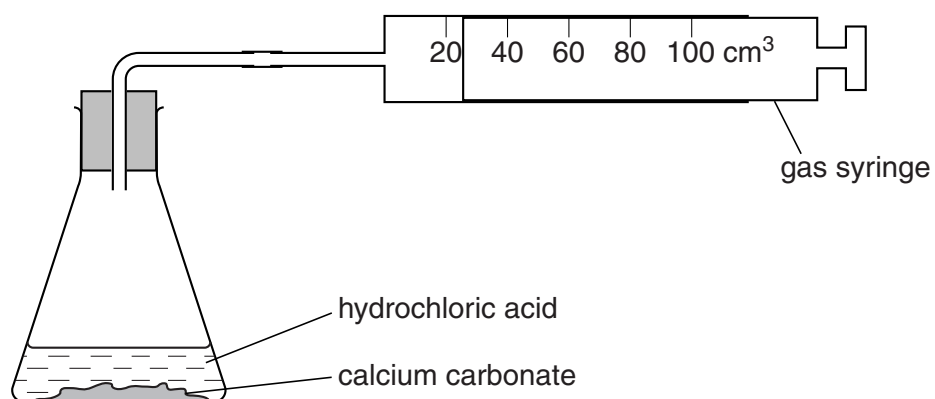
- 7 Ryan and Naomi investigate the reaction between 1.0 g of calcium carbonate and hydrochloric acid. Calcium chloride, carbon dioxide and water are made in this reaction.

(a) Write the **word** equation for this reaction.

..... → ..... [1]

(b) The diagram shows the apparatus they use.

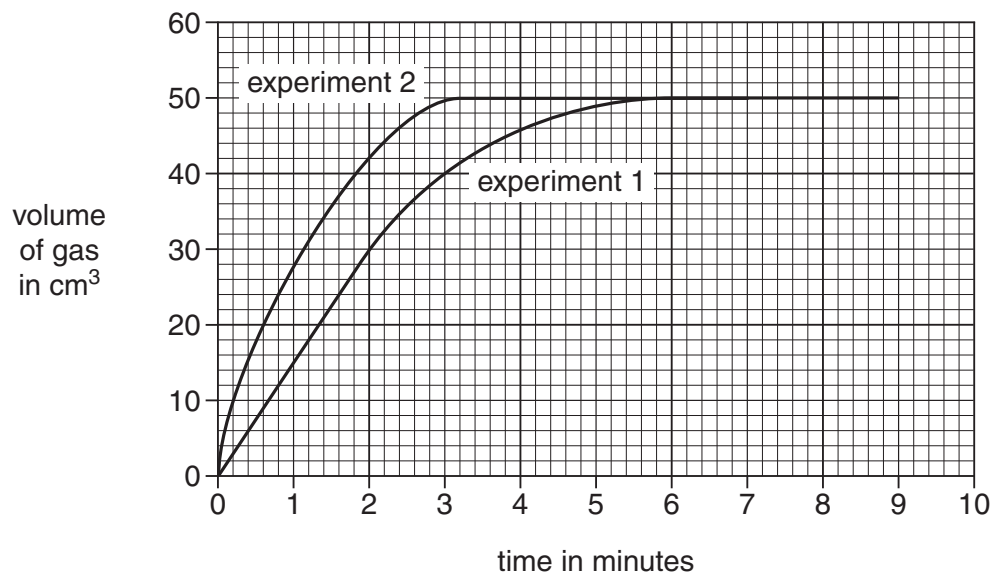
They do the experiment twice.



14

Look at the graph.

It shows their results from the two experiments.



- (i) Look at the curve for **experiment 1**.

How long does it take to collect 40 cm<sup>3</sup> of gas?

..... minutes

[1]

- (ii) Look at the curves for experiments 1 and 2.

How can you tell that experiment 2 is faster than experiment 1?

.....

..... [1]

[Total: 3]

15

8 This question is about the gases in the air.

(a) Look at the list.

Put a ring around **one** gas which is **not** normally present in the air.

**carbon dioxide**

**hydrogen**

**nitrogen**

**oxygen**

**water vapour**

[1]

(b) Two processes affect the level of gases in the air.

Draw a straight line to match each **process** to its **effect**.

**process**

**effect**

photosynthesis

no change to level of oxygen in the air

respiration

decreases level of oxygen in the air

increases level of oxygen in the air

[1]

(c) Burning fossil fuels makes sulfur dioxide.

Sulfur dioxide causes acid rain.

Describe **one** environmental problem caused by acid rain.

.....

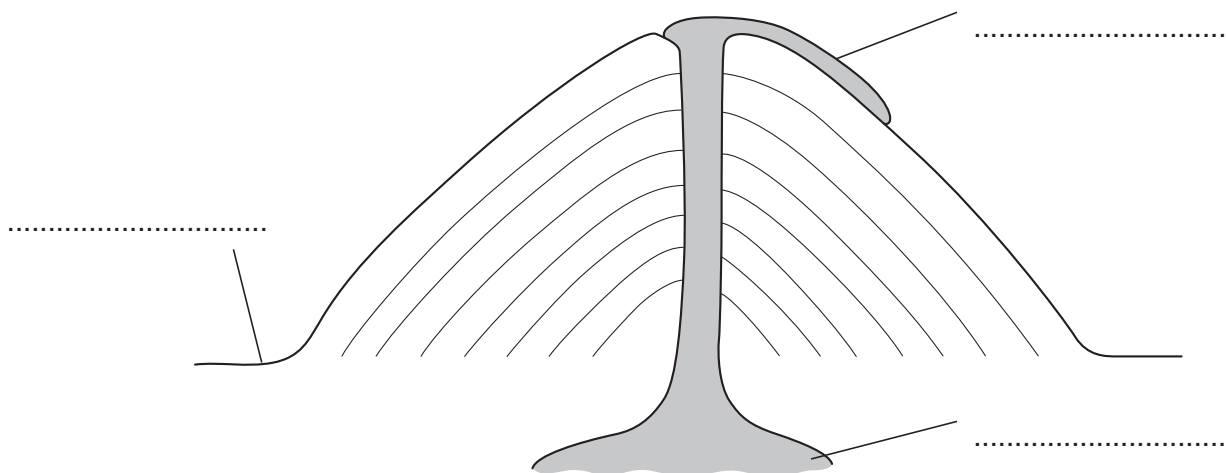
..... [1]

[Total: 3]

16

9 This question is about volcanoes.

Look at the diagram of a volcano erupting.



(a) Complete the labels on the diagram.

Choose from the list.

crust

lava

magma

[2]

(b) Volcanoes can be dangerous.

Suggest why some people live near volcanoes.

.....

..... [1]

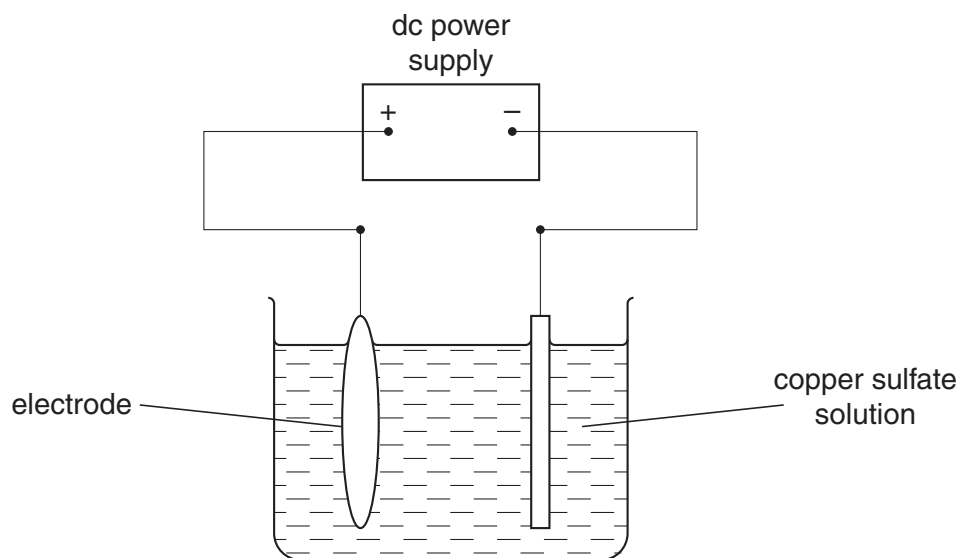
[Total: 3]



10 This question is about copper.

Look at the diagram.

It shows the apparatus used to purify copper.



(a) What is the name of the **process** used to purify copper?

Use the diagram to help you.

..... [1]

(b) Copper sulfate has the formula  $\text{CuSO}_4$ .

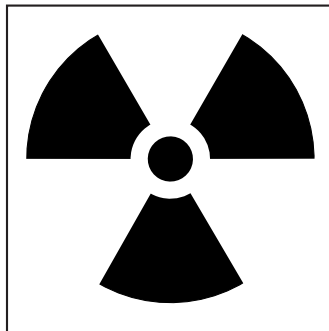
How many **atoms** are shown in this formula?

answer ..... [1]

[Total: 2]

## Section C – Module P2

11 This question is about nuclear radiation.



(a) Nuclear radiation can be useful.

How can nuclear radiation be **useful**?

..... [1]

(b) Using radioactive materials can be harmful to people.

(i) Write down **one** harmful effect of radioactivity.

..... [1]

(ii) Suggest how people can handle radioactive materials **safely**.

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

(c) Complete the sentence.

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

[Total: 4]

12 Power stations generate electrical energy.



(a) Look at the list of fuels that power stations can use.

coal

crude oil

manure

natural gas

uranium

wood

Complete the sentences.

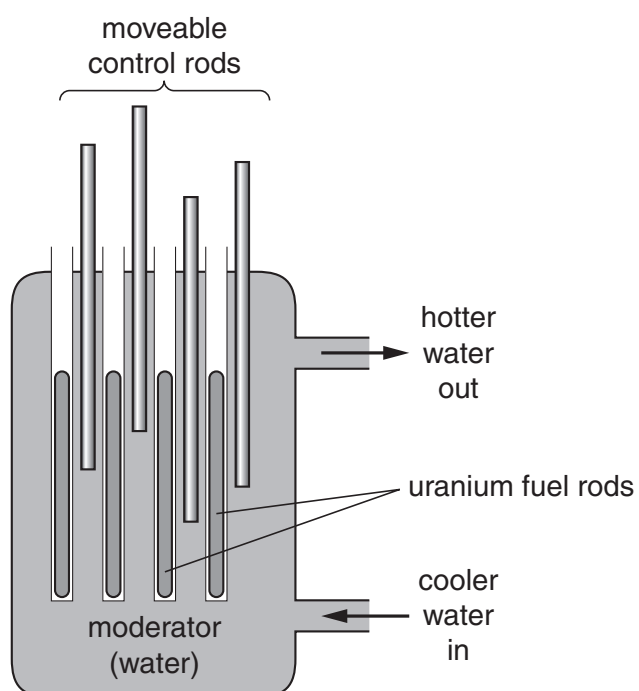
Each word may be used **once**, **more than once** or **not at all**.

(i) **Fossil fuel** power stations burn three types of fuel. The three fuels burned are

natural gas, ..... and ..... [1]

(ii) **Renewable biomass** power stations burn ..... or ..... [2]

(b) Nuclear power stations use fuel rods.



Complete the sentences.

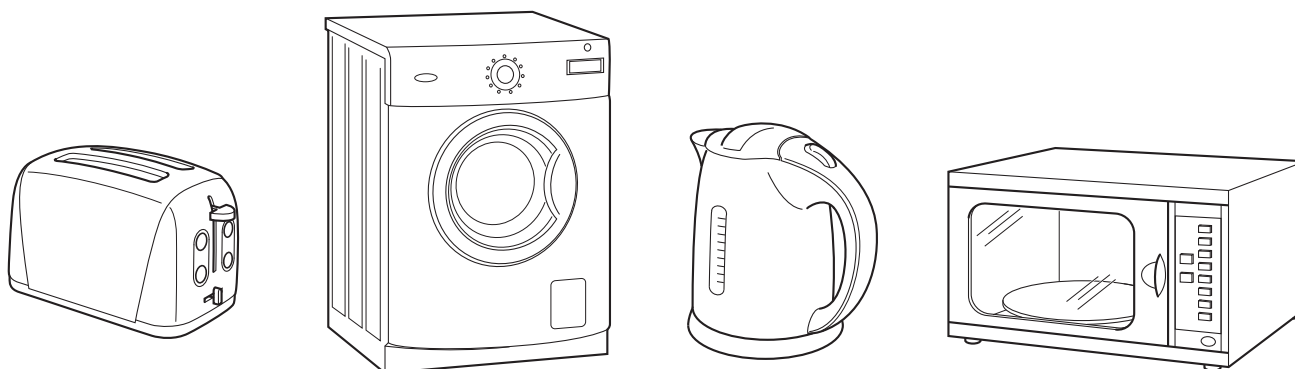
Fuel rods release energy in the form of .....

The fuel rods produce a waste material called .....

[2]

[Total: 5]

13 Look at the information about using some electrical appliances.



appliance	power in kW	time used in hours
toaster	1.5	0.1
washing machine	3.0	2.0
kettle	2.5	0.2
microwave oven	2.0	0.3

(a) The washing machine is the most expensive to use.

Suggest **two** reasons why.

1 .....

2 ..... [2]

(b) (i) The kettle is used for 0.2 hours.

Calculate the number of kilowatt hours used by the kettle.

The equations on page 2 may help you.

.....

.....

answer ..... kWh [1]

(ii) One kWh of electricity costs 12p.

Calculate the cost of using the kettle for 0.2 hours.

.....

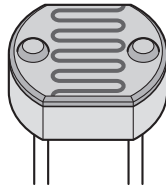
.....

answer ..... pence [1]

[Total: 4]  
Turn over

14 This question is about the Sun.

(a) A photocell collects energy from the Sun.



Write about photocells.

In your answer use ideas about

- the type of energy that is absorbed
- the type of energy that is produced
- an advantage of using photocells.

.....

.....

.....

.....

..... [3]

(b) The Sun produces **solar flares**.

What problem can a solar flare cause?

..... [1]

(c) The Earth orbits the Sun.

What orbits the Earth?

..... [1]

(d) Stars are different sizes.

(i) The Sun is a **medium-weight** star.

It will change into a red giant near the end of its life.

What forms **next**?

Choose from the list.

**black hole**

**neutron star**

**planetary nebula**

**supernova**

answer ..... [1]

(ii) A **heavy-weight** star also changes into a red giant near the end of its life.

What happens **next**?

Choose from the list.

**does not change**

**planetary nebula**

**supernova**

**white dwarf**

answer ..... [1]

[Total: 7]

**END OF QUESTION PAPER**

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\* 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.