

<b>Candidate Forename</b>		<b>Candidate Surname</b>	
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<b>Centre Number</b>						<b>Candidate Number</b>				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**B652/01**

**GATEWAY SCIENCE**

**PHYSICS B**

**Unit 2 Modules P4 P5 P6 (Foundation Tier)**

**FRIDAY 18 JUNE 2010: Afternoon**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**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)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes on the first page.**
- **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.**
- **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).**

## **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 three.**
- **The total number of marks for this paper is 60.**

## EQUATIONS

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

$$v = u + at$$

$$s = \frac{(u + v)}{2} t$$

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

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

**Answer ALL the questions.**

**SECTION A – MODULE P4**

**1 (a) Insulating materials can become charged.**

**Plastic is an insulator.**

**Describe how you can charge a plastic rod.**

\_\_\_\_\_ [1]  
\_\_\_\_\_

**(b) How many different types of charge are there?**

**Choose from:      1      2      3      4**

**answer \_\_\_\_\_ [1]**

**(c) Victor is electrically charged.**

**He touches a metal water tap.**

**Victor gets a shock.**

**Why does he get a shock?**

\_\_\_\_\_ [1]  
\_\_\_\_\_

**(d) Static electricity can sometimes be useful.**

**It is used to restart the heart when it stops.**

**Give one OTHER example of where static electricity is useful.**

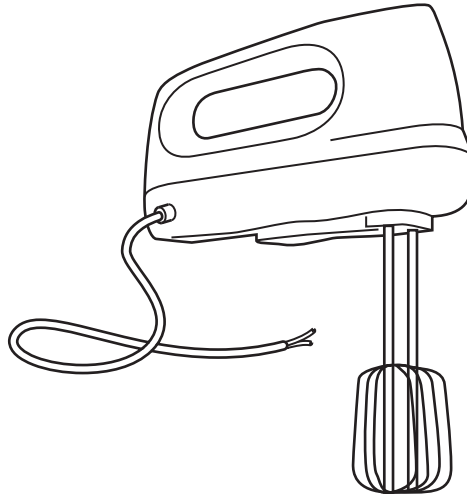
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**[1]**

**[Total: 4]**

**2 (a) Una's food mixer only needs two wires in the plug.**



**Which wire is missing from the plug?**

**Choose from:**

**earth**

**live**

**neutral**

**answer** \_\_\_\_\_ **[1]**

**(b) Most mains electric cables have three wires.**

**They are different colours.**

**Draw a straight line from each WIRE to its correct COLOUR.**

**WIRE**

**earth**

**live**

**neutral**

**COLOUR**

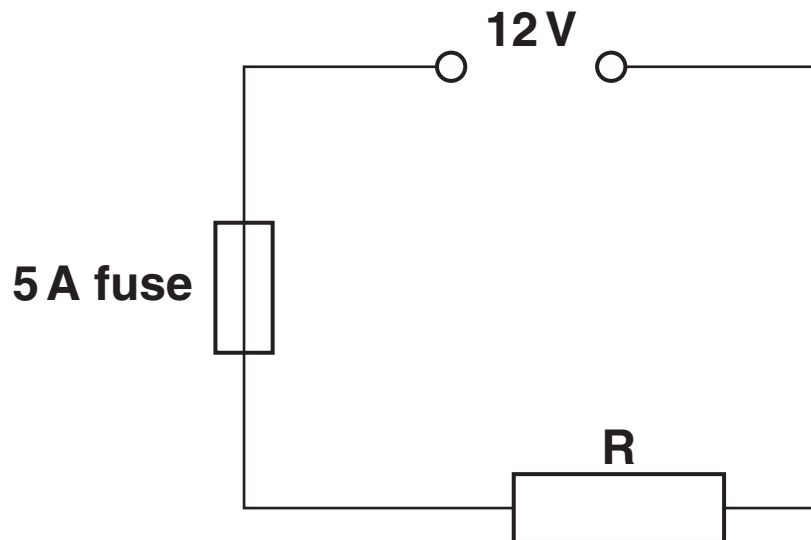
**blue**

**brown**

**green/yellow**

**[2]**

(c) Zak connects the following circuit.



He uses a fuse.

The fuse melts if the current is more than 5 amps.

Calculate the resistance in the circuit when the current is 5 amps.

The equations on page 3 may help you.

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answer \_\_\_\_\_ ohms [2]

[Total: 5]



**3 Ultrasound is used in hospitals.**

**It is used to look inside people by scanning the body.**

**(a) Write down one OTHER use of ultrasound in hospitals.**

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**[1]**

**(b) Ultrasound CANNOT be heard.**

**Explain why.**

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**[1]**

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

**The waves are made up of a series of compressions and rarefactions.**

**What is a compression?**

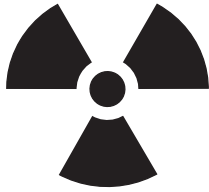
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**[1]**

**[Total: 3]**

**4 This question is about radiation and radioactive materials.**



**(a) X-rays and gamma rays are used in hospitals.**

**How are X-rays similar to gamma rays?**

\_\_\_\_\_ [1]  
\_\_\_\_\_

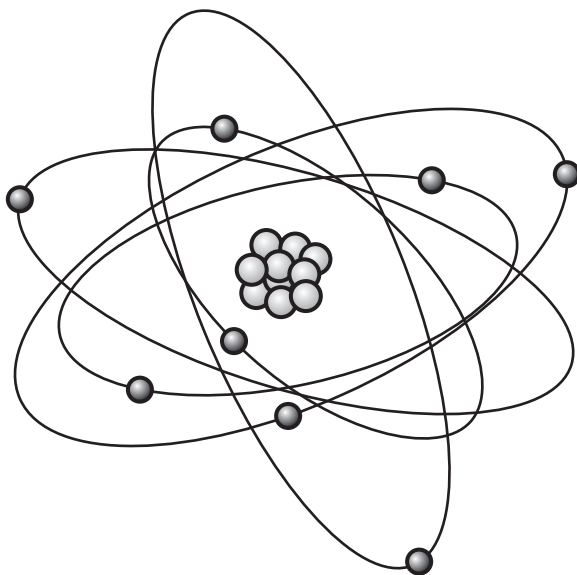
**(b) Some radioactive sources emit alpha particles.**

**Write down ONE use of an alpha source.**

\_\_\_\_\_ [1]

**(c) Some radioactive sources emit beta particles.**

**(i) Beta particles are emitted from radioactive atoms.**



**Which PART of the atom gives out beta particles?**

**Write down its name.**

\_\_\_\_\_ [1]

**(ii) What is a beta particle?**

**In your answer write about**

- **what type of particle it is**
- **its movement.**

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_ [2]

**[Total: 5]**

**5 Nuclear power stations use a nuclear fuel to produce electricity.**

**(a) Which FUEL is used in nuclear power stations?**

**Choose from:**

**coal**

**gas**

**oil**

**uranium**

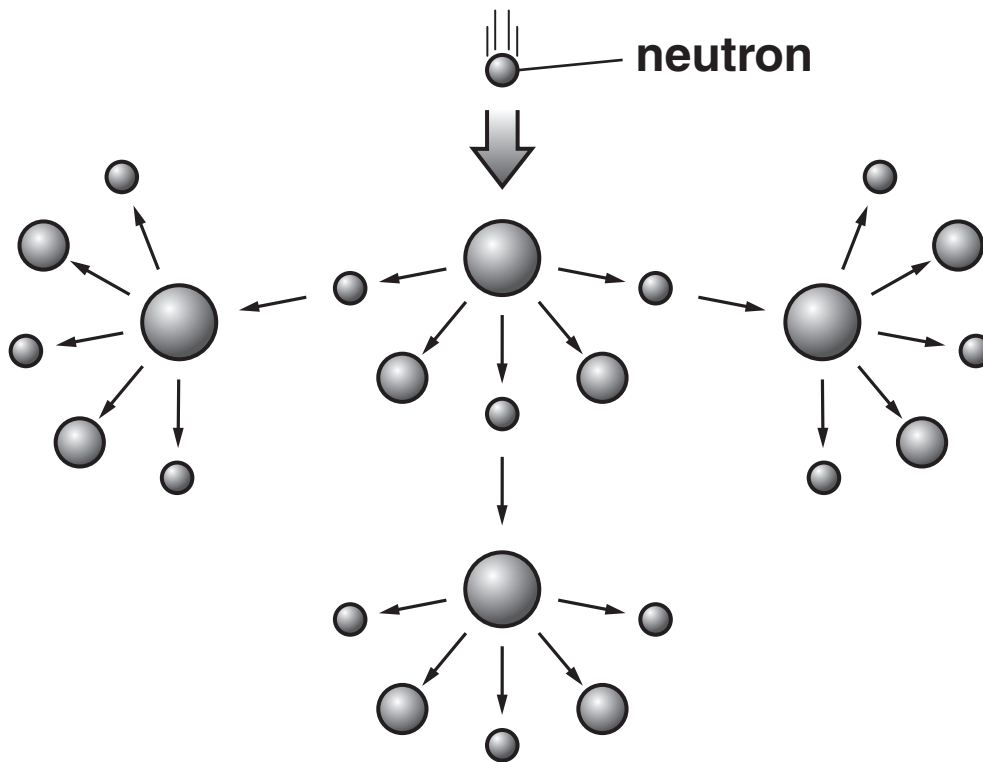
**wood**

**answer \_\_\_\_\_ [1]**

**(b) A chain reaction happens in a nuclear power station.**

**It also happens in a nuclear bomb.**

Look at the diagram.



The chain reaction in a nuclear bomb is different from the chain reaction in a nuclear power station.

Explain how the nuclear bomb chain reaction is different.

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[1]

(c) Tom wants to make a piece of copper radioactive.

How can he do this?

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[1]

[Total: 3]

## SECTION B – MODULE P5

6 A human cannonball is an example of a PROJECTILE.

Look at the picture of a man being fired as a human cannonball.



(a) Which two of the following are examples of PROJECTILES?

Put ticks (✓) in the boxes next to the TWO correct answers.

an athlete long-jumping

a boxer punching

a golf ball in flight

a parachutist falling vertically

a swimmer floating

[2]

**(b) Finish the sentence by choosing the BEST word from this list.**

**orbit**

**trajectory**

**velocity**

**The PATH taken by a projectile is called**

**the \_\_\_\_\_ . [1]**

**(c) All projectiles have a downward vertical force acting on them.**

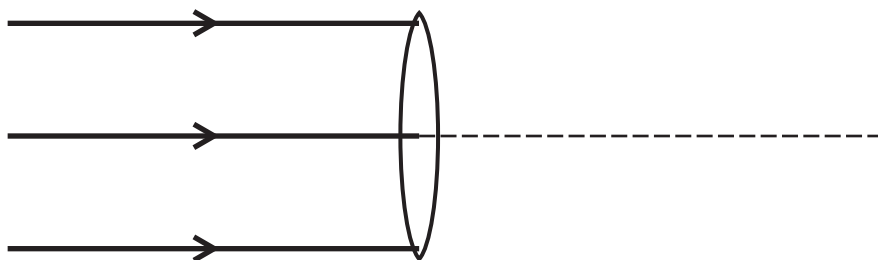
**Write down the name of this force.**

\_\_\_\_\_ [1]

**[Total: 4]**

7 This question is about lenses.

(a) The diagram shows three rays of light and a lens.



(i) What TYPE of lens is shown in the diagram?

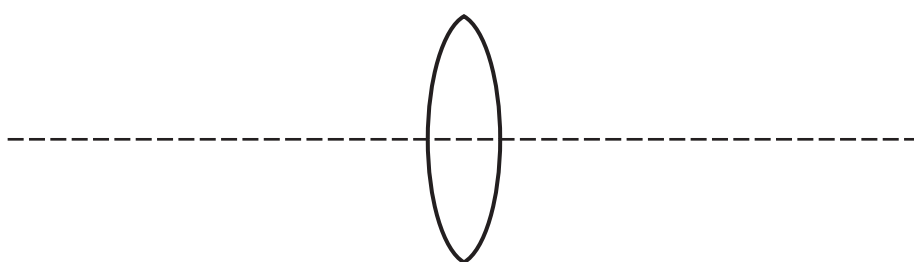
\_\_\_\_\_ [1]

(ii) The rays pass through the lens.

Finish the diagram above by showing the paths they take. [2]

(iii) Label the diagram with an **F** to show the position of the focal point of the lens. [1]

(b) This lens is thicker at its centre.



What happens to the focal length when we use a thicker lens?

\_\_\_\_\_ [1]

[Total: 5]



- 8 (a) Which of the following is NOT a description of a satellite?

Put a ring around the correct answer.

International Space Station orbiting Earth

Mars Odyssey orbiting Mars

space shuttle landing at Kennedy Space Centre

[1]

- (b) The Earth has only one natural satellite.

Write down the name of this natural satellite.

\_\_\_\_\_ [1]

- (c) GOES is an ARTIFICIAL satellite above the Earth.

It is used for WEATHER forecasting.

Write down two OTHER uses of artificial satellites above the Earth.

1 \_\_\_\_\_

2 \_\_\_\_\_ [2]

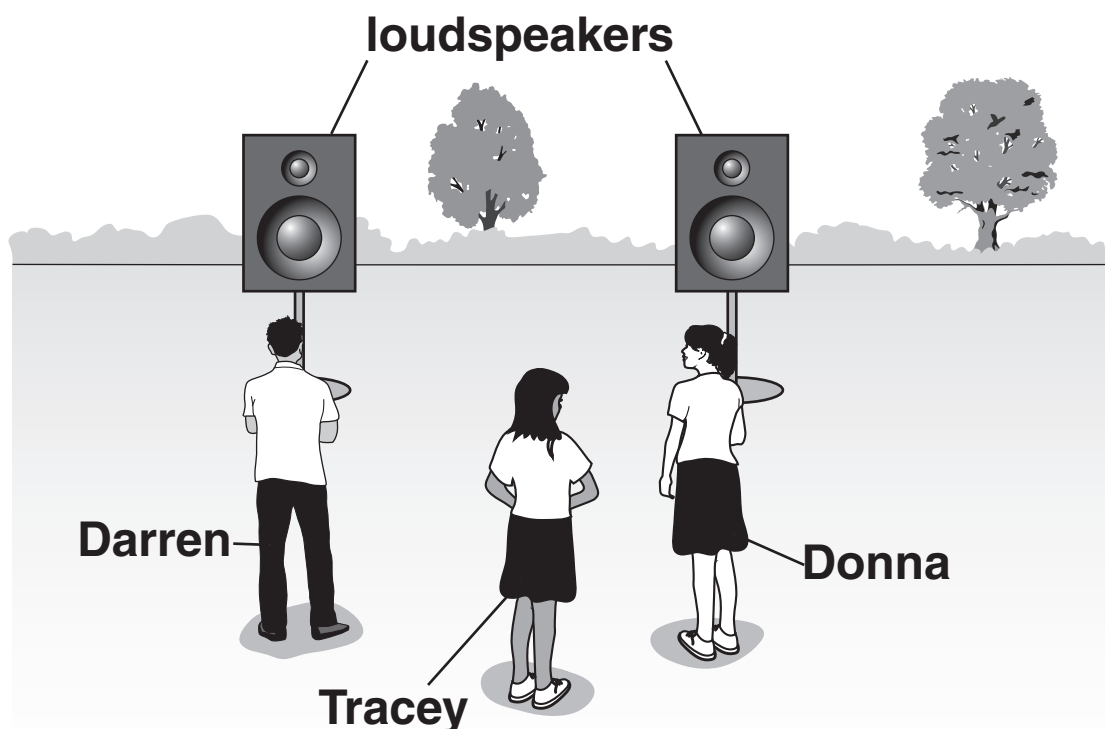
[Total: 4]

9 This question is about properties of sound and light.

(a) A teacher is playing the same sound through two loudspeakers.

The loudspeakers are set up outside on the school field. They are about 1 m apart.

The teacher asks her students what they can hear from the loudspeakers.



Tracey and Donna can both hear well normally.

Why does Tracey hear a loud sound while Donna does not hear anything?

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[2]

**(b) The teacher looks at Darren.**

**Light from Darren travels towards the teacher.**

**Finish the sentences by choosing the BEST words from this list.**

**curved**

**medium**

**random**

**straight**

**vacuum**

**wave**

**Light travels in \_\_\_\_\_ lines.**

**The air that the light goes through is called a**

**\_\_\_\_\_ . [2]**

**[Total: 4]**

**10 The Keirin is a sprint cycle race.**



**The cyclists follow a motorised cycle until they are travelling at a speed of  $14\text{ m/s}$ .**

**The motorised cycle leaves the track.**

**The cyclists then accelerate from  $14\text{ m/s}$  to  $18\text{ m/s}$  at a steady rate.**

**This takes 3 seconds.**

**(a) What distance do the cyclists travel during the 3 seconds?**

**The equations on page 3 may help you.**

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**answer = \_\_\_\_\_ m [2]**

(b) The motorised cyclist leaves the track travelling at a SPEED of 14 m/s.

Speed is a scalar quantity.

Velocity is a vector quantity.

What is the difference between a SCALAR and a VECTOR quantity?

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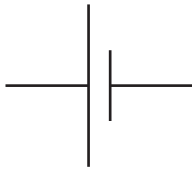
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[1]

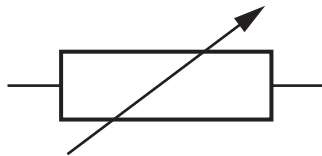
[Total: 3]

**SECTION C – MODULE P6**

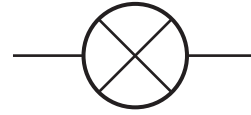
**11 Look at the symbols of electrical components.**



**A**



**B**



**C**



**D**



**E**

**(a) Which is the symbol for a CAPACITOR?**

**Choose from:      A      B      C      D      E**

**answer \_\_\_\_\_ [1]**

**(b) Which is the symbol for a LAMP (BULB)?**

**Choose from:      A      B      C      D      E**

**answer \_\_\_\_\_ [1]**

**(c) Which is the symbol for a DIODE?**

**Choose from:      A      B      C      D      E**

**answer \_\_\_\_\_ [1]**

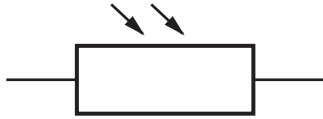
**(d) Which is the symbol for a VARIABLE RESISTOR?**

**Choose from:            A            B            C            D            E**

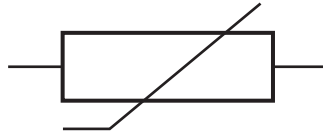
**answer \_\_\_\_\_ [1]**

**[Total: 4]**

12 Look at the three electrical items.



**LDR**



**thermistor**



**metal wire**

Draw a line from each ITEM to its correct DESCRIPTION.

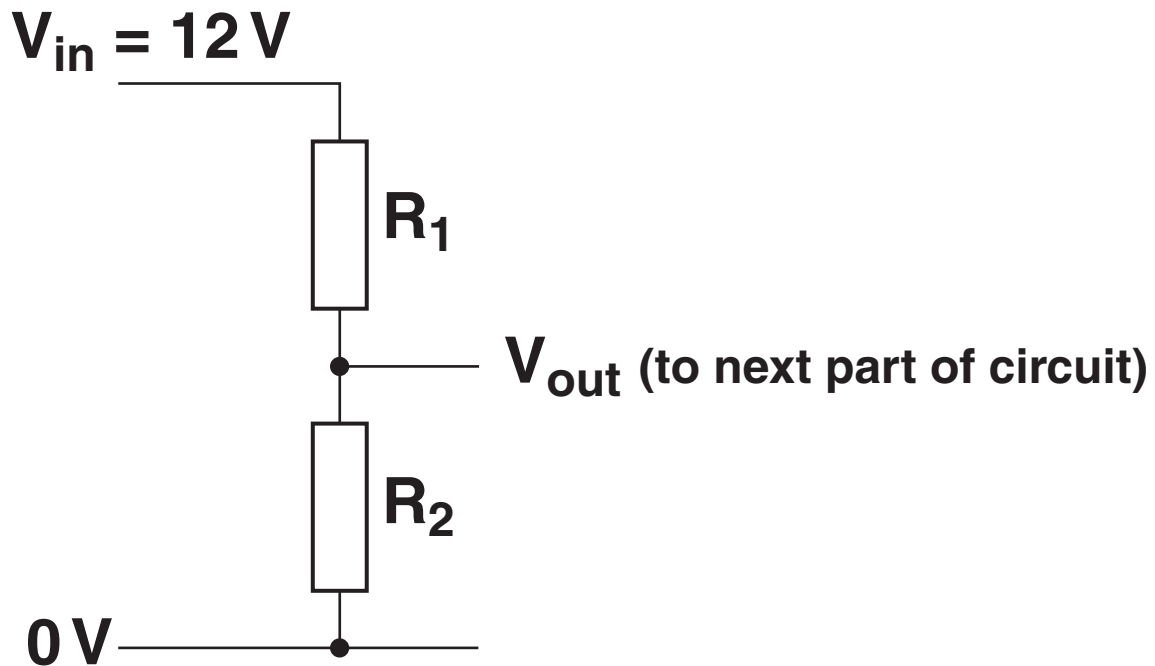
<u>ITEM</u>	<u>DESCRIPTION</u>
LDR	when it becomes hotter resistance <b>ALWAYS</b> increases
thermistor	responds to a change in temperature
metal wire	responds to a change in light

[2]

[Total: 2]



13 Look at the arrangement of two fixed resistors in series.



(a) What is the name given to this arrangement?

\_\_\_\_\_ [1]

(b) What does this arrangement supply to the next part of the circuit?

\_\_\_\_\_ [1]

(c) The input voltage is fixed at 12V.

The output voltage needs to be variable.

Explain how you could do this.

\_\_\_\_\_  
\_\_\_\_\_

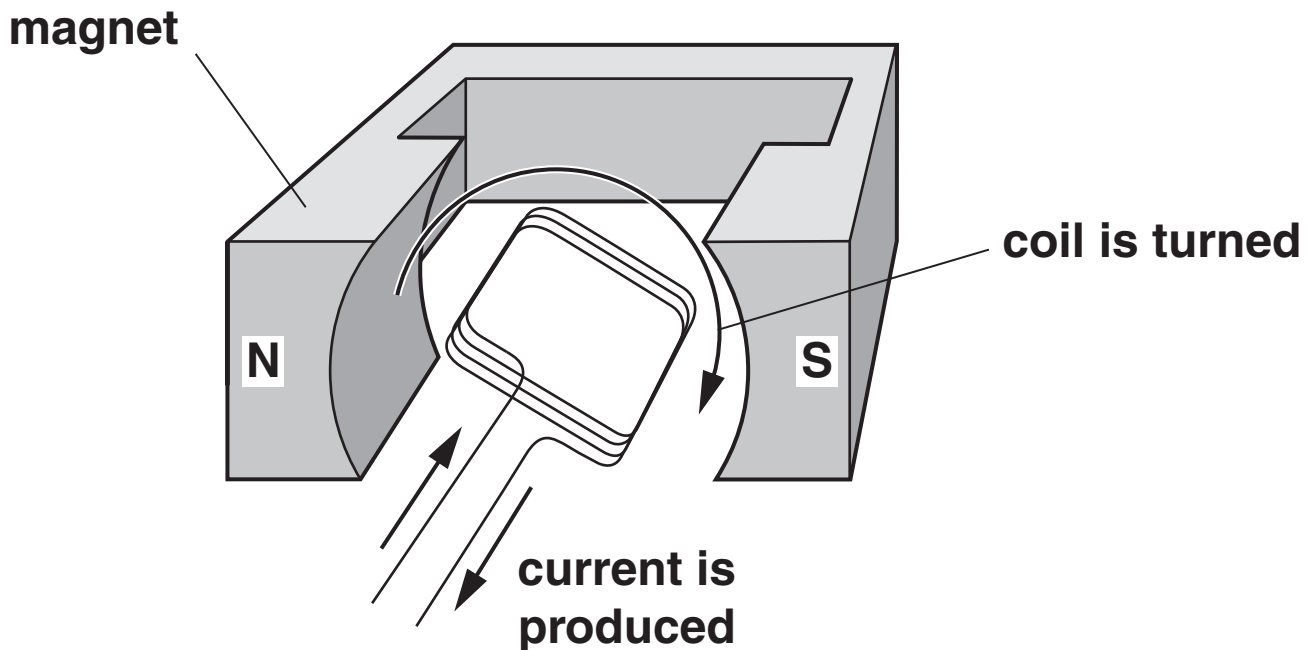
\_\_\_\_\_ [2]

[Total: 4]

14 Look at the diagram. It shows part of a DC (direct current) generator.

The coil is turned.

A current is produced.



(a) The DC generator can be made into a different electrical device by SUPPLYING the coils WITH a current.

Complete the sentences about THIS type of device.

When a DC generator is supplied with a current the coil turns.

It is now working as a \_\_\_\_\_ .

Some household appliances use this device.

One example is a \_\_\_\_\_ .

[2]

**(b) Power stations use a different type of generator.**

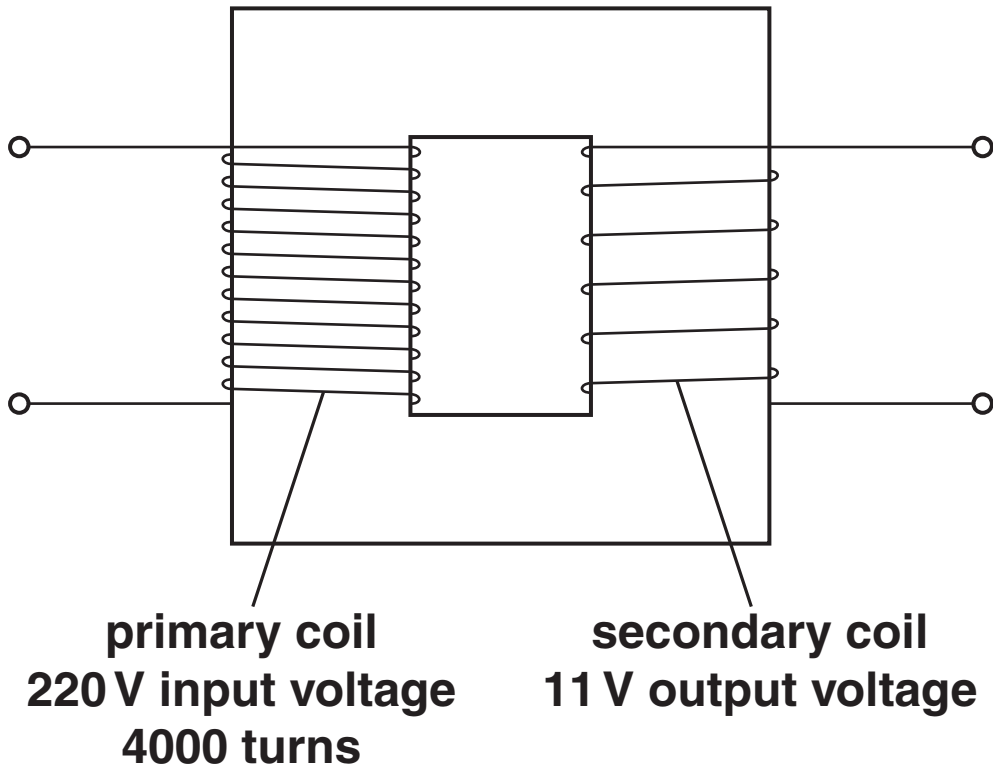
**These generators produce AC (alternating current).**

**What is the FREQUENCY of the mains electricity supply in the UK?**

\_\_\_\_\_ hertz (Hz) [1]

**[Total: 3]**

15 Look at the diagram of a transformer.



(a) Calculate the number of turns in the secondary coil.

The equations on page 3 may help you.

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answer \_\_\_\_\_ turns

[2]

(b) The transformer in the diagram is a STEP DOWN transformer.

What is different in the construction of a STEP UP transformer?

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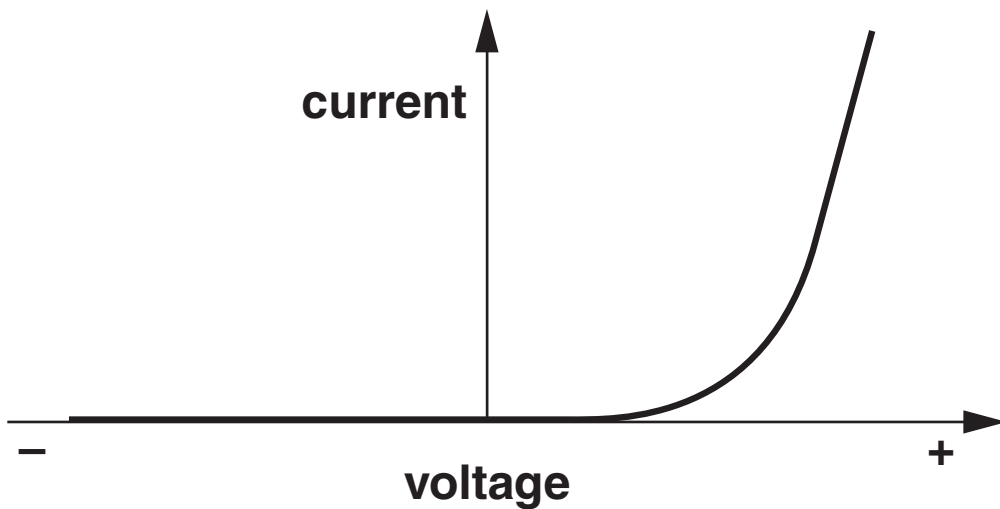
[1]

[Total: 3]

**16 Declan does an experiment with an electrical component.**

**He measures the current and voltage for the component.**

**He then draws a current-voltage graph.**



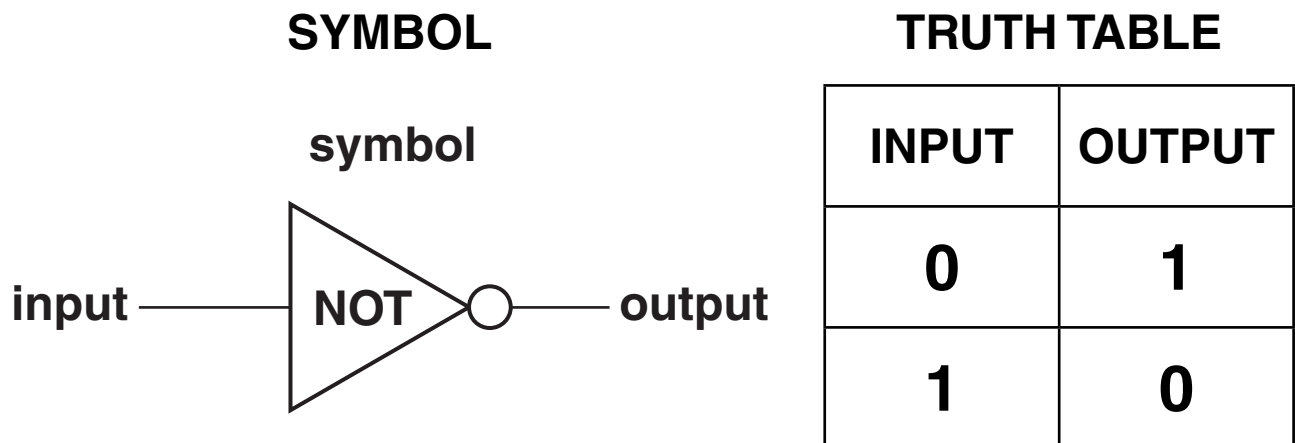
**(a) Look at the graph.**

**Complete the sentence.**

**The graph shows the current-voltage**

**characteristics for a silicon \_\_\_\_\_ . [1]**

(b) A NOT gate is another type of electrical component.



Complete the sentences about the NOT gate.

The input signal to the NOT gate is either a high or a low \_\_\_\_\_ .

The output in the truth table is either **0** or **1**.

The values '0' and '1' represent the output

\_\_\_\_\_ . [2]

(c) A LATCH in a car alarm contains two logic gates.

What does the latch do once the alarm sounds?

\_\_\_\_\_ [1]

[Total: 4]

**END OF QUESTION PAPER**



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