



**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 Nuclear power stations do not burn fuel.

(a) They use a different energy source.

Write down an energy source used in nuclear power stations.

Choose from

**carbon dioxide**

**hydrogen**

**uranium**

**water**

answer ..... [1]

(b) Americium-241 is an artificial radioactive isotope.

How is americium **made** radioactive?

..... [1]

(c) Americium-241 emits radiation in the form of alpha particles.

Which **part** of the atom does this radiation come from?

..... [1]

(d) A source of alpha radiation is used in a household appliance.

Which appliance uses a radioactive source?

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

microwave oven

mobile phone

remote controller

smoke detector

[1]

[Total: 4]

2 The picture shows an aircraft being refuelled.



copper wire

fuel pipe

There is a copper wire between the aircraft and the fuel tanker.

This wire carries electric charge.

(a) There are two types of electric charge.

Finish the sentence by choosing the **best** words from this list.

**alternating**

**direct**

**negative**

**neutral**

**positive**

The two types of electric charge are ..... and ..... [2]

(b) The fuel becomes charged as it flows along the pipe.

The copper wire becomes loose. It is now **not** attached to the aircraft.

The fuel pipe is disconnected. Suggest what might happen.

..... [1]

(c) A charged balloon will be attracted to a wall or ceiling.

A charged comb will pick up paper.

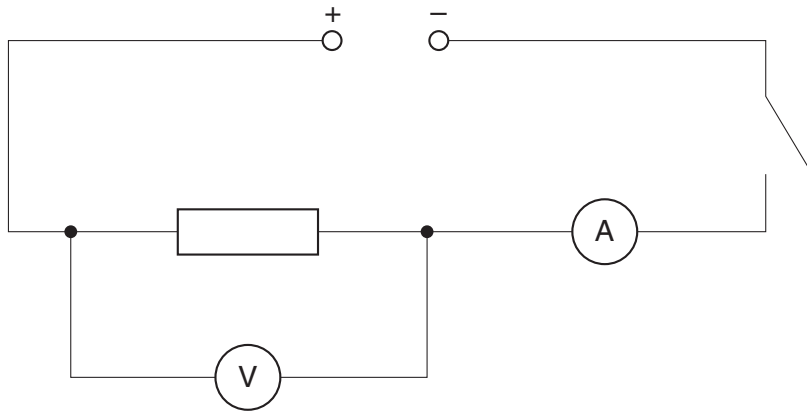
These are ways of showing the **effect** of static electricity.

Suggest one example where static electricity is **useful**.

..... [1]

[Total: 4]

3 Sally builds this circuit.



(a) She closes the switch. A current passes through the circuit.

Finish the sentence.

The current is caused by a flow of ..... [1]

(b) The reading on the voltmeter is 6V.

The reading on the ammeter is 1.5A.

Calculate the resistance of the resistor.

The equations on page 2 may help you.

.....

.....

.....

answer ..... ohms [2]

(c) Sally adds a 0.5A fuse in series with the resistor.

(i) What happens to the fuse when the switch is closed?

..... [1]

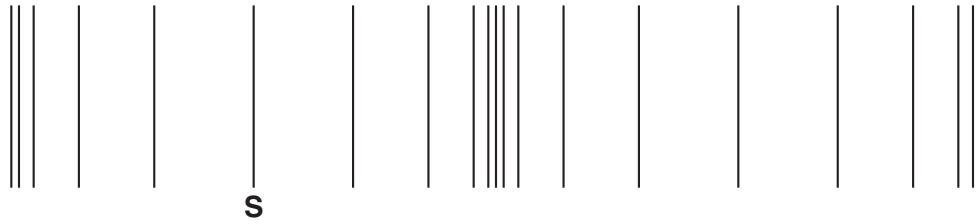
(ii) Why does this happen?

..... [1]

[Total: 5]

4 Look at the diagram. It represents an ultrasound wave.

Ultrasound is a longitudinal wave.



(a) Write the letter **C** below the centre of a **compression**. [1]

(b) Write the letter **L** below the point that is one wavelength away from the point **S**. [1]

(c) Ultrasound is used in hospitals.

Describe **two** different ways it is used in a hospital.

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

[Total: 4]

5 Radiation has many uses in medicine.

(a) Which two types of radiation are **electromagnetic waves**?

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

- alpha and beta**
- beta and gamma**
- gamma and X-rays**
- X-rays and alpha**
- X-rays and beta**

[1]

(b) A radioisotope which emits gamma radiation is used in a hospital.

Describe what happens to the activity of the radioisotope over a period of time.

..... [1]

(c) The gamma radiation is used to treat cancer.

Suggest **one** other use for radioisotopes in hospitals.

..... [1]

[Total: 3]

Section B – Module P5

6 This question is about satellites.

(a) There are two **types** of satellite.

One type is **artificial**.

Write down the name of the **other** type of satellite.

..... [1]

(b) Look at the photograph of an artificial satellite.



(i) What is an **artificial** satellite?

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

(ii) Artificial satellites are used for communication.

Write down one **other** use of artificial satellites.

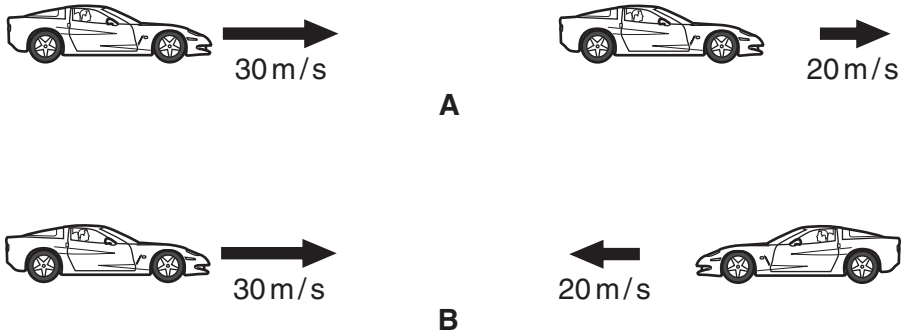
.....  
..... [1]

[Total: 4]



7 This question is about motion.

(a) The diagrams show the direction and speed of movement of two cars.



Which diagram shows the lowest **relative** speed?

answer .....

Explain why.

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

(b) Oliver travels 300 m in 60 seconds.

His **average** speed is 5 m/s.

Does this mean that he is always travelling at 5 m/s?

.....

Explain your answer.

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

(c) Polly drops a stone from a hot air balloon.

It takes 8 seconds to reach the ground.

What is the speed of the stone when it hits the ground?

Ignore the effects of air resistance.

The acceleration (due to gravity) is  $10\text{ m/s}^2$ .

The equations on page 2 may help you.

.....  
.....  
.....

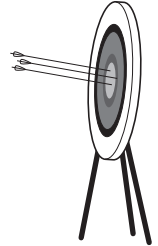
answer ..... m/s

[2]

[Total: 4]

8 Ruth fires an arrow towards a target.

Look at the drawing.



(a) (i) What is the **path** of the arrow called?

Choose from **orbit projector range trajectory**

answer ..... [1]

(ii) What is the **shape** of the arrow's path?

Choose from **circular elliptical parabolic straight**

answer ..... [1]

(b) When Ruth pulls on the string of the bow, she uses a force of 20 N.

What force does the string apply to the arrow as soon as she lets go?

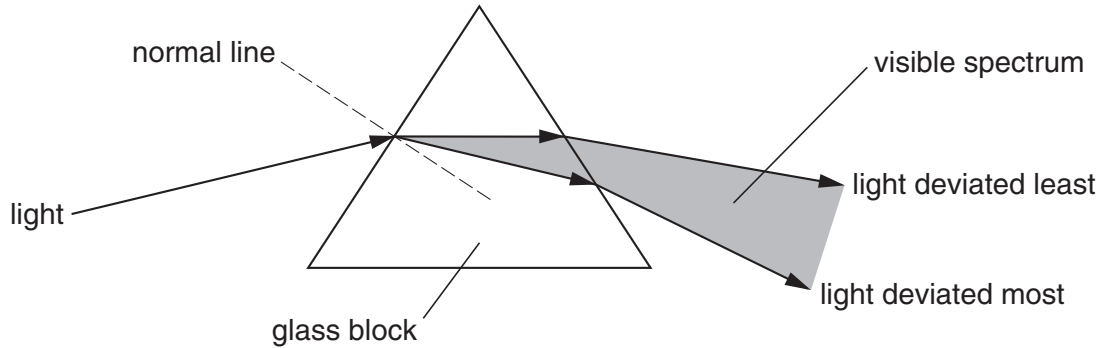
answer ..... N [1]

[Total: 3]

9 This question is about light.

(a) Look at the diagram.

It shows a ray of white light striking a prism.



When the light hits the prism the light is deviated.

The light splits into colours.

(i) Which colour is deviated the least?

Choose from **blue** **green** **orange** **red**

answer ..... [1]

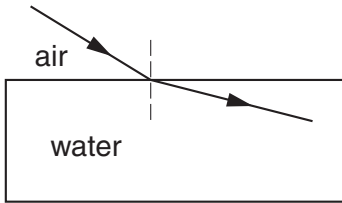
(ii) The white light is dispersed to produce the different colours of the spectrum.

Explain why.

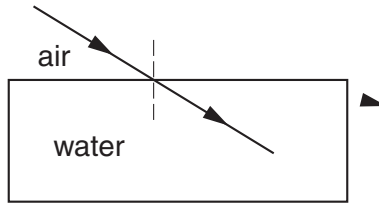
.....  
.....  
..... [1]

(b) Light enters the water in a swimming pool.

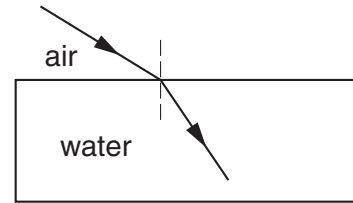
Look at the diagrams.



A



B



C

Which diagram correctly shows refraction at an air/water boundary?

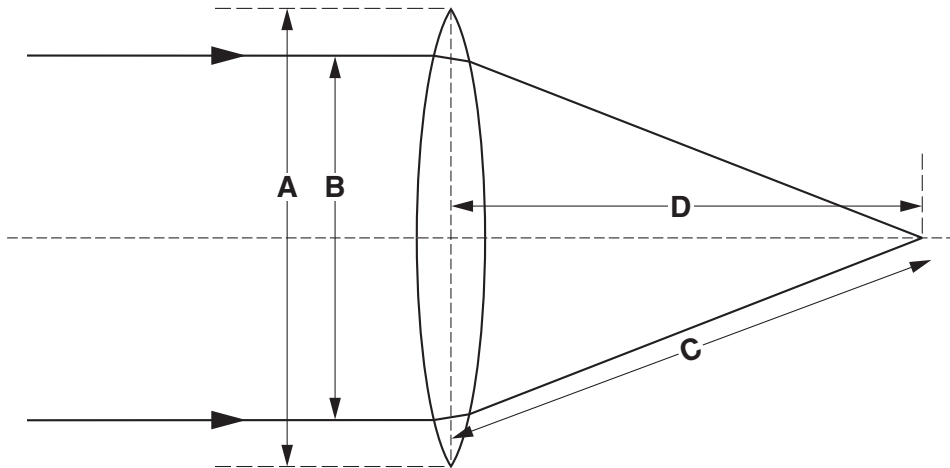
Choose from     **A**     **B**     **C**

answer .....

[1]

[Total: 3]

10 This question is about lenses.



(a) Which letter shows the **focal length**?

Choose from      **A**      **B**      **C**      **D**

answer .....

[1]

(b) Complete the sentence.

Lenses that make light converge are called converging lenses. Another name for a converging lens is a ..... lens.

[1]

(c) Converging lenses are used as magnifying glasses.

Write down one **other** use of a converging lens.

.....

..... [1]

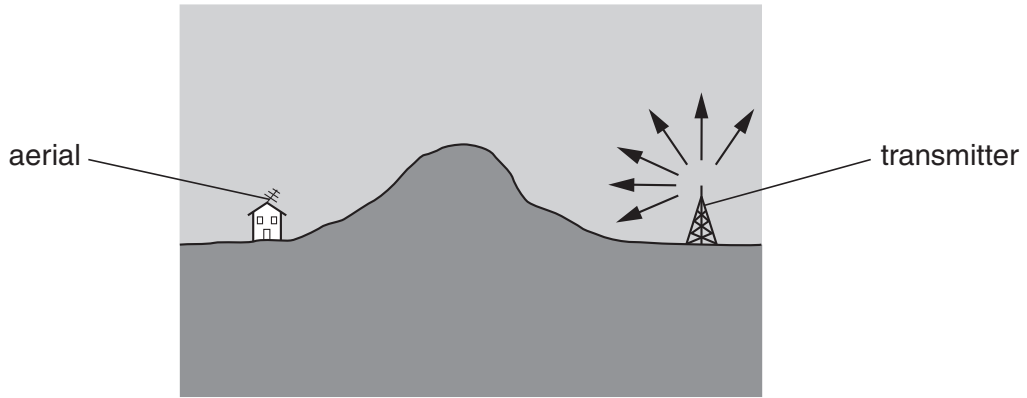
[Total: 3]

11 This question is about communication.

(a) Long wave radio waves are used for communication.

They do **not** need to be reflected from the ionosphere or use satellites.

Look at the diagram.



The waves from the transmitter reach the aerial.

Explain how.

.....

.....

.....

..... [2]

(b) Waves can interfere with each other.

Describe what is meant by **interference**.

You may use a diagram in your answer.

.....

..... [1]

[Total: 3]  
Turn over

Section C – Module P6

12 Electric motors are used in some electrical appliances in the home.

(a) Look at the list of electrical appliances.

**electric shaver**

**food mixer**

**grill**

**hair dryer**

**kettle**

**lamp**

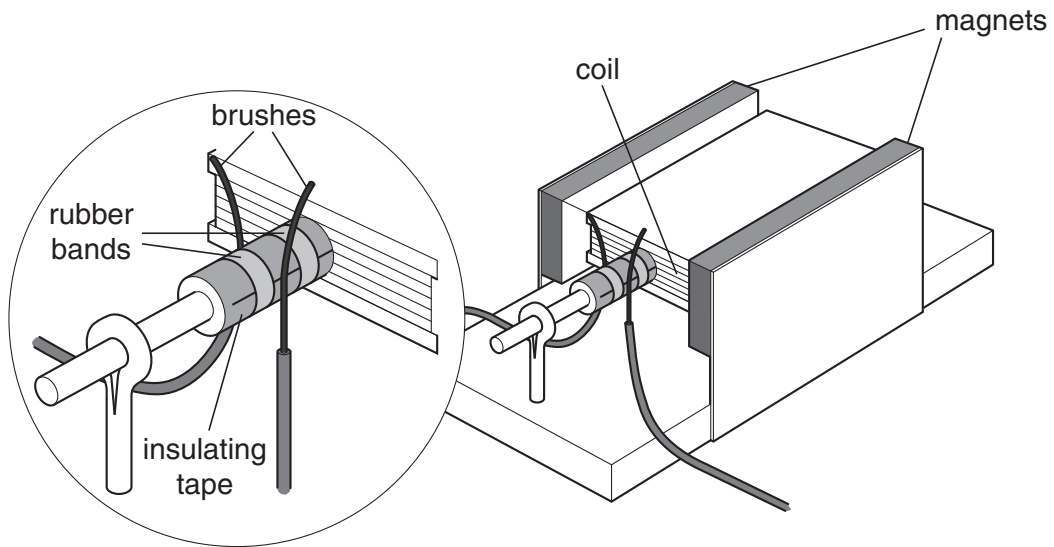
The electric shaver has an **electric motor**.

Which two **other** appliances have an electric motor?

answer ..... and ..... [1]



(b) Look at the diagram of an electric motor.



Current is passed through the coil.

The coil spins.

(i) What will happen to the motor if **stronger magnets** are used?

..... [1]

(ii) What will happen to the motor if **less current** is used?

..... [1]

[Total: 3]

13 This question is about transformers.

(a) An electric shaver is plugged into a socket in the bathroom.

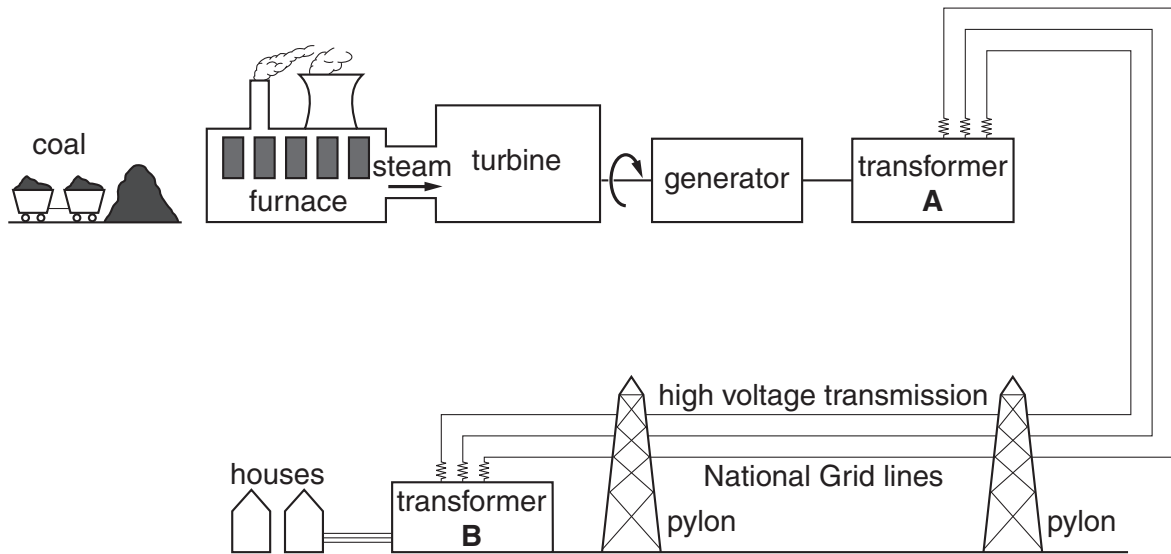
This socket contains a transformer.

What **type** of transformer does this socket have?

..... [1]

(b) Look at the diagram.

It shows a power station connected to the National Grid.



Transformer **A** and transformer **B** change voltages.

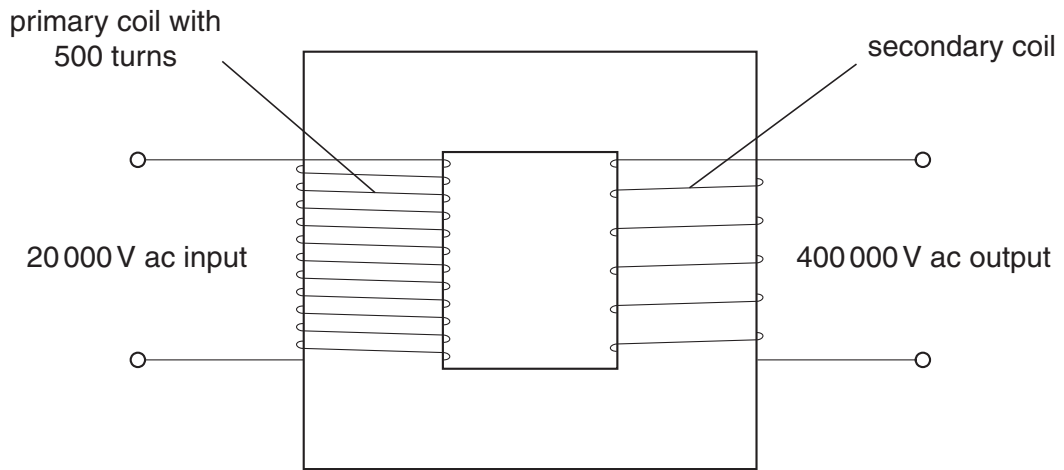
What happens at each transformer on the diagram?

In your answer write about

- what happens to the **voltages** at **A** and **B**
- the **types** of transformer used at **A** and **B**.

.....  
.....  
.....  
.....  
..... [3]

(c) Look at the diagram of a transformer.



The **primary** coil has 500 turns.

Calculate the number of turns on the **secondary** coil.

The equations on page 2 may help you.

.....  
.....

answer ..... turns

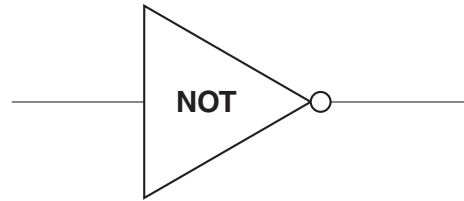
[2]

[Total: 6]

14 Logic gates are used in electronic circuits.

(a) (i) Complete the truth table for the **NOT** gate.

input	output
0	
1	



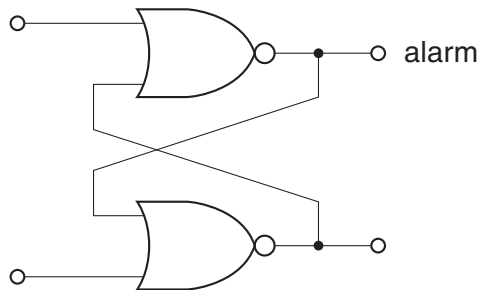
[1]

(ii) What is meant by 0 and 1 in a truth table?

0 means .....

1 means ..... [1]

(b) Look at the diagram of a latch circuit.

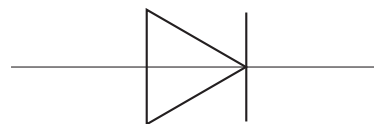


This latch circuit is used in a burglar alarm.

Why does a burglar alarm need a latch circuit?

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

(c) **Diodes** are used in electronic circuits.



Complete the sentence.

Diodes only allow current to flow ..... [1]

[Total: 4]

15 Archie uses electrical components for his experiments.

(a) Look at the list of electrical components.

**battery**

**diode**

**light source**

**power supply**

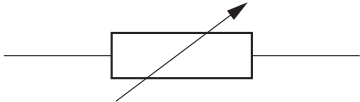
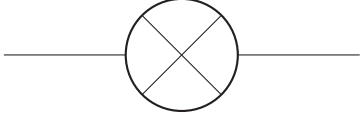

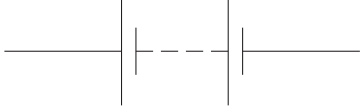

**switch**

**variable resistor**

Write the correct **name** for each **symbol** in the table.

Choose from the list.

The first one has been done for you.

symbol	component
	<p>variable resistor</p>
	<p>.....</p>
	<p>.....</p>
	<p>.....</p>
	<p>.....</p>

[4]

(b) Variable resistors change resistance.

Variable resistors are used in the home.

Suggest how they are used.

..... [1]

(c) Archie experiments with a bulb in a circuit.

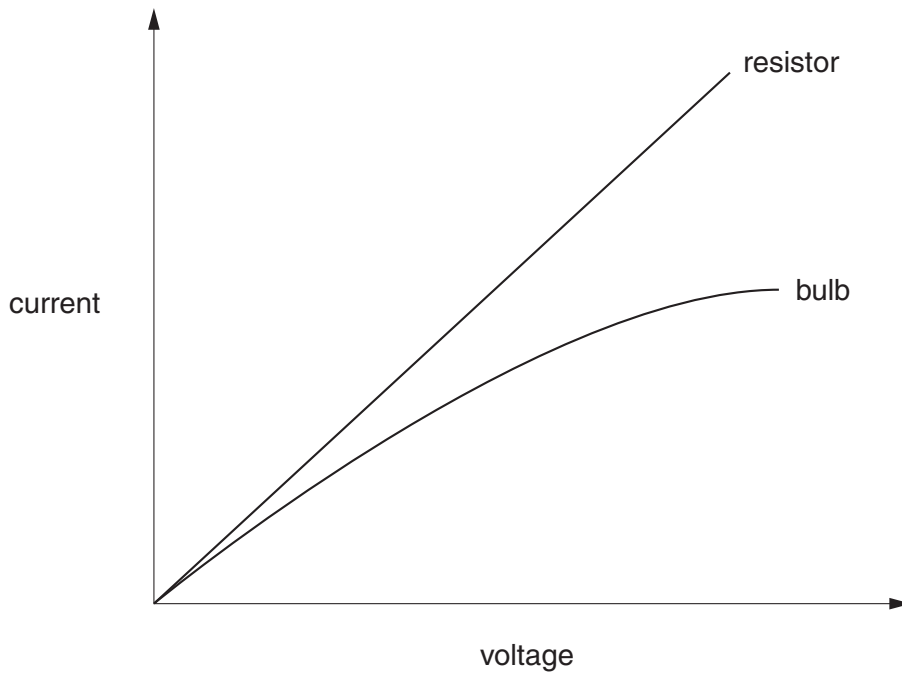
He **increases** the voltage across the bulb.

He measures the current.

He plots a graph of current against voltage.

He compares this graph with the graph for a resistor.

Look at the graphs.



The graph for the bulb is **not** a straight line.

Suggest why.

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

(d) Archie finds two more components.

They are a **LDR** and a **thermistor**.

Complete the sentences about these components.

The resistance of LDRs and thermistors can increase or decrease.

LDRs have ..... resistance when light levels get brighter.

Thermistors have more resistance when temperature ..... [1]

[Total: 7]

**END OF QUESTION PAPER**

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