Candidate forename		Candidate surname	

Centre number						Candidate number				

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 17 JUNE 2011: 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

DC (LEO/SW) 11MEP06142 46541

INSTRUCTIONS TO CANDIDATES

- **Write your name, centre number and candidate number in the boxes on the first page. 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.**

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 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 When an aircraft is being refuelled, the fuel travels from the fuel tanker to the aircraft in a pipe.

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

This wire carries electric charge.

(a) There are two types of charge.

Finish the sentence by choosing the BEST words from this list.

ALTERNATING

DIRECT

NEGATIVE

NEUTRAL

POSITIVE

The two types of 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.

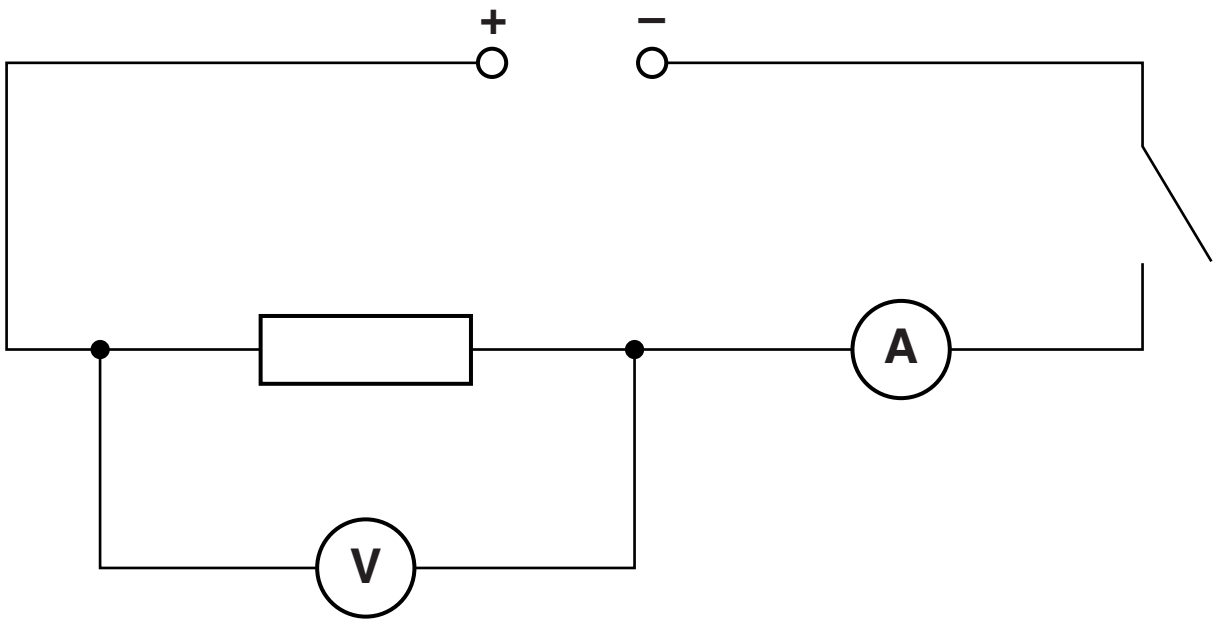
These are ways of showing the EFFECT of static electricity.

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 1.5 A.

Calculate the resistance of the resistor.

The equations on page 3 may help you.

_____

_____

_____

answer _____ ohms [2]

(c) Sally adds a 0.5 A 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.

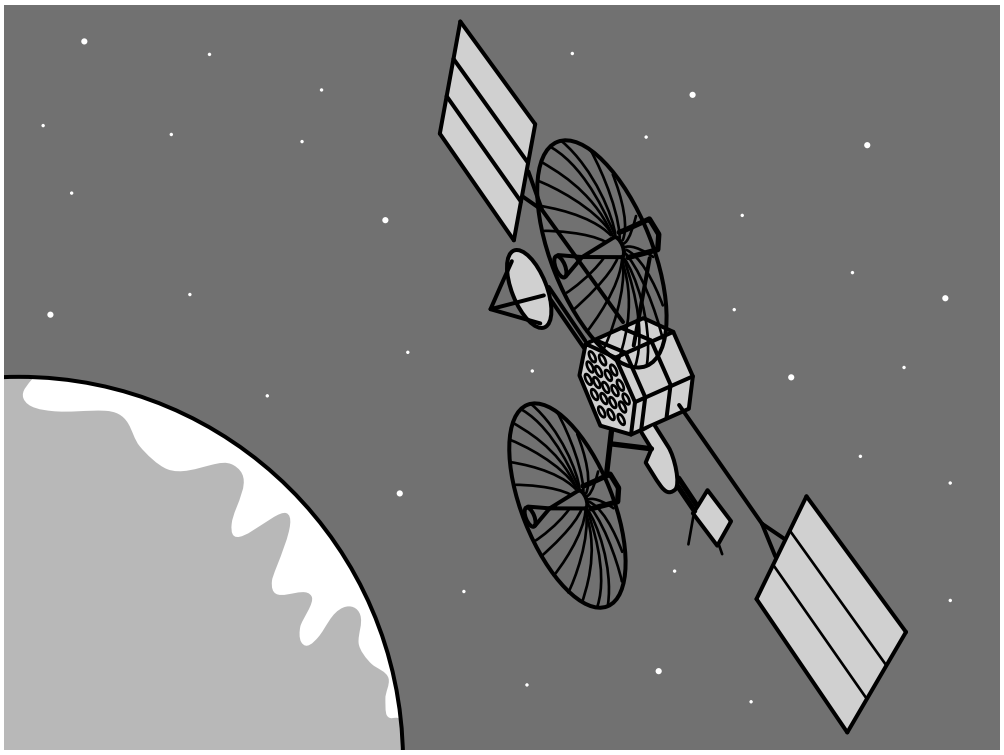
(a) There are two TYPES of satellite.

One type is ARTIFICIAL.

Write down the name of the OTHER type of satellite.

_____ **[1]**

(b) Look at the picture 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.

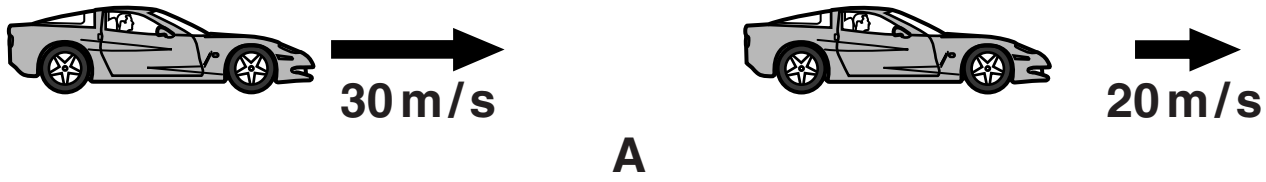
_____

_____ **[1]**

[Total: 4]

7 This question is about motion.

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



A

B

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 m/s^2.

The equations on page 3 may help you.

_____

_____

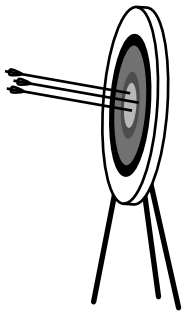
_____

answer _____ m/s **[2]**

[Total: 4]

8 Ruth is an archer. She 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?

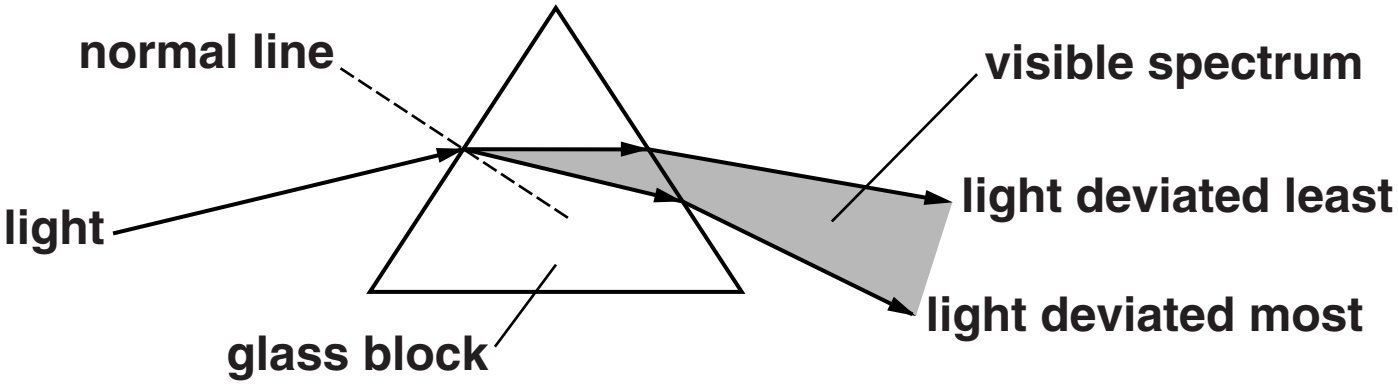
answer _____ N [1]

[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.

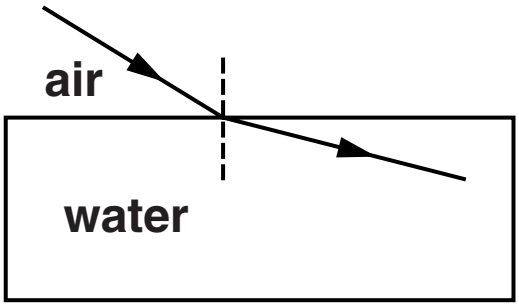
_____

_____

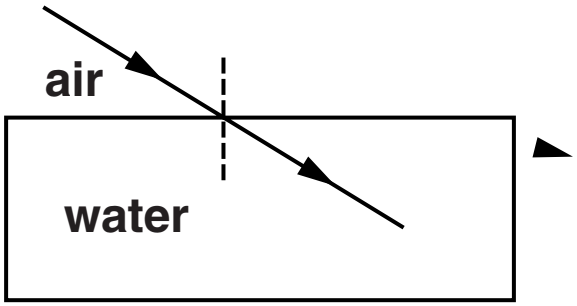
_____ **[1]**

(b) Light enters water in a swimming pool.

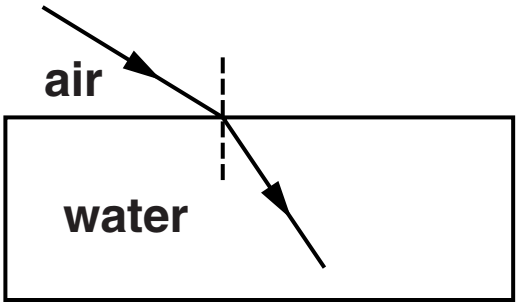
Look at the diagrams.



A



B



C

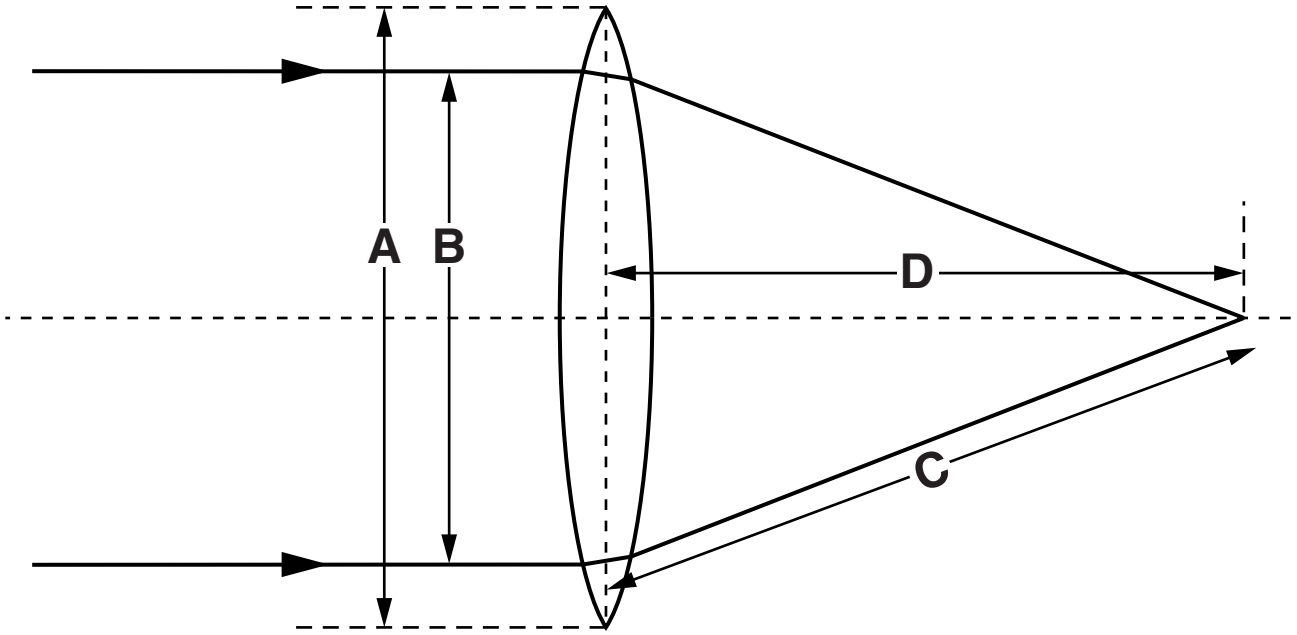
Which diagram correctly shows refraction at an air/water boundary?

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]**

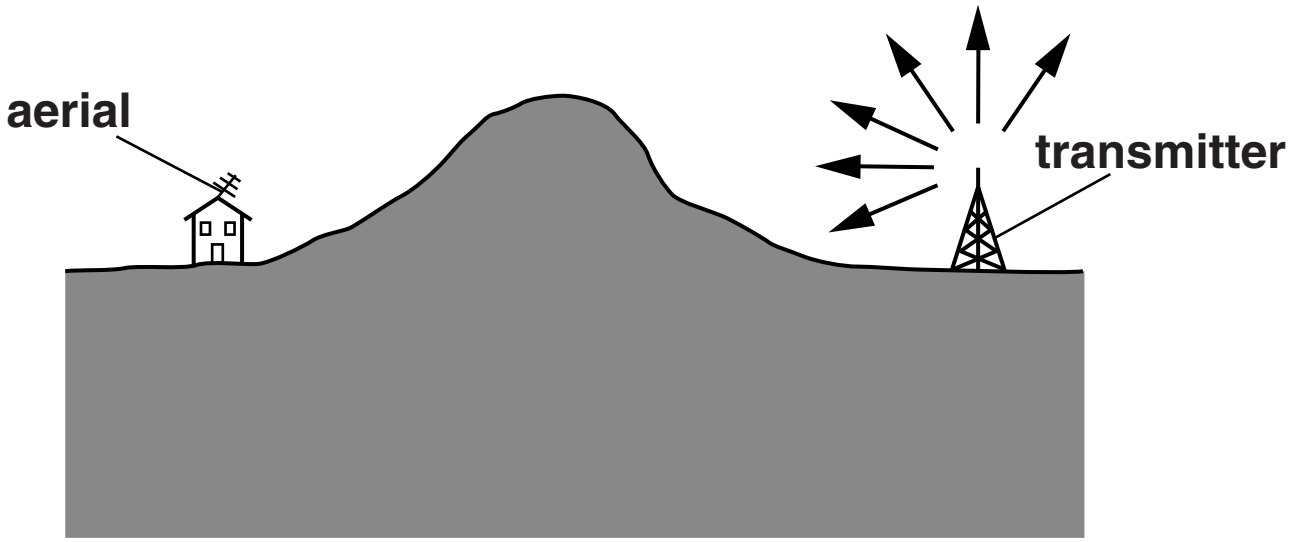
[Total: 3]

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]

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

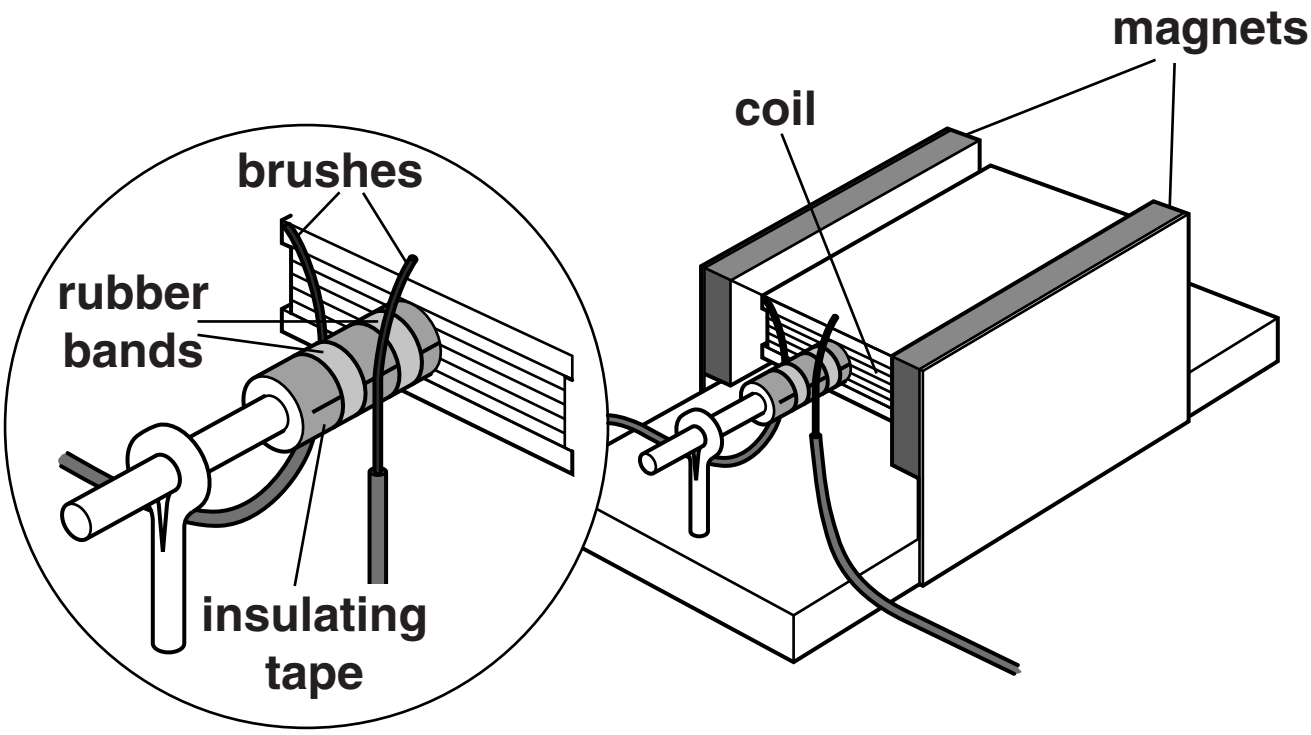
LAMP

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 opposite.

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.**

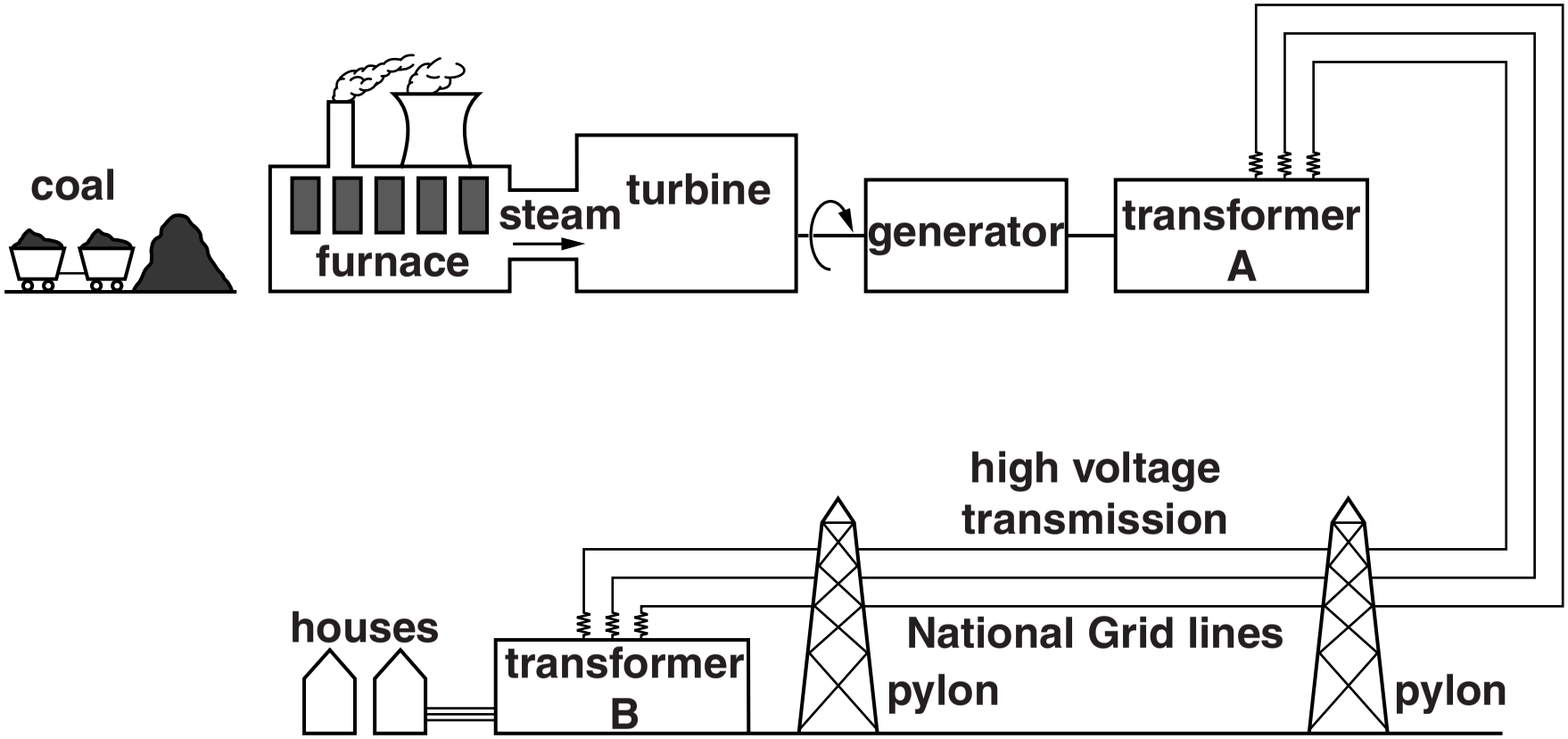
_____

_____

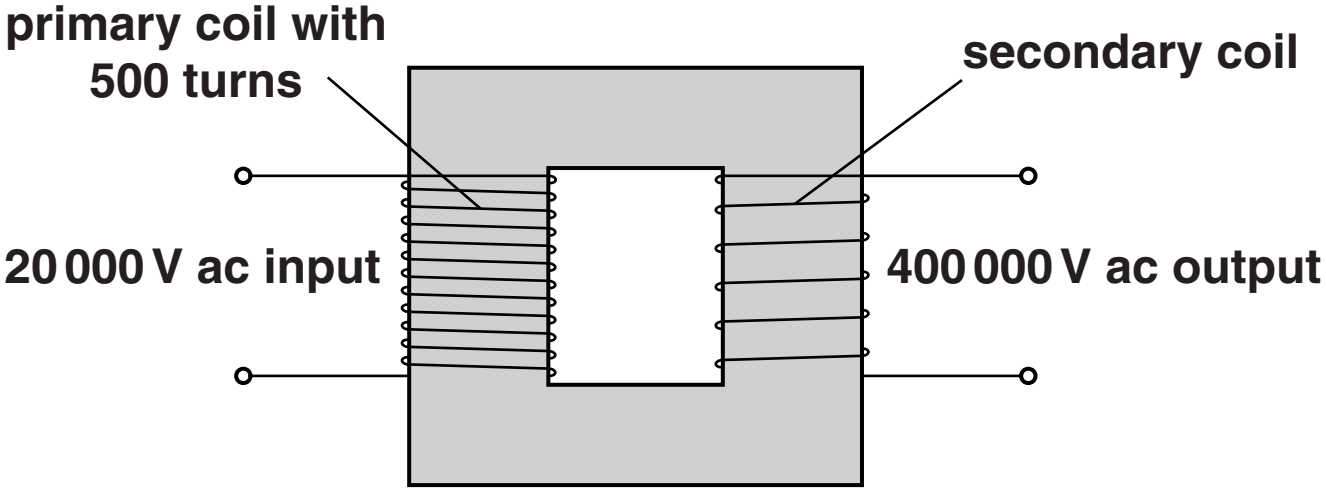
_____

_____

_____ **[3]**


coal
furnace
steam
turbine
generator
transformer
A
high voltage
transmission
houses
transformer
B
National Grid lines
pylon
pylon

(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 3 may help you.

_____

_____

answer _____ turns **[2]**

[Total: 6]

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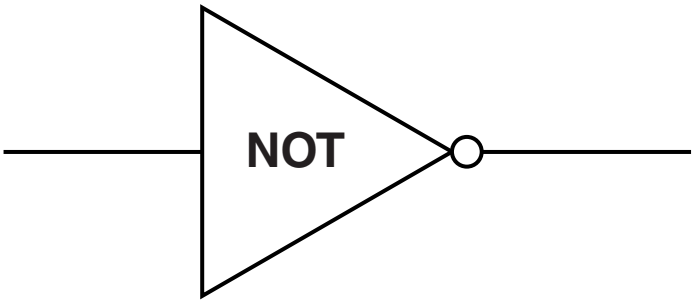
14 Logic gates are used in electronic circuits.

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

INPUT	OUTPUT
0	
1	



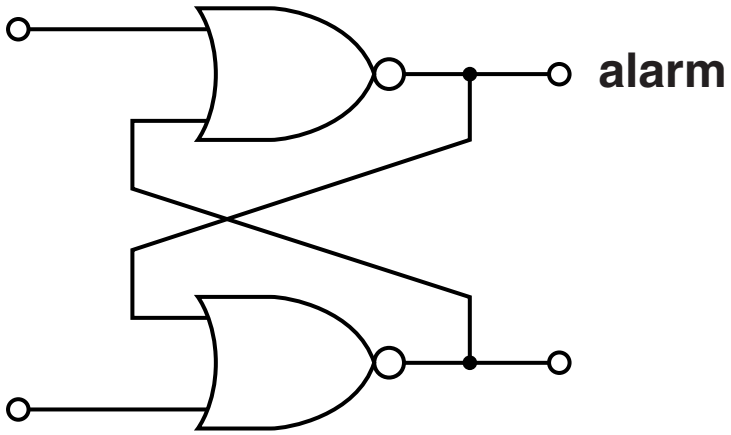
[1]

(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.



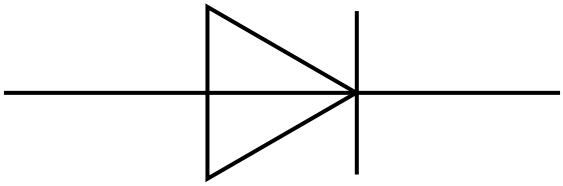
This latch circuit is used in a burglar alarm.

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

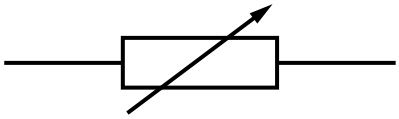
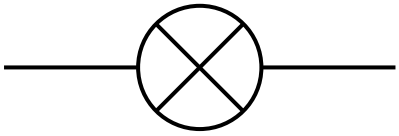
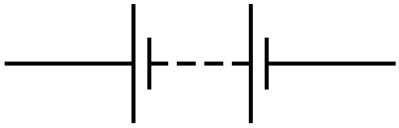
SWITCH

VARIABLE RESISTOR

Write the correct NAME for each SYMBOL in the table opposite.

Choose from the list.

The first one has been done for you.

SYMBOL	COMPONENT
	variable resistor
	_____
	_____
	_____
	_____

[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.**

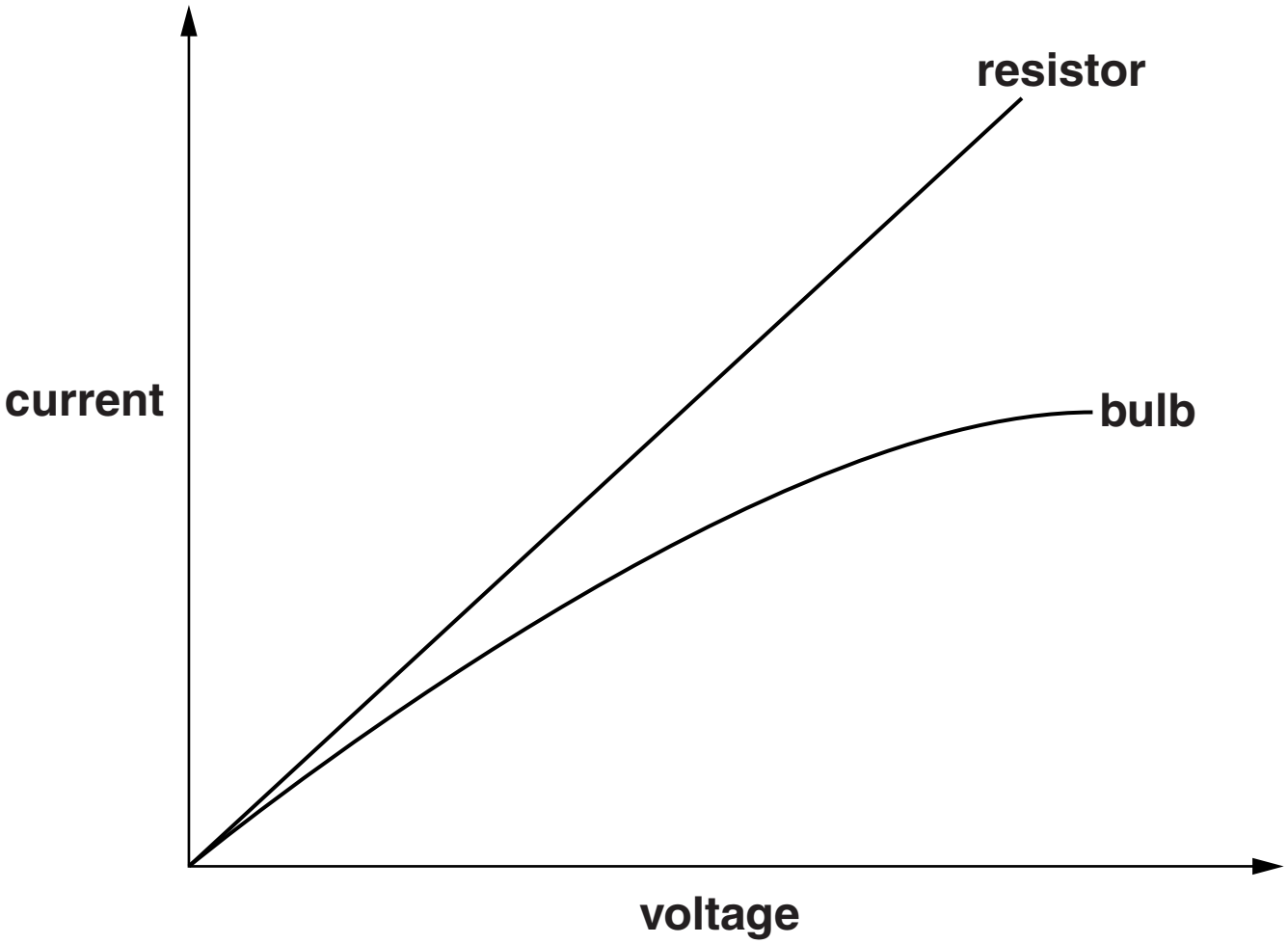
He INCREASES the voltage across the bulb.

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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