

| | | | | | | | | | | | |
|-----------------------|--|--|--|--|--|----------------------|--|--|--|--|--|
| Candidate forename | | | | | | Candidate surname | | | | | |
| Centre number | | | | | | Candidate number | | | | | |

OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE
B652/01
GATEWAY SCIENCE
PHYSICS B

Unit 2 Modules P4 P5 P6 (Foundation Tier)

WEDNESDAY 20 JUNE 2012: Morning

DURATION: 1 hour

MODIFIED ENLARGED

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, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **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).**

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 Steven experiments with electrostatics in a science lesson.**

He rubs a polythene rod with a cloth.

The rod and the cloth become charged.

- (a) Complete the sentence.**

**If the rod has a _____ charge the
cloth will have a _____ charge. [2]**

- (b) Why do the cloth and the rod become charged when rubbed?**

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

the rod is a conductor

☐

the rod is metal

☐

the rod is an insulator

☐

the cloth is a conductor

☐

the cloth has metal fibres in it

☐

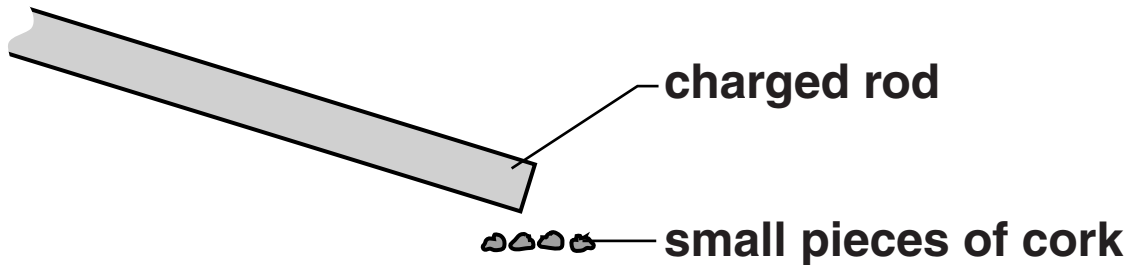
the cloth is an insulator

☐

[2]

(c) Steven places the **CHARGED** rod near some small pieces of cork.

The pieces of cork are **UNCHARGED**.



What happens to the pieces of cork?

[1]

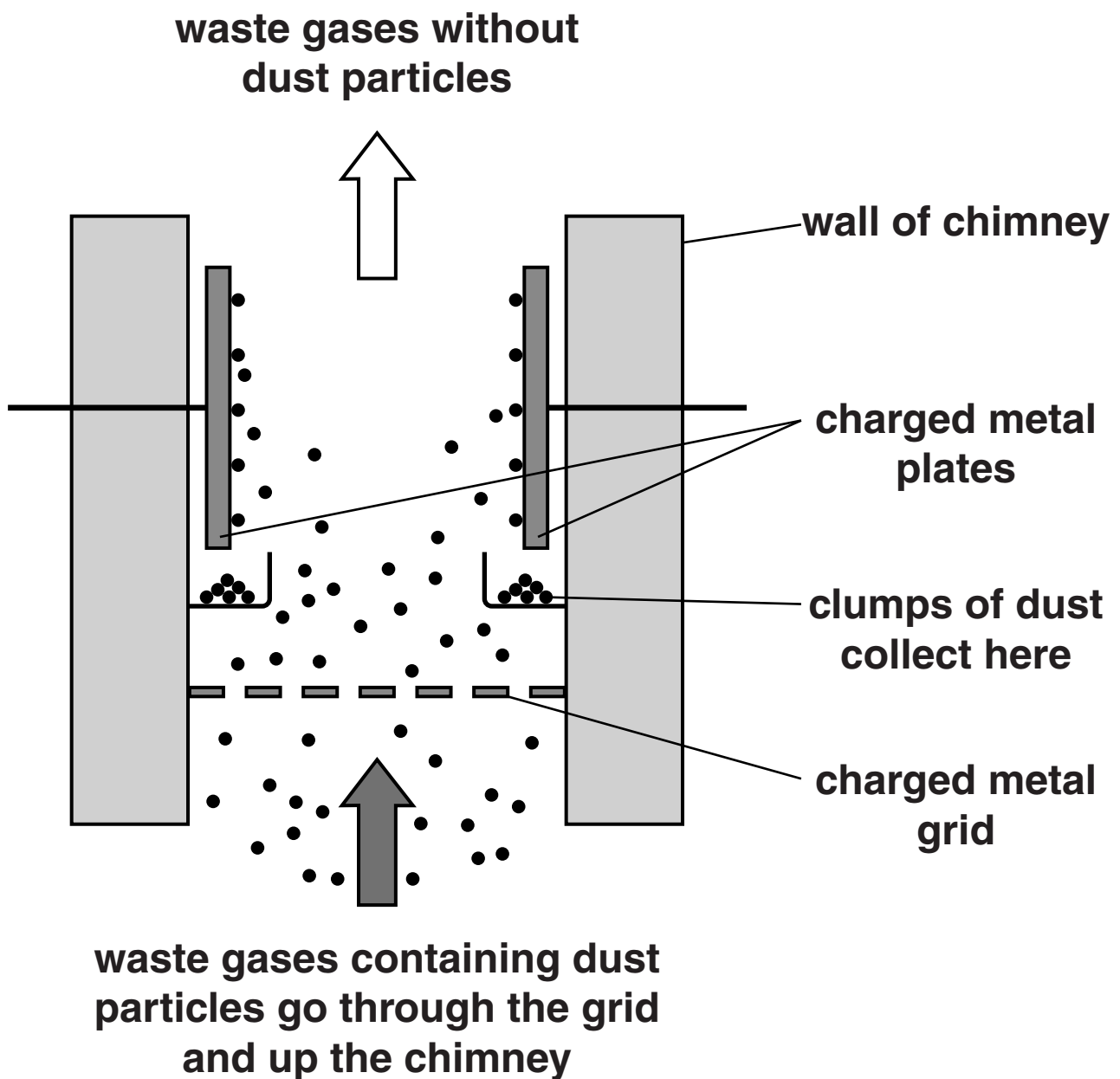
[Total: 5]

2 This question is about how static electricity can be useful.

One use is removing dust (smoke) particles from power station chimneys.

This is done using an ELECTROSTATIC PRECIPITATOR.

Look at the diagram of an electrostatic precipitator.



Look at the sentences below about how the electrostatic precipitator works.

They are NOT in the CORRECT ORDER.

Put numbers (2 to 6) in the correct order boxes to explain how the precipitator works.

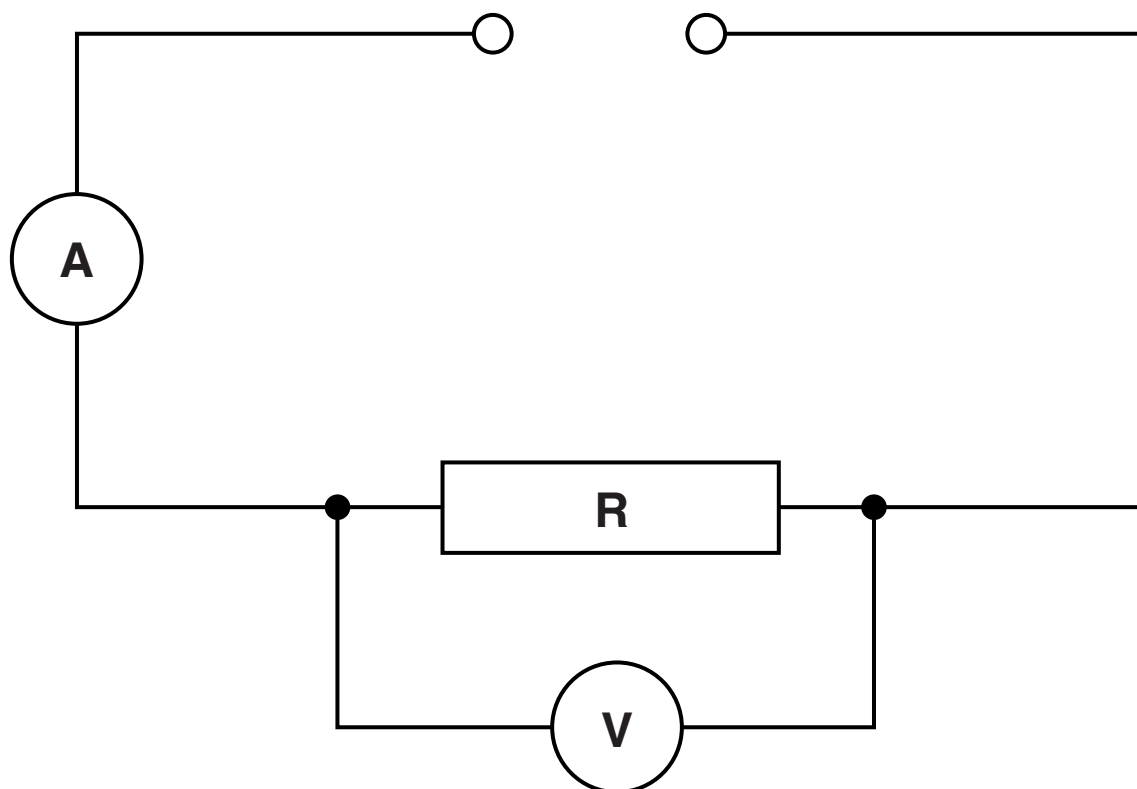
Two sentences (1 and 7) have been done for you.

| SENTENCE | CORRECT ORDER |
|----------------------------------------------------------------------------------------------|----------------------|
| Dust particles pass through the metal grid and become negatively charged. | |
| Dust particles are attracted to the metal plates. | |
| The metal grid is negatively charged and the metal plates are positively charged. | 1 |
| Plates are knocked so dust can fall and be collected. | |
| This is because opposite charges attract. | |
| Up to 99% of the dust in the smoke from the power station can be removed in this way. | 7 |
| Dust particles form larger clumps of dust on the metal plates. | |

[3]

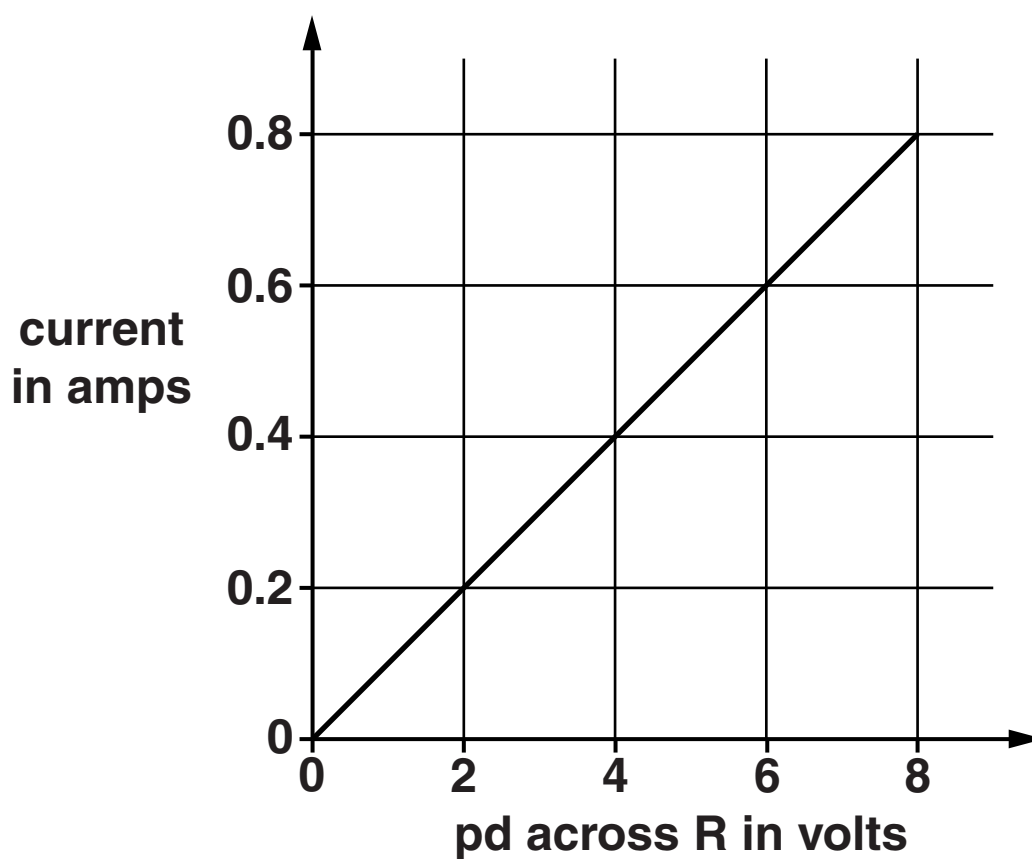
[Total: 3]

3 Thomas sets up this circuit.



He measures current and voltage (pd).

This is a graph of his results.



Calculate the resistance of R.

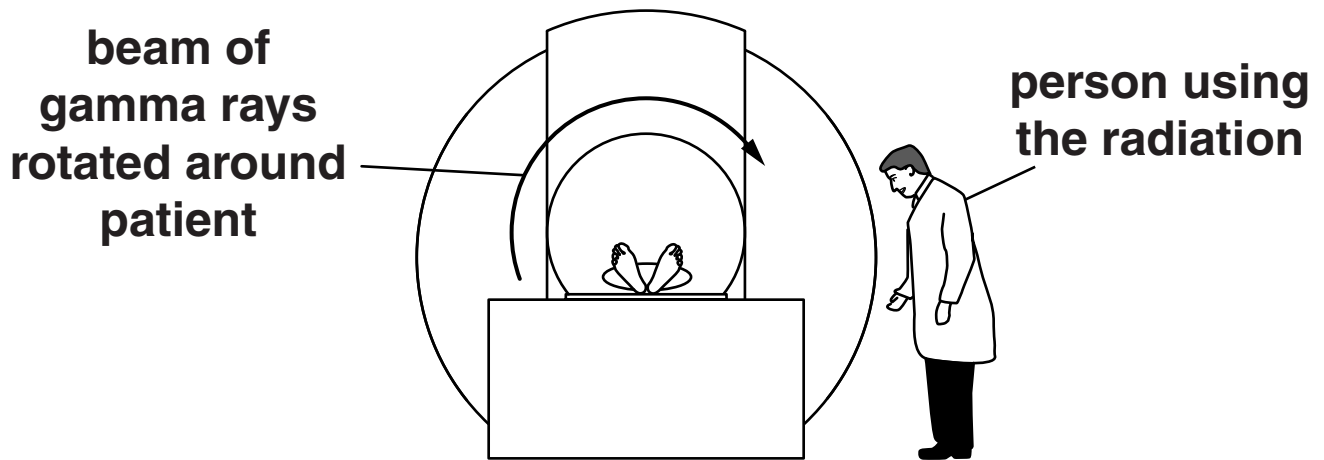
The equations on page 3 may help you.

answer _____ **ohms (Ω)** **[3]**

[Total: 3]

4 Nuclear radiation is used in hospitals.

Gamma rays are one type of NUCLEAR radiation.



Write about the uses of NUCLEAR radiation in hospitals.

Include in your answer the NAME given to the person who uses the nuclear radiation.

[3]

[Total: 3]

BLANK PAGE

5 Ultrasound is a sound wave with a very high frequency.

(a) Ultrasound waves can be shown by a wave diagram, opposite.

(i) What is the name given to the HIGHER pressure region of the wave?

_____ **[1]**

(ii) What is the name given to the LOWER pressure region of the wave?

_____ **[1]**

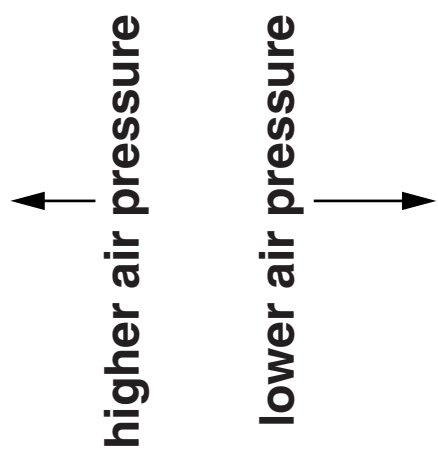
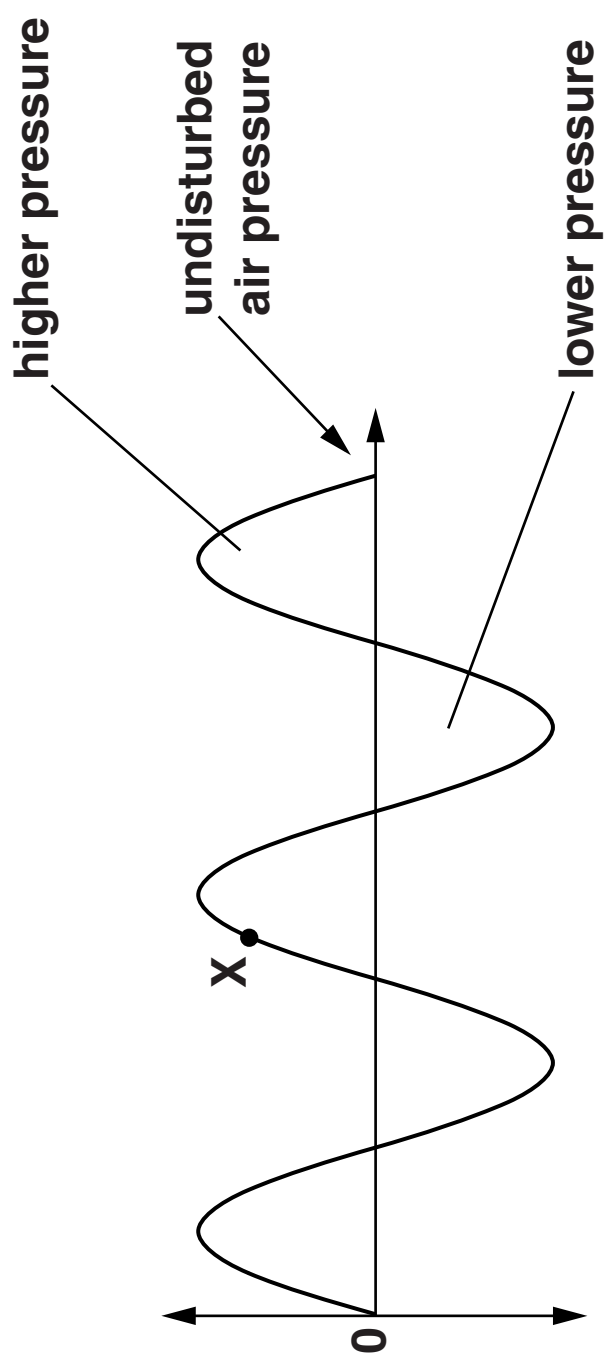
(iii) Draw a line from X on the DIAGRAM to show the WAVELENGTH of the wave. **[1]**

(b) Ultrasound is used for scans in hospitals.

Write down one OTHER use of ultrasound.

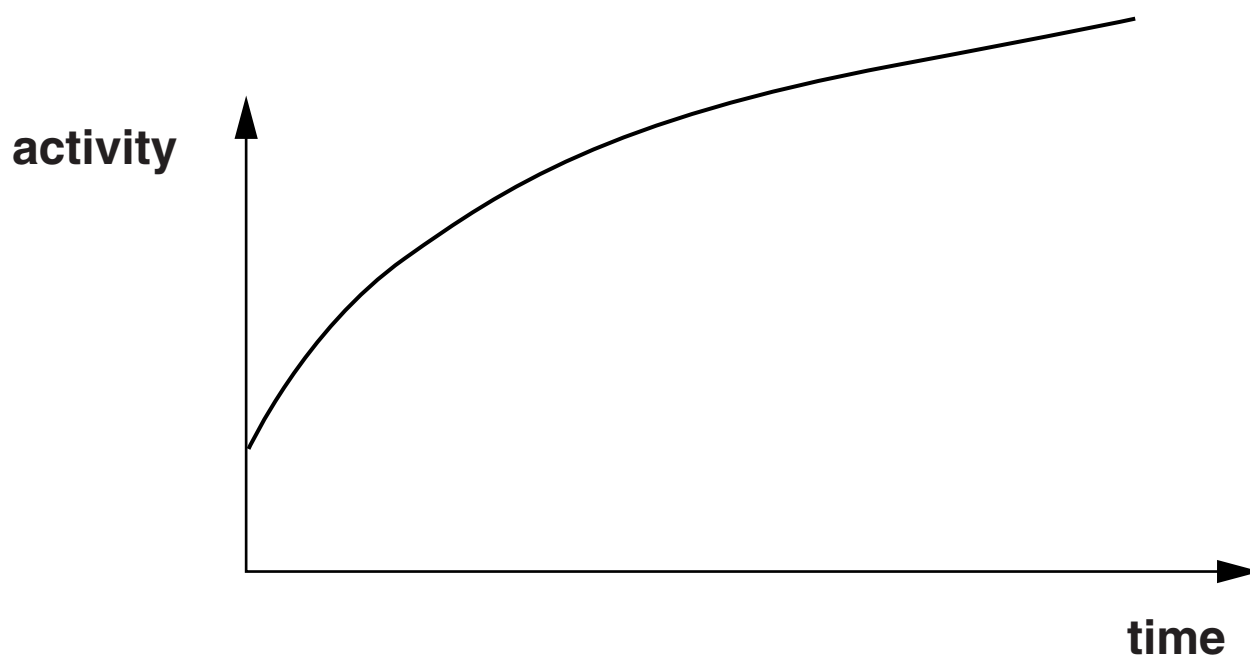
_____ **[1]**

[Total: 4]



6 A radioactive substance emits nuclear radiation.

(a) Beth draws a graph to show how its activity (radioactivity) changes with time.



Is her graph correct?

answer _____

Explain your answer.

_____ [1]

(b) One type of nuclear radiation is used in some smoke detectors.

What type of nuclear radiation is used?

_____ [1]

[Total: 2]

SECTION B – MODULE P5

7 This question is about SATELLITES.

(a) What is a satellite?

Complete the sentence.

**A satellite is an object that _____
_____. [1]**

(b) There are TWO types of satellite.

One type is ARTIFICIAL.

Write down the name of the OTHER type of satellite.

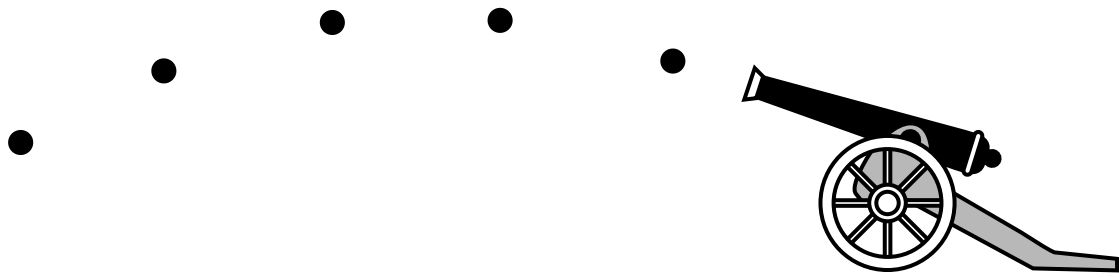
_____ [1]

(c) Write down one USE of an artificial satellite.

_____ [1]

[Total: 3]

8 Cannon balls FIRED FROM A GUN are projectiles.



(a) Describe one OTHER example of a projectile.

_____ [1]

(b) What name do scientists give to the PATH of a projectile?

_____ [1]

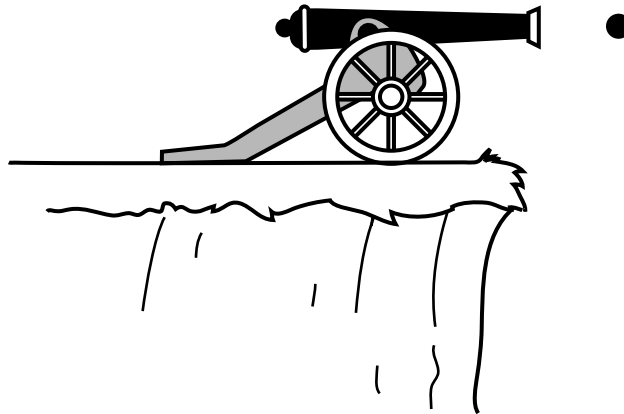
(c) In this question ignore the effects of air resistance.

A cannon ball is fired HORIZONTALLY from the top of a cliff.

The ball leaves the cannon. Its HORIZONTAL velocity is 30 m/s.

Its VERTICAL velocity is 0 m/s.

The acceleration due to gravity (g) is 10 m/s^2 .



(i) What is the horizontal velocity of the ball after 3 seconds?

_____ **[1]**

- (ii) Calculate the vertical velocity of the ball 3 seconds after it leaves the cannon.

The equations on page 3 may help you.

answer _____ [2]

[Total: 5]

BLANK PAGE

9 This question is about waves.

(a) Waves can undergo INTERFERENCE.

Explain what is meant by interference and describe how you could DEMONSTRATE the interference of one type of wave.

In your answer you should

- **draw a diagram of how your equipment is set up**
- **name the type of wave being used**
- **explain how the demonstration works.**

[3]

(b) Radio waves can have a very long wavelength.

Satellite TV waves have a shorter wavelength.

Radio signals and satellite TV signals are collected in different ways.

Complete the sentences.

Radio signals are collected using

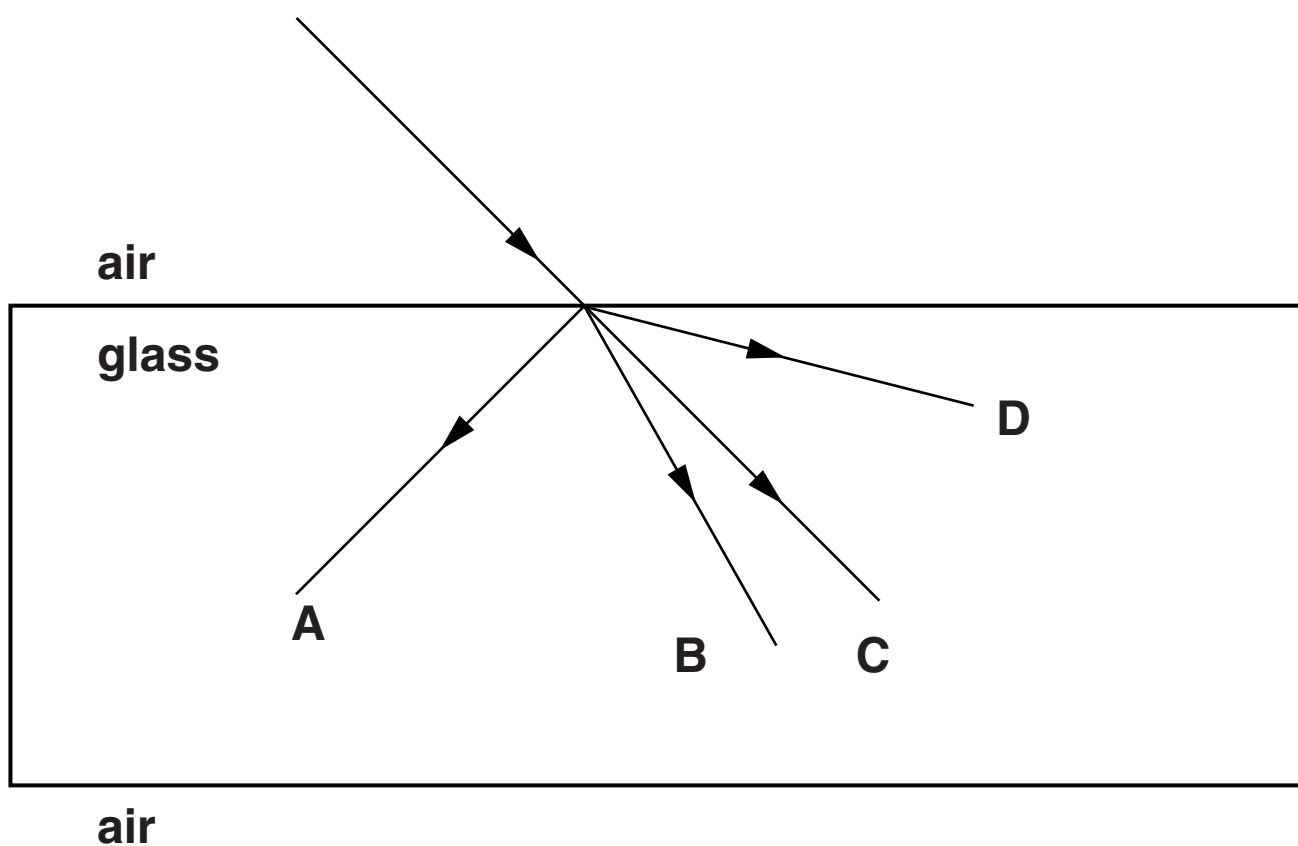
Satellite TV signals are collected using

[1]

[Total: 4]

10 This question is about REFRACTION.

(a) Look at the diagram of a ray of light passing from air into glass.



Which line shows the correct path?

Choose from A B C D

answer _____ .

[1]

(b) When white light is refracted, it is dispersed (splits into different colours).

Some friends discuss this effect.

BEN

**All the different colours
are deviated by the
same amount.**

ANNA

**Blue light is deviated
more than red light.**

CELIA

**Red light is deviated
more than blue light.**

Who is correct?

Choose from BEN ANNA CELIA

answer _____ .

[1]

(c) Donna experiments with lenses.

Look at the diagram opposite.

(i) Write down the NAME of this type of lens.

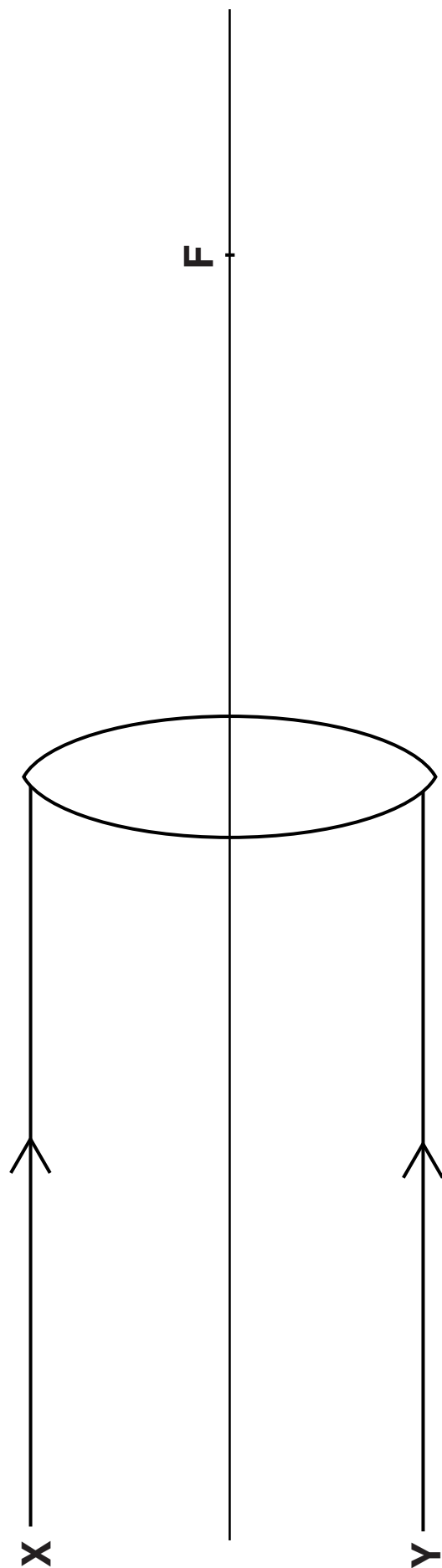
_____ [1]

(ii) Use a ruler to complete the diagram to show what happens to the rays X and Y when they pass through the lens. [2]

(iii) Write down one USE of this type of lens.

_____ [1]

[Total: 6]



\mathbb{F}

\times

γ

BLANK PAGE

11 Look at the diagram.

It shows a book on a table.

The book weighs 15 N.



(a) What is the force exerted by the table on the book?

- A 15 N upwards**
- B 15 N downwards**
- C more than 15 N upwards**
- D more than 15 N downwards**
- E less than 15 N upwards**
- F less than 15 N downwards**

Choose from A B C D E F

answer _____ .

[1]

(b) Look at the diagrams opposite.

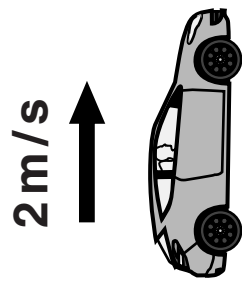
Each shows two cars travelling on a straight road.

Which diagram shows cars with the LOWEST relative speed?

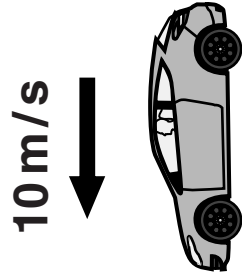
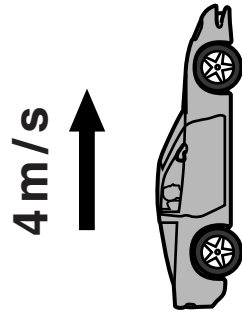
Choose from A B C D

answer _____ . **[1]**

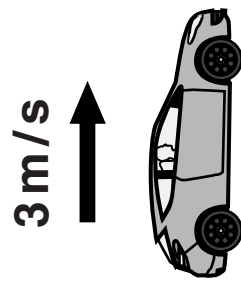
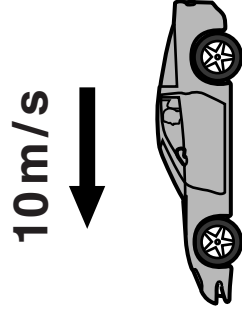
[Total: 2]



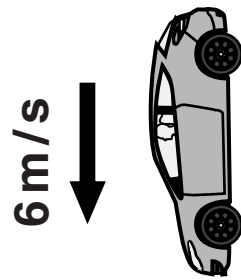
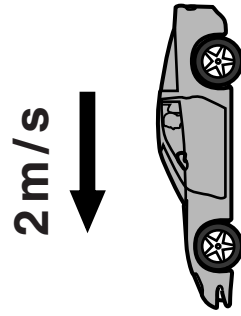
A



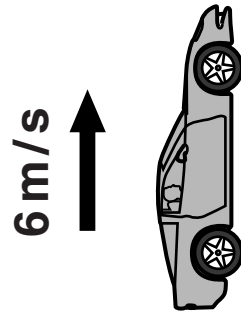
B



C



D



SECTION C – MODULE P6

12 Amelia does some experiments with electricity.

(a) Look at the list of electrical equipment she uses.

CAPACITOR

DIODE

GENERATOR

LDR

MOTOR

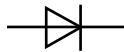
THERMISTOR

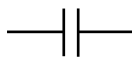
TRANSFORMER

VARIABLE RESISTOR

Complete the sentences.

Choose your answer from the list.

(i) The component that has the symbol  is called a _____ .
[1]

(ii) The component that has the symbol  is called a _____ .
[1]

(iii) The component that changes resistance when the LIGHT LEVEL changes is called a _____ . [1]

(iv) The component that changes resistance when the TEMPERATURE changes is called a _____ . [1]

(v) DC motors transfer ELECTRICITY into KINETIC energy.

Another piece of equipment does the OPPOSITE to this.

A _____ transfers KINETIC energy into ELECTRICITY. [1]

(b) Amelia knows that variable resistors are useful IN CIRCUITS.

They are used to change the resistance and current in circuits.

Describe one PRACTICAL USE for a variable resistor.

_____ [1]

[Total: 6]

13 Bob has electrical appliances in his home.

Some electrical appliances contain an ELECTRIC MOTOR.

(a) Name TWO appliances in the home that contain an electric motor.

_____ and _____ [1]

(b) Look at the diagram, opposite, of a model electric motor.

The brushes are making contact with the wire ends of the coil.

Bob connects the motor to the power supply. The coil spins round.

(i) Bob wants the motor to spin FASTER.

Describe THREE different ways to make THIS motor spin faster.

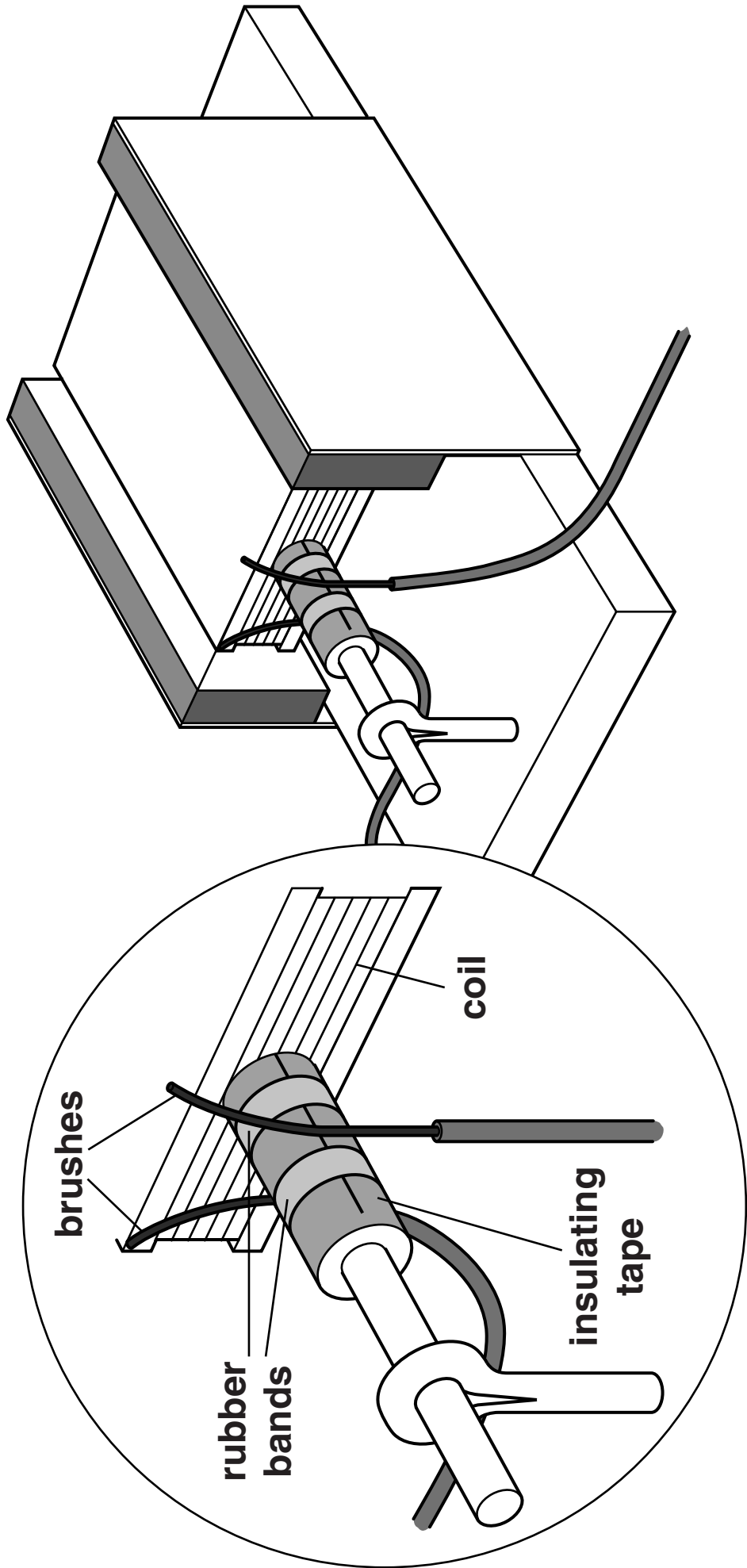
_____ [3]

(ii) Bob uses the power supply to change the direction of the CURRENT.

What happens to the motor?

_____ [1]

[Total: 5]



14 Electricity is generated in power stations.

It is sent to homes through cables and transformers in the National Grid.

- (a) (i) What is the **FREQUENCY** of AC electricity in the UK?

_____ Hz [1]

- (ii) Why is DC electricity NOT used with transformers?

_____ [1]

- (b) Look at the diagram, opposite, of a transformer.

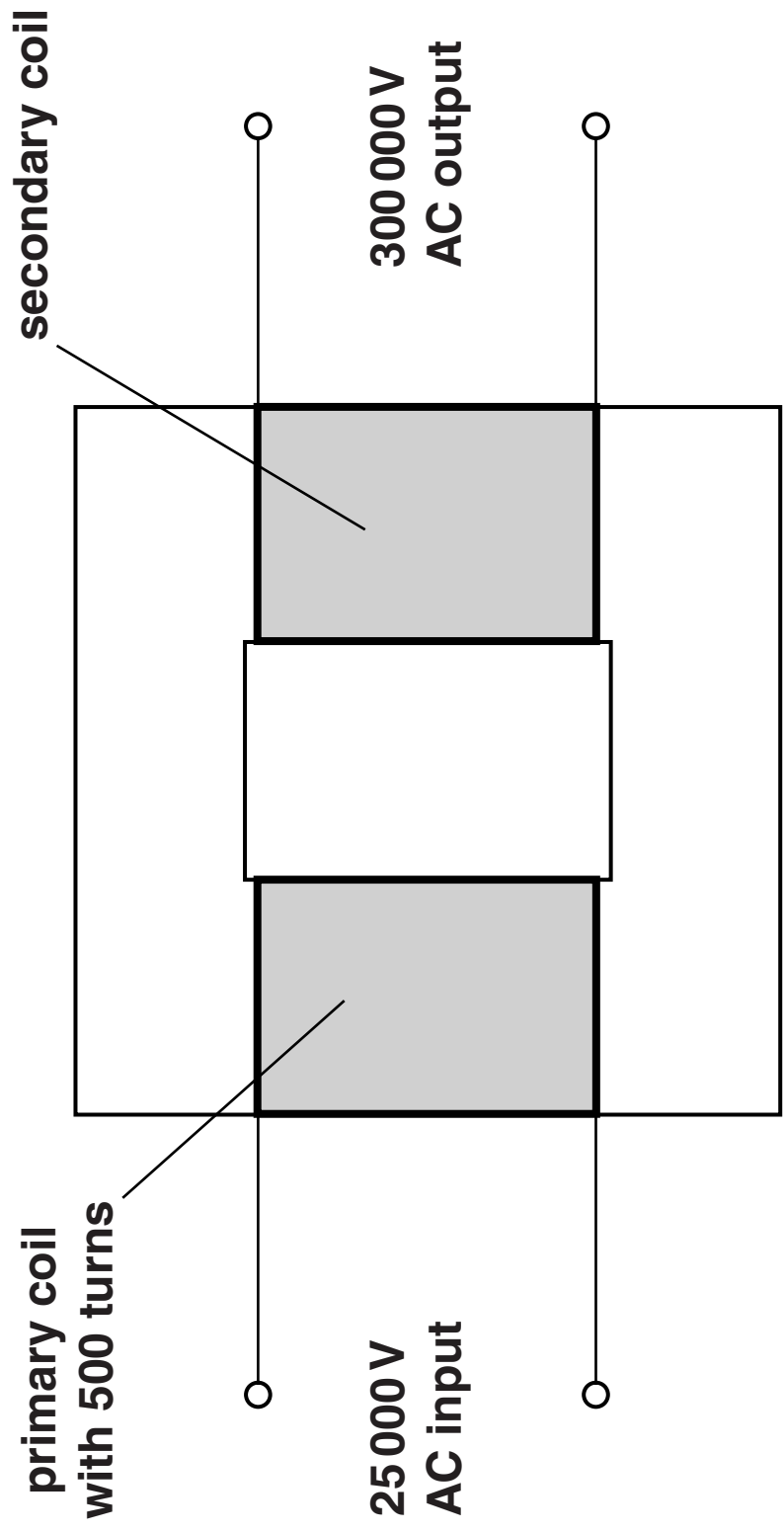
The **PRIMARY** coil has 500 turns.

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

The equations on page 3 may help you.

answer _____ turns [2]

[Total: 4]



15 Electronic devices are controlled by logic gates.

(a) One type of logic gate is a NOT gate.

The INPUT to a NOT gate is either 0 or 1.

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

Use 0s and 1s to complete the table correctly.

| INPUT SIGNAL | OUTPUT SIGNAL |
|---------------------|----------------------|
| 0 | |
| | |

[1]

(ii) What is MEANT by 0 and 1?

0 means _____

1 means _____ [1]

(b) Kamrun has an alarm on his car.

The alarm system has a series of gates and other electronic components.

The last gate before the output is a NOT gate.

The output from the NOT gate is very SMALL.

Kamrun wants the alarm system to control

- a signal light inside the car**
- the headlamps outside the car.**

(i) What type of signal light inside the car could Kamrun connect DIRECTLY to the NOT gate?

_____ [1]

(ii) Kamrun wants to light the 12V headlights on his car.

The battery is connected. What else does he need for the NOT gate to switch on the headlights?

_____ [1]

(c) The alarm system contains a component called a LATCH.

Why is a latch USED in the alarm system?

_____ [1]

[Total: 5]

END OF QUESTION PAPER

BLANK PAGE

BLANK PAGE

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.