

**Wednesday 20 June 2012 – Morning**

**GCSE GATEWAY SCIENCE  
PHYSICS B**

**B652/01** Unit 2 Modules P4 P5 P6 (Foundation Tier)

Candidates answer on the Question Paper.  
A calculator may be used for this paper.

**Duration: 1 hour**

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. 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).
- Do **not** write in the bar codes.

**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 total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

## 2

### 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

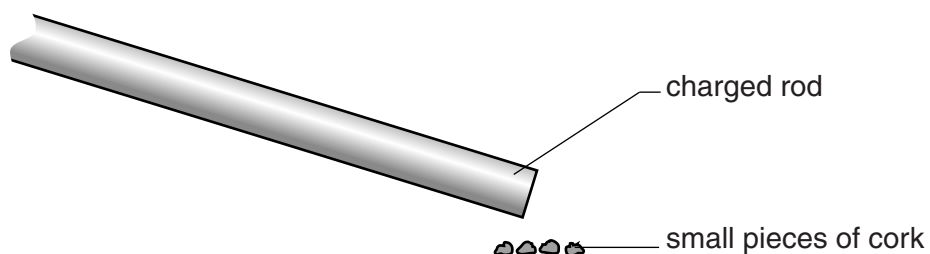
the cloth has metal fibres in it

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]

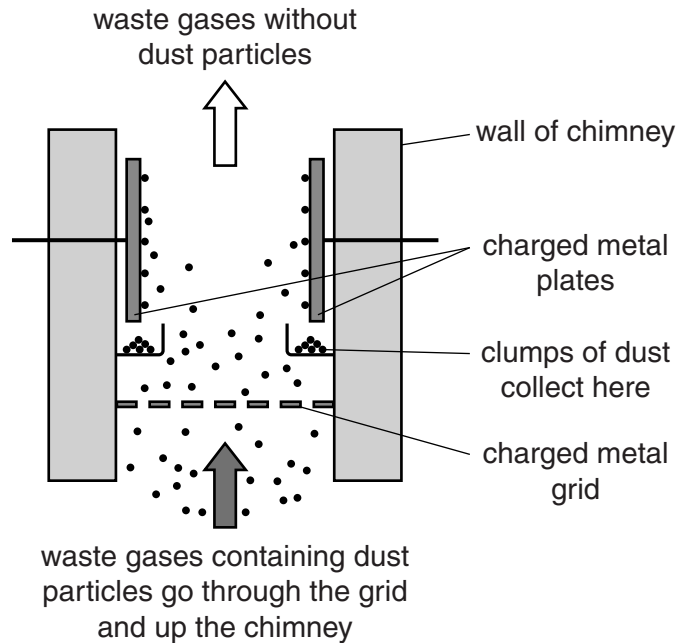
[Total: 5]

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 opposite 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.

5

**sentence**

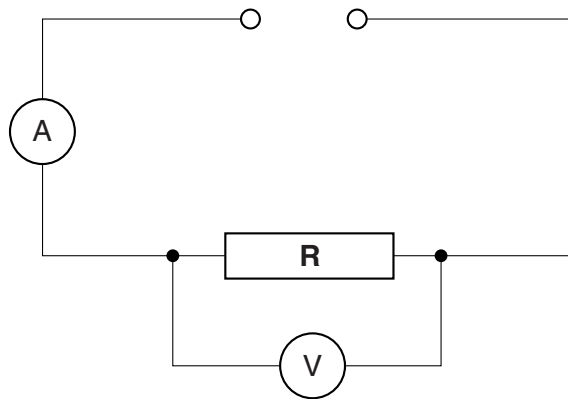
**correct  
order**

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]

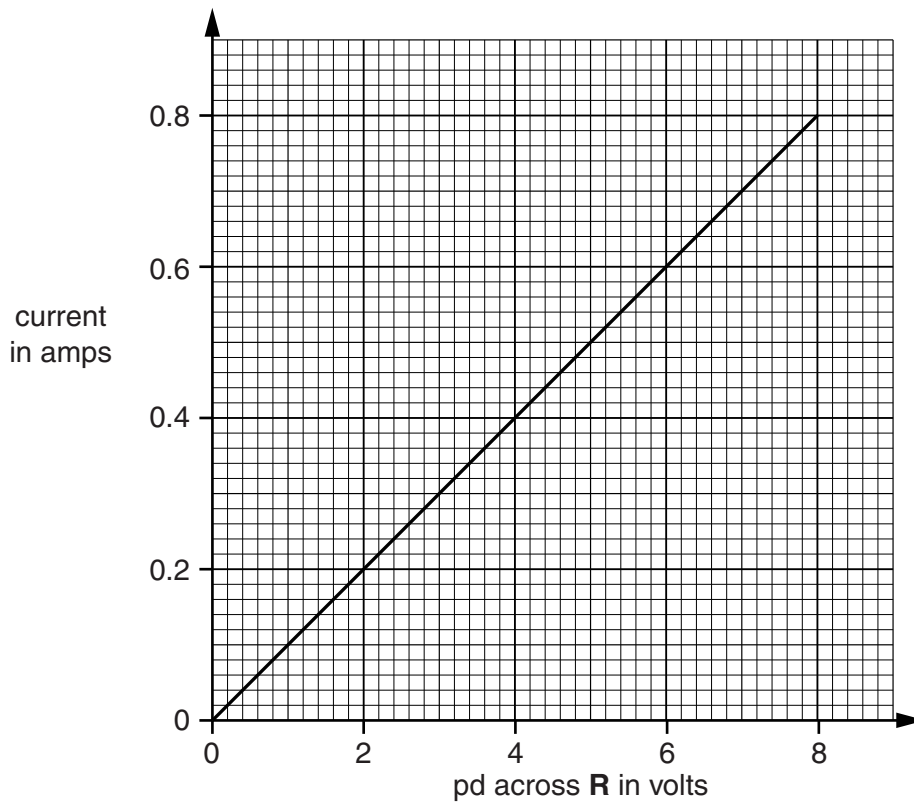
[Total: 3]

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 2 may help you.

.....

.....

.....

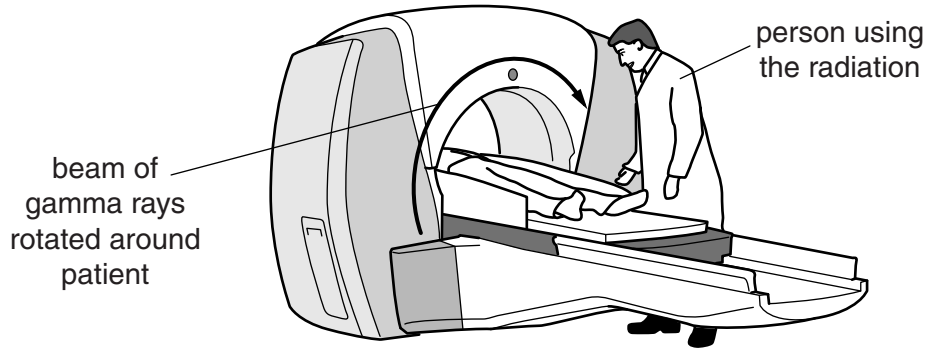
answer .....ohms ( $\Omega$ )

[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.

.....

.....

.....

.....

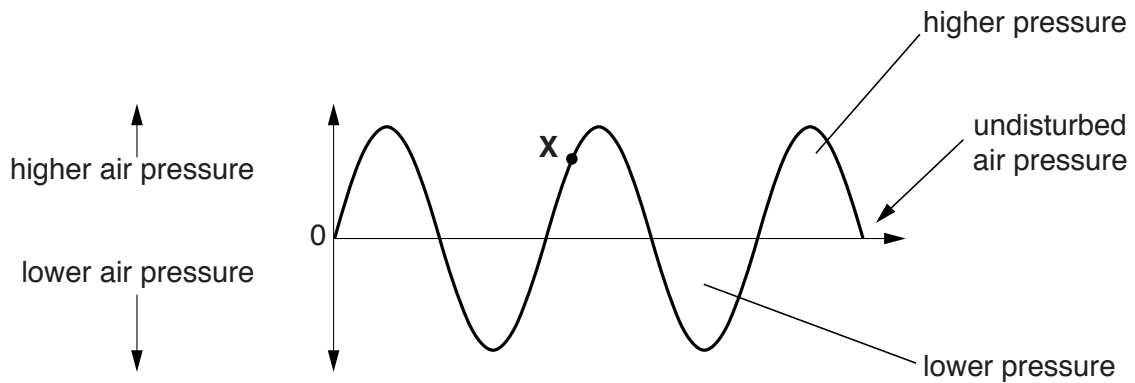
.....

..... [3]

[Total: 3]

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

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



(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.

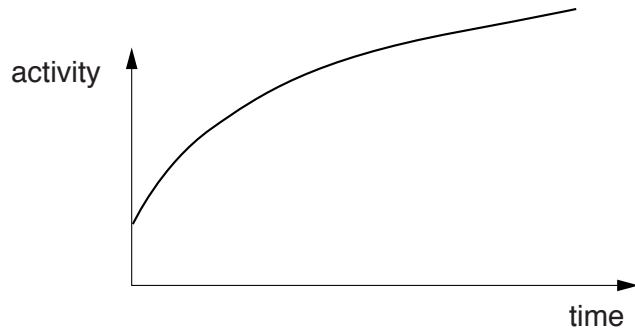
..... [1]

[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.

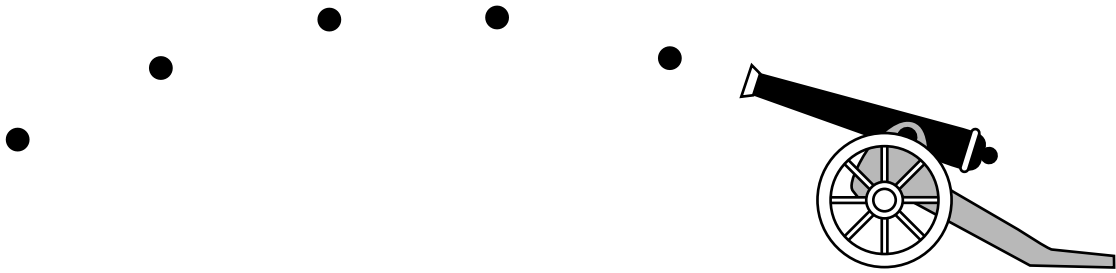
..... [1]

(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]

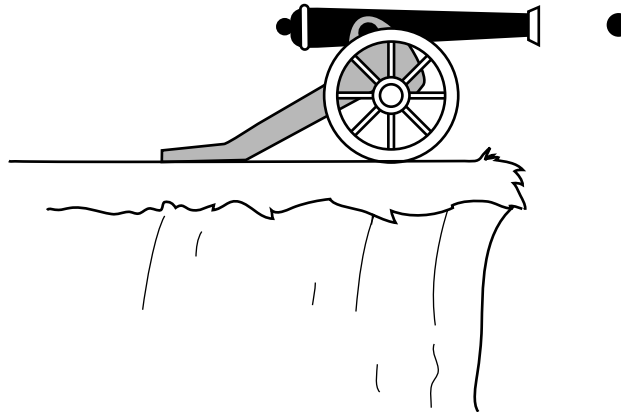
(c) In this question ignore the effects of air resistance.

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  $10 \text{ m/s}^2$ .



(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 2 may help you.

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

answer ..... [2]

[Total: 5]

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 .....

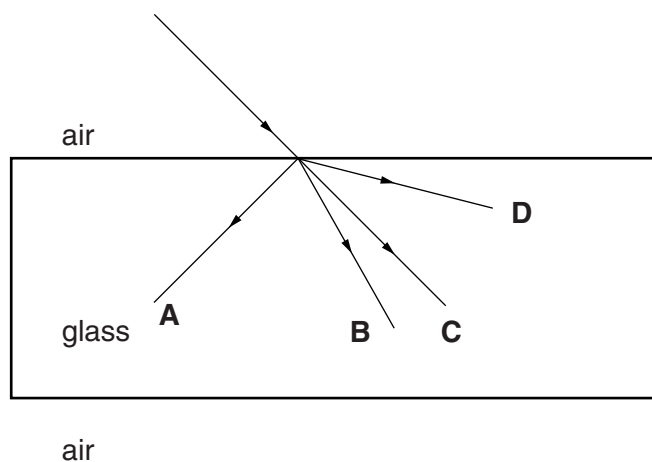
Satellite TV signals are collected using ..... [1]

[Total: 4]

Turn over

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?

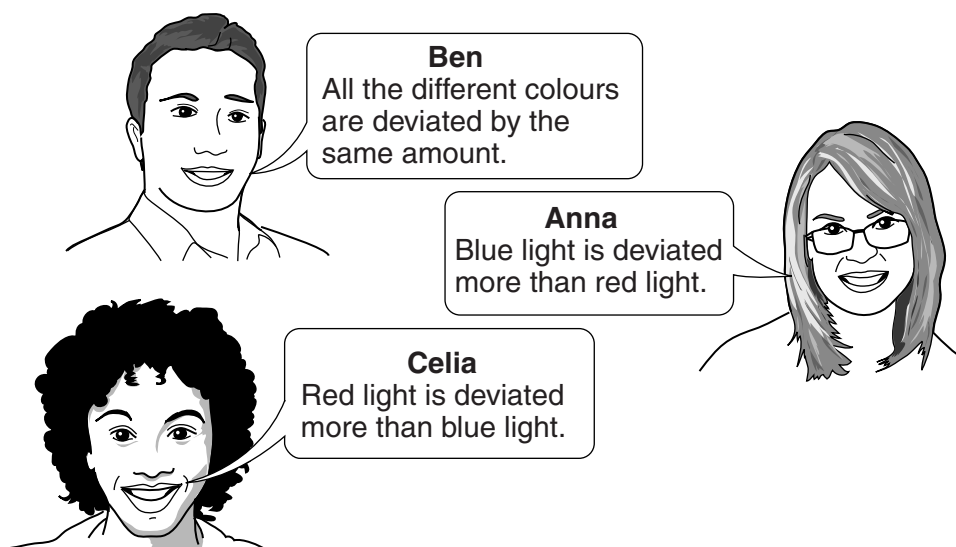
Choose from **A B C D**

answer .....

[1]

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

Some friends discuss this effect.



Who is correct?

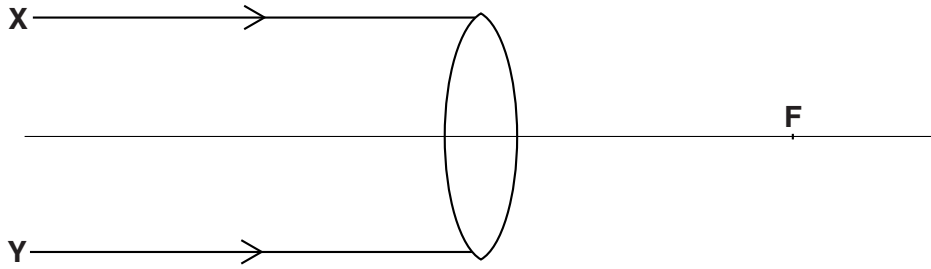
Choose from **Ben Anna Celia**

answer .....

[1]

(c) Donna experiments with lenses.

Look at the diagram.



(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]

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**

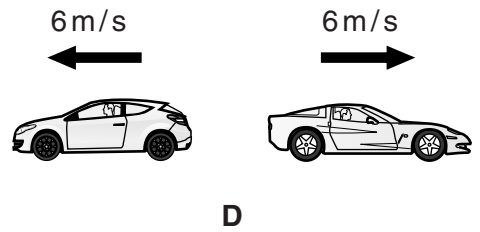
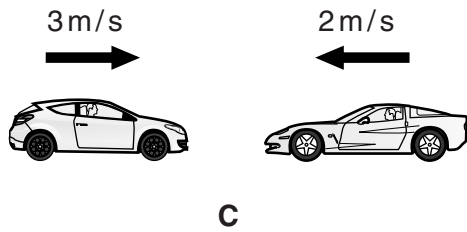
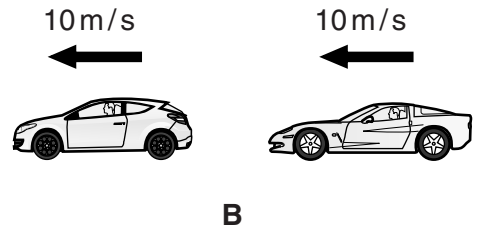
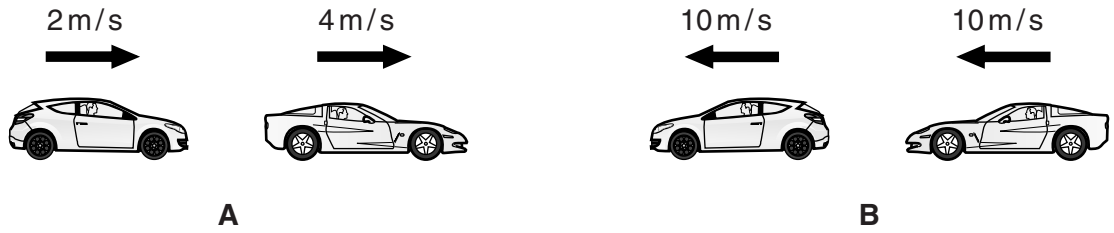
answer .....

[1]



(b) Look at the diagrams.

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]

## 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.

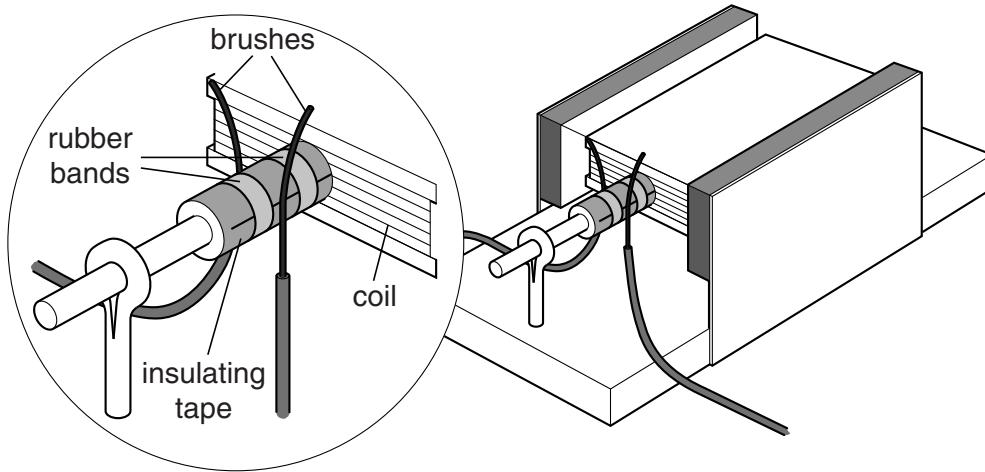
Some electrical appliances contain an **electric motor**.

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

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

(b) Look at the diagram 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.

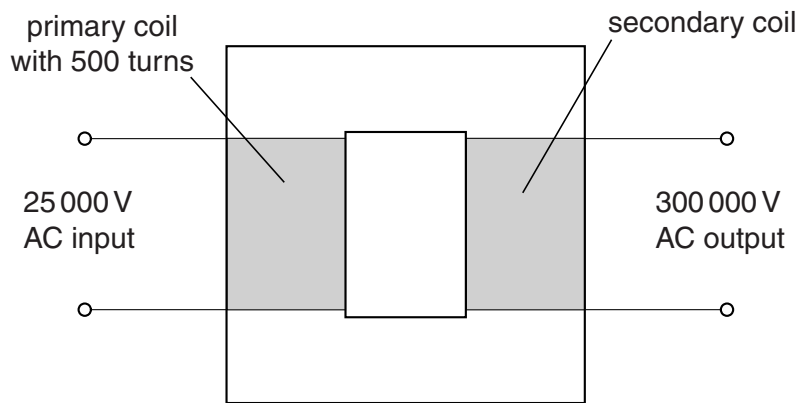
(a) (i) What is the **frequency** of AC electricity in the UK?

..... Hz [1]

(ii) Why is DC electricity **not** used with transformers?

..... [1]

(b) Look at the diagram 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: 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 headlamps on his car.

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

..... [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

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