

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
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

**OCR Supplied Materials:**  
None

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)

**Monday 1 February 2010  
Afternoon**

**Duration: 1 hour**



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- 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.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- A list of physics equations is printed on page two.
- This document consists of **24** pages. Any blank pages are indicated.

## 2

### EQUATIONS

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

$$v = u + at$$

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

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

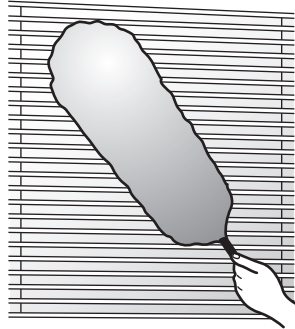
$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

Answer **all** the questions.

**Section A – Module P4**

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

(a) Russell is dusting his window blinds.



The duster has an electrostatic charge.

Russell moves the duster over the blinds.

(i) What happens to dust particles on the blinds?

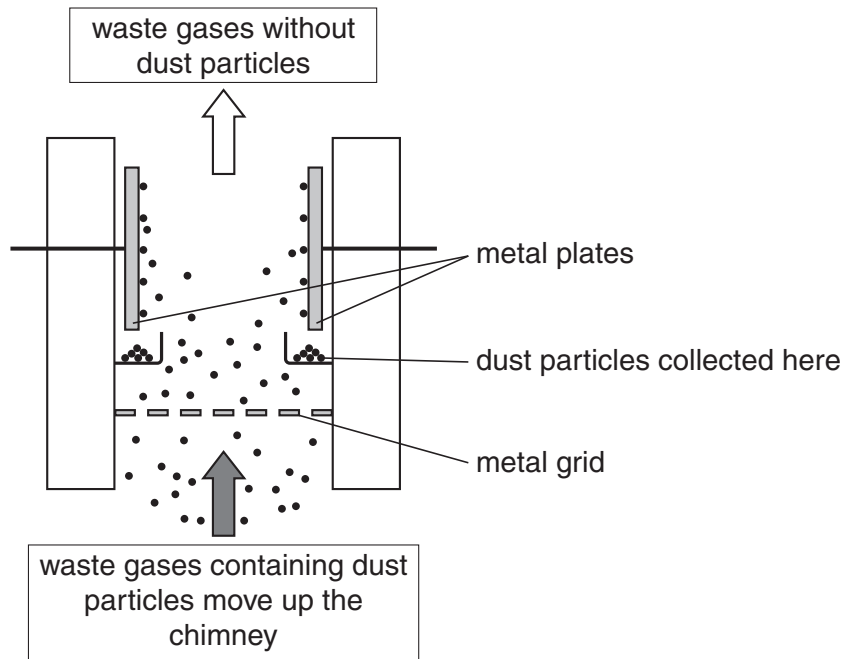
..... [1]

(ii) What are the **two** kinds of electrostatic charge?

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

(b) Dust particles can be removed from a chimney using an **electrostatic precipitator**.

The diagram shows an electrostatic precipitator.



Complete the following sentences to explain how the electrostatic precipitator works.

Choose words from the list.

Each word can be used once, more than once or not at all.

- attracted**      **charged**      **conducted**      **direct**      **knocked**  
**negative**      **neutral**      **positive**

The metal grid has a ..... charge.

The metal plates have a ..... charge.

The dust is charged by the metal grid.

Then the dust is ..... to the plates.

The plates are ..... so the dust falls down and is collected. [3]

(c) Static electricity can also be dangerous.

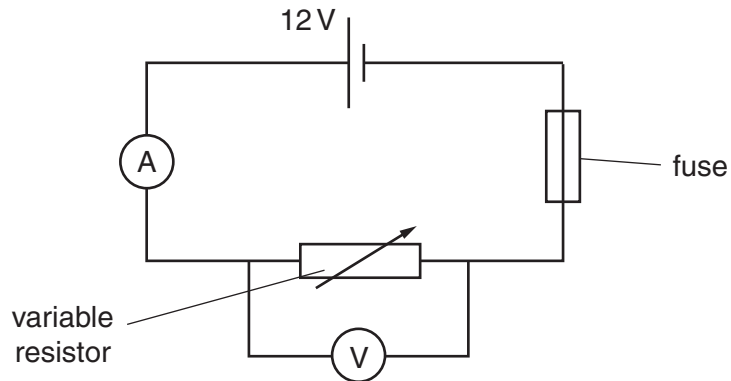
How can static electricity be **dangerous**?

..... [1]

[Total: 6]

2 Harry is investigating electrical circuits.

He sets up the circuit shown in the diagram.



(a) Harry investigates how the fuse works.

He adjusts the variable resistor.

The current increases to 1.5 A (amps).

The fuse blows.

Describe what happens to the circuit when the fuse blows.

..... [1]

(b) Harry measures the current and voltage for the variable resistor just before the fuse blows.

Look at his results.

current = 1.5 A

voltage = 12 V

Calculate the value of the **resistance**.

The equations on page 2 may help you.

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

answer .....  $\Omega$  [2]

[Total: 3]

3 Daniel finds out about uses of physics in hospitals.

(a) Ultrasound is a high frequency longitudinal wave.

It is used in hospitals.

Daniel finds a picture of a doctor using ultrasound for a particular test.



Write about **three** uses of ultrasound in hospitals.

.....

.....

.....

.....

.....

[3]

(b) Daniel also finds out that **nuclear** radiation is used in hospitals.

Gamma rays are one type of nuclear radiation.

Look at the table.

Put **ticks** (✓) in the boxes to show if each statement is true or false.

Two have been done for you.

statement	true	false
nuclear radiation is used to break up kidney stones		
nuclear radiation does <b>not</b> harm cells in the human body		
gamma rays are longitudinal waves		✓
nuclear radiation can be used to sterilise surgical instruments		
the name of the person who uses nuclear radiation in a hospital is a radiographer	✓	
nuclear radiation can be used to treat cancer		

[3]

(c) Daniel learns that radiographers use radioisotopes in some tests.

The radioisotope is put into patients and followed around the body.

(i) Complete the sentence.

When a radioisotope is followed around the body it is being used as a

.....

[1]

(ii) The radioisotopes are radioactive.

What happens to their radioactivity over time?

.....

[1]

(iii) Nuclear radiation comes from inside an unstable atom.

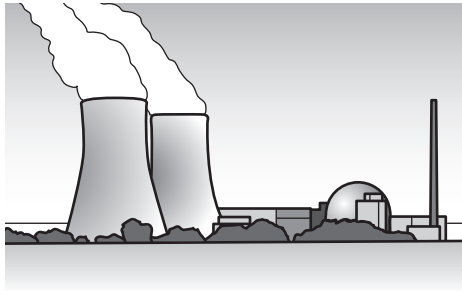
What **part** of the atom does all nuclear radiation come from?

.....

[1]

[Total: 9]

4 Nuclear power stations produce electricity.



(a) Nuclear power stations use a nuclear fuel as a source of energy.

Write down the name of this nuclear fuel.

..... [1]

(b) The diagram shows the three main stages in the production of electricity from a nuclear fuel.

Complete the sentence in the middle box.

stage 1
The nuclear fuel produces heat.

stage 2
The heat is used to
.....
.....
.....
.....
.....

stage 3
The electricity is produced in the generator.

[1]

[Total: 2]



Section B – Module P5

5 This question is about natural and artificial satellites.

(a) The Moon is the Earth’s only natural satellite.

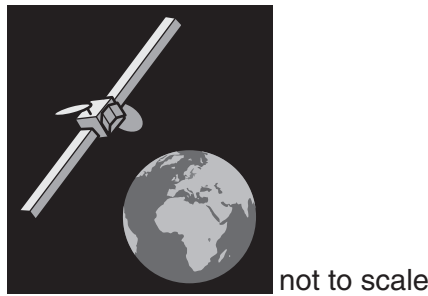


A force keeps the Moon in orbit.

Write down the name of this force.

..... [1]

(b) Artificial satellites are put into orbit by rockets.



Write down two **different** uses of artificial satellites.

1 .....

2 ..... [2]

(c) Waves are transmitted from Earth up to satellites.

The satellites then transmit these waves back to Earth.

What type of wave is used?

Choose from

- infrared**
- microwave**
- radio**
- ultraviolet**

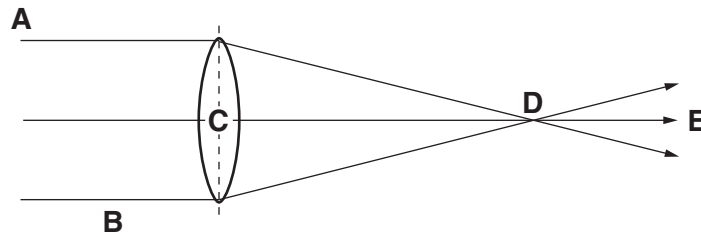
answer ..... [1]

[Total: 4]

Turn over

6 Convex lenses converge parallel light rays.

Look at the diagram.



(a) (i) The lens has a focal point.

Which letter shows the focal point?

Choose from **A B C D E**

answer..... [1]

(ii) The focal length is between letters ..... and ..... [1]

(b) The lens is changed for a **fatter** one.

What happens to the focal length?

Choose from

**decreases increases stays the same**

answer ..... [1]

(c) Convex lenses are used in different optical instruments.

Write down two uses of a convex lens.

1 .....

.....

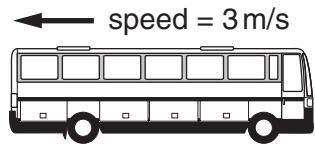
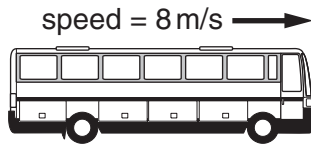
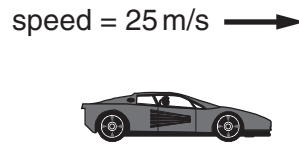
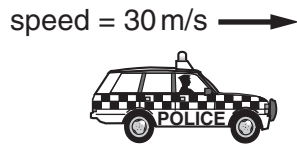
2 .....

..... [2]

[Total: 5]

7 Vehicles can travel at different speeds.

Look at the diagrams.



The cars and buses all travel at different speeds.

(a) What is the **fastest** speed in the diagrams?

..... m/s [1]

(b) The buses have a higher **relative** speed than the cars.

Use the information in the diagram to explain why.

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

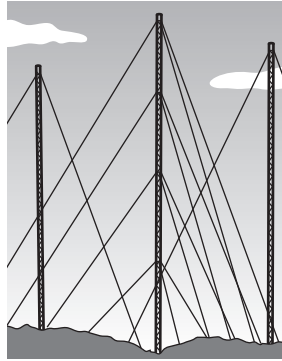
[Total: 2]

8 Radio waves carry radio signals.

(a) What part of the radio receives these waves?

..... [1]

(b) Radio waves are transmitted from radio masts.



These radio waves travel to radios in people's homes.

Some people live close to hills.

Others live near tall buildings.

They can still receive the radio signals.

Explain how they can receive these signals.

In your answer write about

- the wavelength of radio waves
- why hills and buildings do **not** block the signal.

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

(c) Radio waves can be transmitted long distances using the Earth's upper atmosphere.

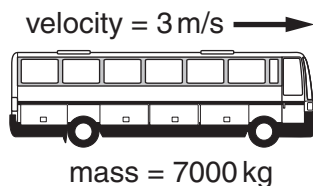
What happens to the waves when they hit the upper atmosphere?

..... [1]

[Total: 4]

9 This question is about velocity and momentum.

(a) A bus moves along the road. Look at the diagram.



(i) The mass of the bus is 7000 kg. Its velocity is 3 m/s.

Calculate the momentum of the bus.

The equations on page 2 may help you.

.....

.....

answer ..... kg m/s [2]

(ii) More passengers get on the bus.

The mass of the bus increases.

It moves again at 3 m/s.

How will this extra mass affect its momentum?

..... [1]

(b) A car accelerates. Look at the diagram.



The car accelerates at 1.5 m/s<sup>2</sup>.

It takes 12 seconds to reach its final velocity.

Calculate the final velocity of the car.

The equations on page 2 may help you.

.....

.....

answer ..... m/s [2]

[Total: 5]

Turn over

## Section C – Module P6

10 This question is about current, voltage and resistance.

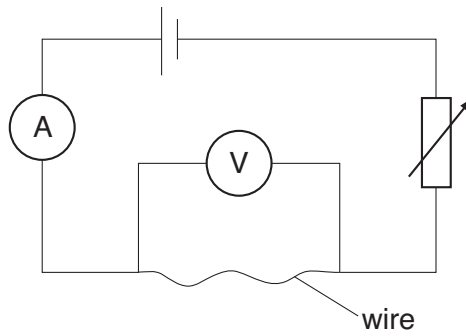
(a) Look at the list of electrical quantities and units.

Draw a straight line from each **quantity** to its correct **unit**.

quantity	unit
current	ohms
voltage	amps
resistance	volts

[2]

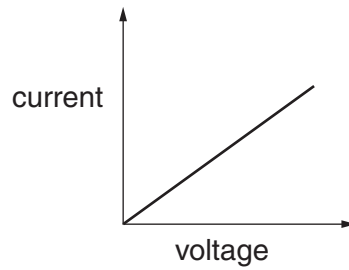
(b) Katy connects the following circuit.



She measures the voltage and current.

She draws a graph of her results.

Look at the graph.



Explain how she **uses the graph** to find the resistance of the wire.

.....

.....

.....

..... [2]

[Total: 4]

16  
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11 This question is about electrical components.

(a) Look at the list of components.

**fixed resistor**

**fuse**

**LDR**

**motor**

**switch**

**thermistor**

(i) Which component responds to a change in the brightness of **light**?

Choose from the list.

answer ..... [1]


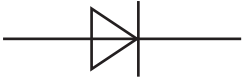
(ii) Which component responds to a change in **temperature**?

Choose from the list.

answer ..... [1]

(b) Scientists use symbols for electrical components.

Write the correct name of the components in the box next to their symbol.

symbol	name
	<p>.....</p>
	<p>.....</p>

[2]

[Total: 4]

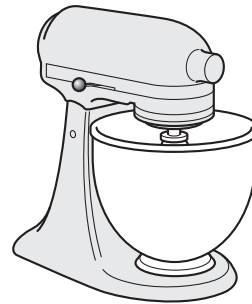
12 (a) Look at the pictures of household appliances.



kettle



lamp



food mixer



washing machine



cd player

Some of the appliances have electric motors inside them.

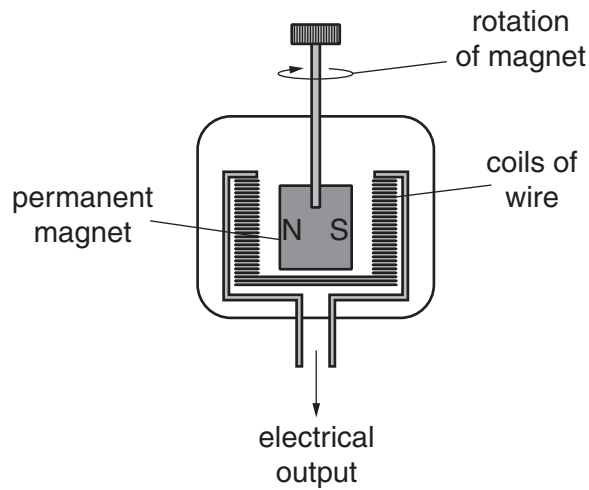
How many?

Choose from    1    2    3    4    5

answer .....

[1]

(b) In a power station a magnet rotates inside a coil of wire.



An alternating current (AC) is produced.

(i) The magnet spins faster.

Complete the sentence.

When the magnet spins faster, the size of the AC produced .....

and the frequency of the output ..... [1]

(ii) A stronger magnet is used.

Complete the sentence.

When the stronger magnet is used, the size of the AC produced .....

and the frequency of the output ..... [1]

[Total: 3]

13 This question is about transformers.

(a) Batteries produce direct current (DC).

Fred connects a battery to the input of a transformer.

What is the output from the transformer?

..... [1]

(b) Some transformers **reduce** the voltage.

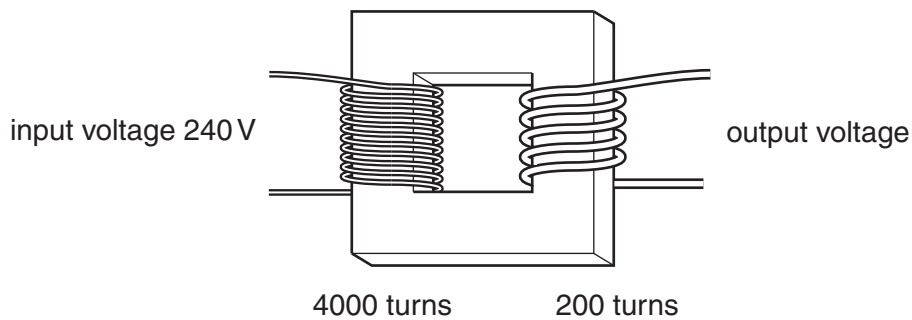
(i) Write down the **name** of these transformers.

..... [1]

(ii) Write down one **use** of a transformer that reduces the voltage.

..... [1]

(c) The diagram shows a transformer.



The primary coil has 4000 turns.

The secondary coil has 200 turns.

The input voltage is 240V.

Calculate the output voltage.

The equations on page 2 may help you.

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

answer ..... V [2]

[Total: 5]

14 This question is about logic gates

(a) The input for a logic gate can be either **high** or **low**.

Complete the table for a NOT gate.

input	output
high	
low	

[1]

(b) Logic gates are sometimes connected in combination.

Car alarms have a combination of logic gates called a latch.

The latch is needed to make sure that the alarm works properly.

Explain why.

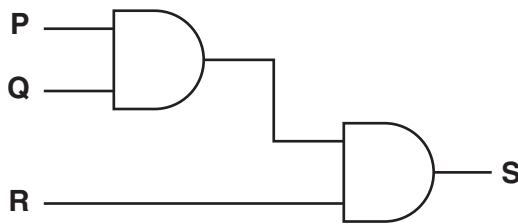
.....

.....

..... [2]

(c) Look at the diagram.

It shows two logic gates (a combination) being used together.



Which letter shows the **output** from the combination of gates?

Choose from **P Q R S**

answer .....

[1]

[Total: 4]

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