OCR
RECOGNISING ACHIEVEMENT

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B652/01

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

PHYSICS B

Unit 2 Modules P4 P5 P6 (Foundation Tier)

TUESDAY 29 JANUARY 2008

Afternoon
Time: 1 hour

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

CUP/T45742

Candidate Forename		Candidate Surname	
Centre Number		Candidate Number	

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or 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.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- A list of physics equations is printed on page two.

FOR EXAMINER'S USE		
Section	**Max.**	**Mark**
A	**20**	
B	**20**	
C	**20**	
TOTAL	**60**	

This document consists of **19** printed pages and **1** blank page.

[Turn over

EQUATIONS

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

$$v = u + at$$

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

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

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

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Question 1 begins on page 4.

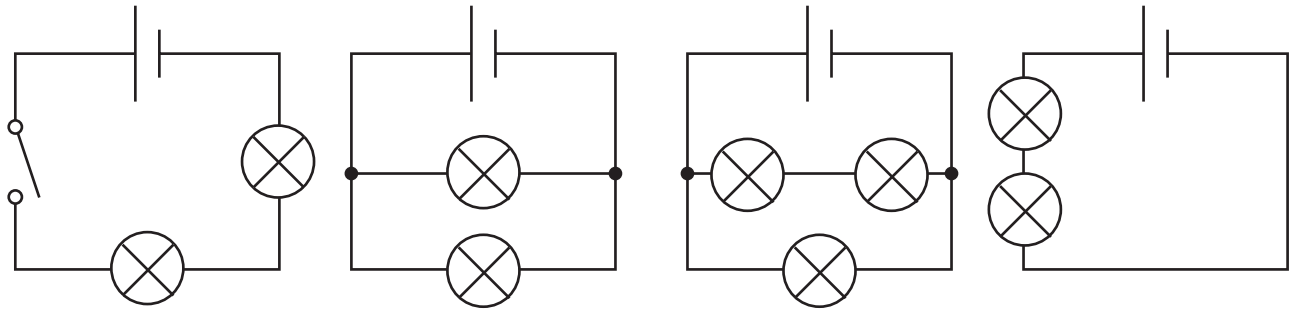
PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

Section A – Module P4

1 This question is about electric circuits.

(a) Look at the electric circuits.



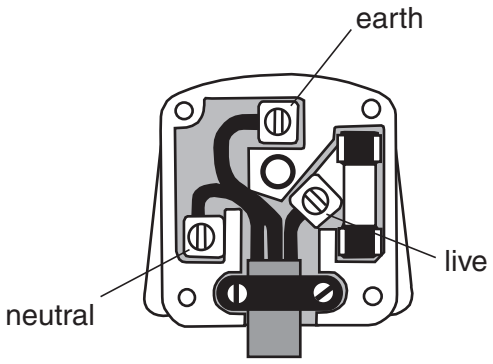
The bulbs in **one** of the circuits are not lit.

Which one?

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

answer ..... [1]

(b) Look at the diagram of a mains electric plug.



The table shows the terminals and colours of the wires.

	live	**neutral**	**earth**
A	red	black	green
B	brown	blue	green/yellow
C	green/yellow	blue	brown
D	blue	brown	green/yellow

Which line shows the correct colours for the wires?

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

answer ..... [1]

(c) Most electrical circuits have either a fuse or a circuit breaker.

Write down a reason for having either a fuse or circuit breaker in a circuit.

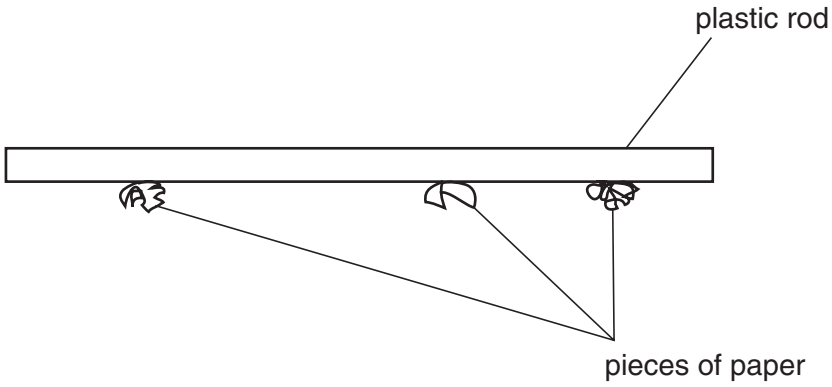
.....

..... [1]

[Total: 3]

2 **(a)** Vincent rubs a plastic rod with a duster.

Look at the diagram.



The rod attracts the small pieces of paper.

Suggest why.

.....

..... [1]

(b) Wayne has a pair of trainers.

They have plastic soles.

He plays football on an artificial grass pitch.

He touches a metal goal post and gets an electric shock.

Describe:

how he gets charged

.....

.....

why he gets a shock.

.....

.....

.....

[3]

(c) Static electricity is useful in spray-painting cars.

Explain how.

In your answer write about

- electrostatic charge
- electrostatic force
- why it is used.

.....

.....

.....

.....

..... [3]

[Total: 7]

3 This question is about **longitudinal** waves.

(a) Look at the list of words.

amplitude

compression

frequency

rarefaction

Complete the following sentences.

Use words from the list.

(i) The number of vibrations each second is called the ..... . [1]

(ii) When particles in a wave move apart, they produce a ..... . [1]

(b) Ultrasound and sound are examples of longitudinal waves.

Describe how ultrasound is different from sound.

.....

.....

..... [2]

[Total: 4]

4 Radiation is used in hospitals.

(a) Specially trained people take X-ray pictures.

What do we call the people who take these pictures?

..... [1]

(b) There are three types of nuclear radiation.

One type is stopped by skin.

Which type of nuclear radiation is stopped by skin?

..... [1]

(c) Radioisotopes are used in hospitals.

Write down two **uses** of radioisotopes in hospitals.

use 1 .....

.....

use 2 .....

..... [2]

[Total: 4]

5 **(a)** In a nuclear power station, uranium atoms split. This releases neutrons.

These neutrons make other uranium atoms split.

What do we call this sort of reaction?

..... [1]

(b) What would happen if this reaction went out of control?

.....

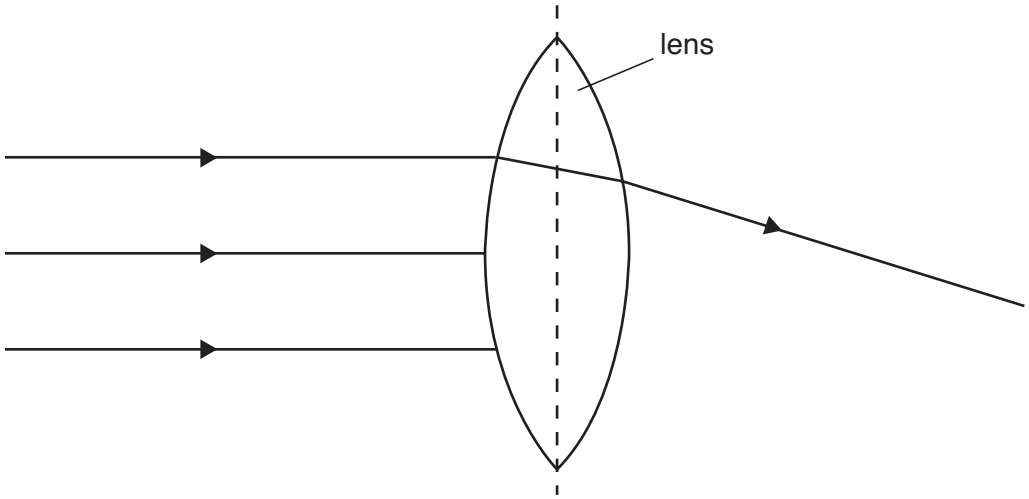
..... [1]

[Total: 2]

Section B – Module P5

6 The diagram shows three rays of light shining towards a lens.

One ray is shown passing through the lens.



(a) Draw the paths of the other **two** rays as they pass through the lens.

Use a ruler. [2]

(b) The lens has a **focus**.

Write the letter **F** on the diagram to show the **focus**. [1]

(c) Use a ruler to measure the **focal length** (in cm) of the lens.

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

1.0 **4.0** **6.5** **12.0**

The focal length of the lens is ..... cm. [1]

(d) What type of lens is shown in the diagram?

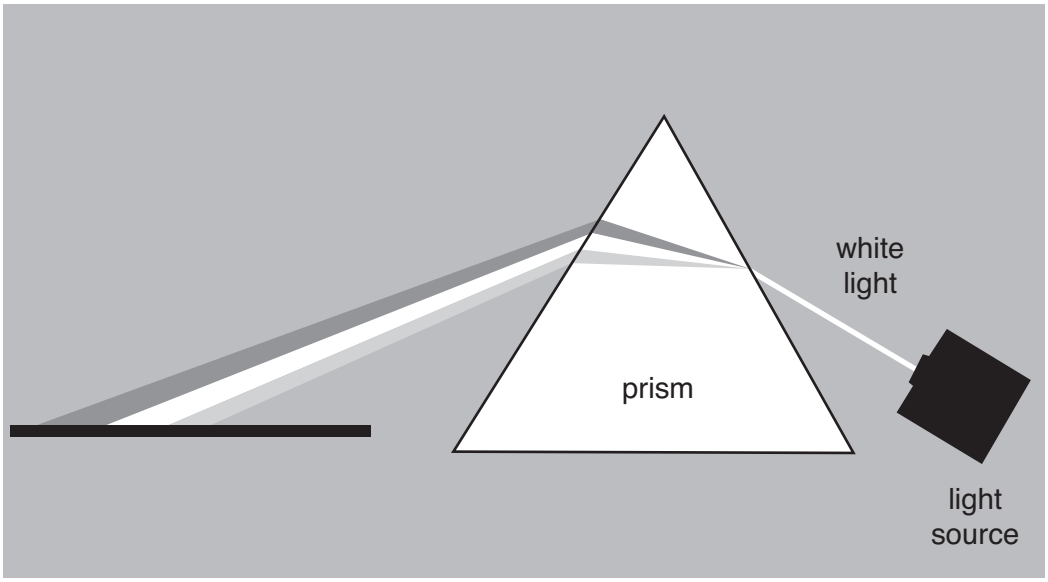
Put a (ring) around the correct answer.

concave **convex** **diverging** **plane**

[1]

[Total: 5]

7 Look at the diagram. It shows what happens to white light when it passes through a prism.



(a) Describe what happens to the light as it passes through the prism.

.....

.....

.....

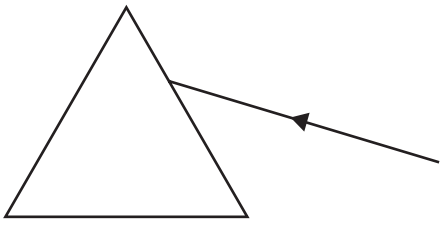
..... [3]

(b) The prism is made of glass. Light passes through the prism.

Write down the name of **one** other material which can be used to make the prism.

..... [1]

(c) Light is partially reflected as it passes from one material to another.

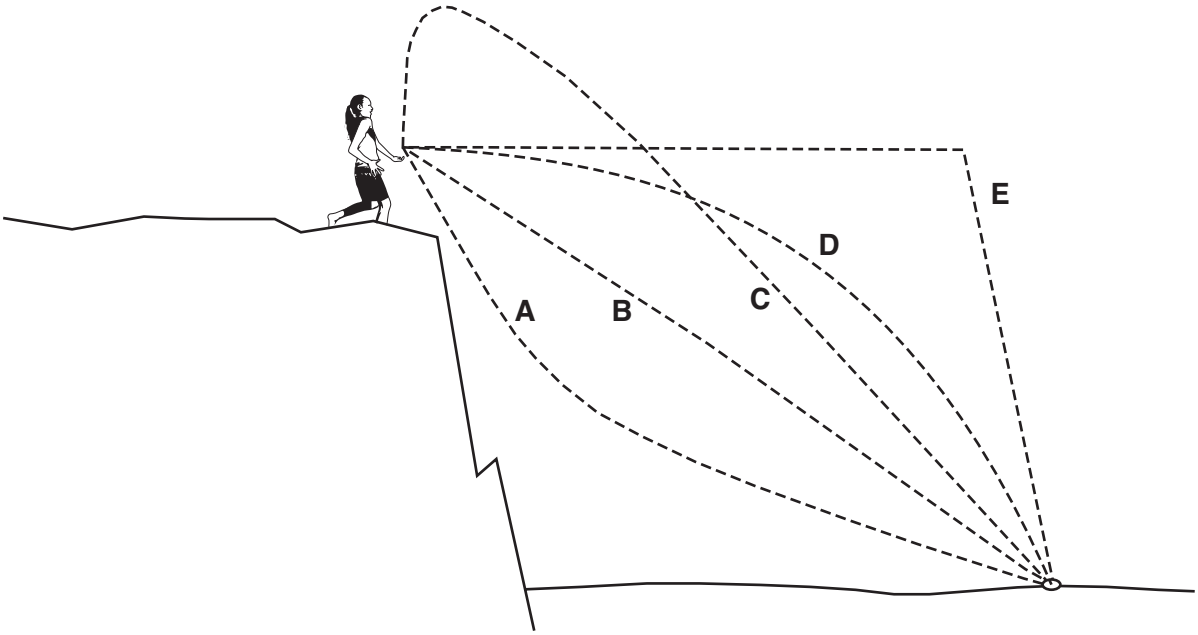


Draw on the diagram, the path of **one** reflected ray. [1]

[Total: 5]

8 Sophie throws a stone into the sea.

There are five paths shown on the diagram. Only **one** is correct.



(a) Which is the correct path taken by the stone?

Choose from: **A** **B** **C** **D** **E**

answer ..... [1]

(b) Here are four sentences about how the stone behaves after it leaves her hand.

Ignore the effects of air resistance.

Only one of the statements is correct.

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

The stone speeds up horizontally. ☐

The stone has a constant horizontal velocity. ☐

The stone is called a trajectory. ☐

The stone has a constant vertical velocity. ☐

[1]

(c) When Sophie throws a stone, the stone is a **projectile**.

Which of the following is an example of a projectile?

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

a falling parachutist ☐

an arrow shot from a bow ☐

a train slowing down as it approaches a station ☐

[1]

(d) Sophie throws the stone with a speed of 25 m/s.

The stone travels for 1.5 s before it goes into the sea.

How far in front of Sophie does the stone go into the sea?

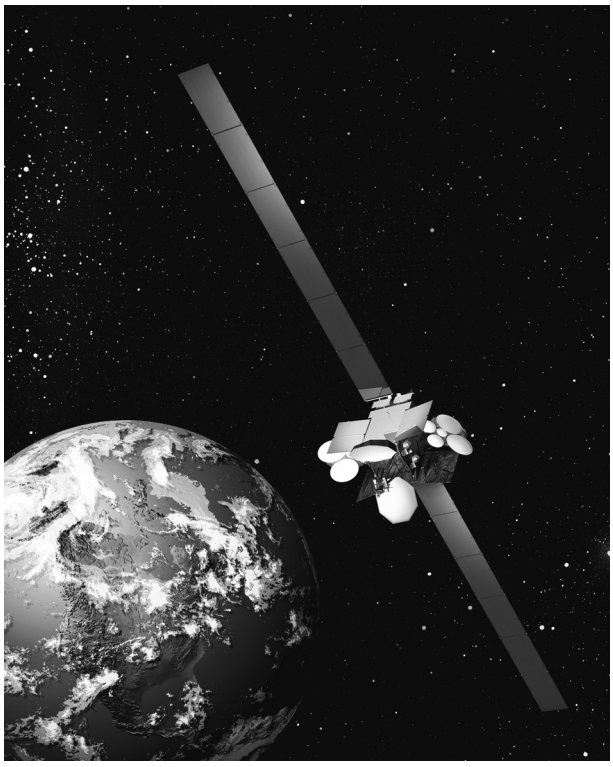
.....

.....

answer ..... m [2]

[Total: 5]

9 Anik is an **artificial** satellite. It orbits the Earth.



(a) What is the name of the **natural** satellite that orbits the Earth?

Put a (ring) around the correct answer.

Halley's comet

Meteosat

Moon

Pluto

[1]

(b) A **force** keeps Anik in orbit around the Earth.

Write down the name of this force.

..... [1]

(c) Satellites are used for communication.

Write down **two** other uses of satellites.

1 .....

2 ..... [2]

(d) Anik is a communications satellite. It orbits the Earth above the equator in **geostationary** orbit.

How long does it take Anik to orbit the Earth?

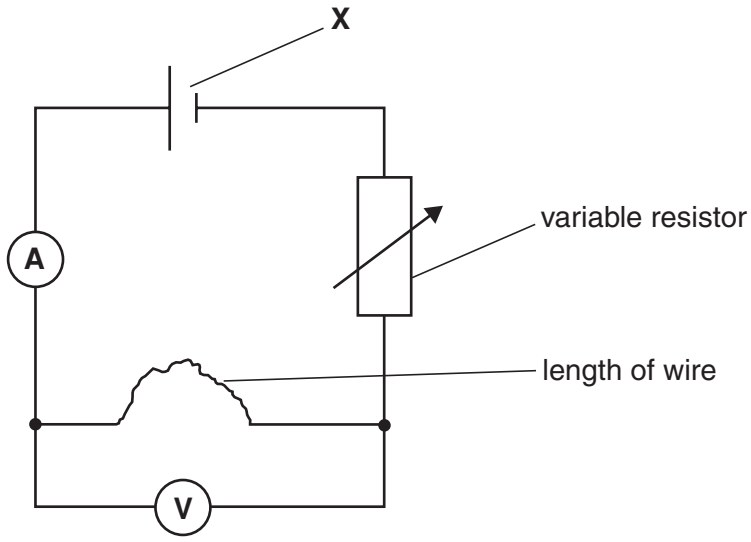
answer ..... hours [1]

[Total: 5]

Section C – Module P6

10 Jenny wants to measure the resistance of a wire.

She uses this circuit.



(a) What is the name of the component labelled **X**?

Put a (ring) around the correct answer.

bulb

cell

resistor

voltmeter

[1]

(b) Jenny changes the variable resistor. The resistance gets less.

What happens to the current in the circuit when the resistance gets less?

..... [1]

(c) Jenny accidentally touches the wire.

She screams as she quickly takes her hand away.

Suggest why she reacts like this.

..... [1]

(d) The reading on the ammeter is 0.5 A. The reading on the voltmeter is 1.5 V.

Calculate the resistance of the wire.

Use the equations on page 2 to help you.

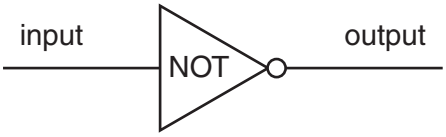
.....

.....

resistance of wire = ... unit ..... [3]

[Total: 6]

11 The input signal to a NOT gate can be either high or low.



(a) What is the voltage of a **high** signal to a NOT gate?

Put a (ring) around the **best** answer.

0V

1V

5V

24V

230V

[1]

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

input	**output**
low	.....
high	.....

[2]

(c) Which of the following will work directly from the output of a NOT gate?

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

bell ☐

laptop computer ☐

light emitting diode (LED) ☐

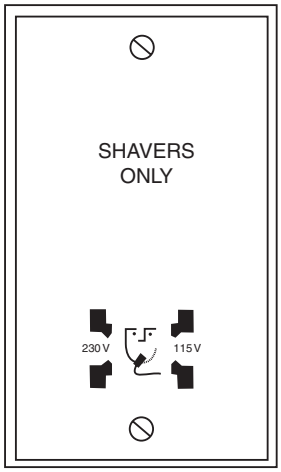
motor ☐

[1]

[Total: 4]

12 Transformers are normally used to change the size of an AC voltage.

A shaving socket has two outputs, 230V and 115V.



(a) What type of transformer changes the 230V mains supply to 115V?

..... [1]

(b) The input to the transformer is 230V. There are 10000 turns on the primary coil of the transformer.

The output is 115V. How many turns are there on the secondary coil?

Use the equations on page 2 to help you.

.....

.....

number of turns on secondary coil = ... [2]

(c) An **isolating** transformer is used between the 230V mains supply and the 230V outlet.

Why is there an **isolating** transformer in a shaver socket?

..... [1]

(d) Naseer is reading about his new rechargeable shaver.

He looks at the label on the charger.

AC – DC adaptor Input 230V ~ 50Hz Output 2.8V 1200mA

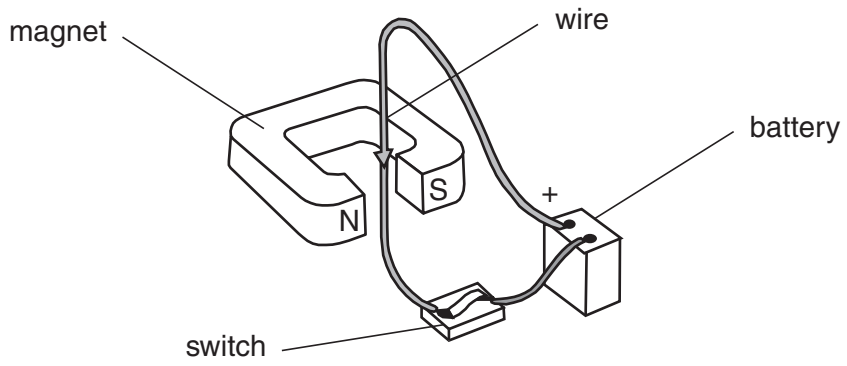
What is the frequency of the mains electricity supply in the UK? ..... [1]

[Total: 5]

13 This question is about how electric motors work.

(a) Michael hangs a wire between the poles of a magnet.

He wants to find out what happens when a current passes through the wire.



The current is switched on.

(i) Describe the magnetic field produced around the wire by the current.

.....

.....[1]

(ii) What effect does this have on the wire?

.....

.....

..... [2]

(b) Michael changes the direction of the current. What happens to the wire?

..... [1]

(c) Write down the name of **one** kitchen appliance that contains an electric motor.

..... [1]

[Total: 5]

END OF QUESTION PAPER