

**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)

**Friday 18 June 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. 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 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 (a) Insulating materials can become charged.

Plastic is an insulator.

Describe how you can charge a plastic rod.

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

(b) How many different types of charge are there?

Choose from: 1 2 3 4

answer [1]

(c) Victor is electrically charged.

He touches a metal water tap.

Victor gets a shock.

Why does he get a shock?

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

(d) Static electricity can sometimes be useful.

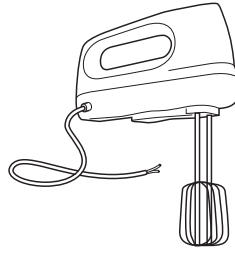
It is used to restart the heart when it stops.

Give one **other** example of where static electricity is useful.

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

[Total: 4]

- 2 (a) Una's food mixer only needs two wires in the plug.



Which wire is missing from the plug?

Choose from: **earth** **live** **neutral**

answer [1]

- (b) Most mains electric cables have three wires.

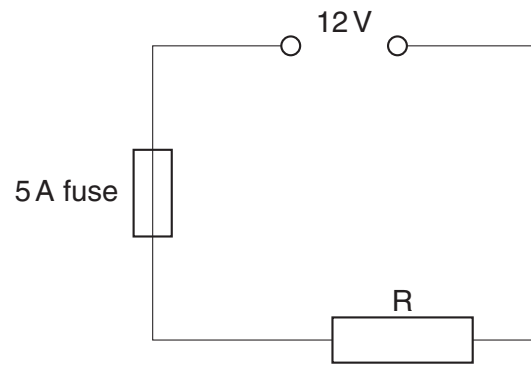
They are different colours.

Draw a straight line from each **wire** to its correct **colour**.

wire	colour
earth	blue
live	brown
neutral	green/yellow

[2]

(c) Zak connects the following circuit.



He uses a fuse.

The fuse melts if the current is more than 5 amps.

Calculate the resistance in the circuit when the current is 5 amps.

The equations on page 2 may help you.

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

answer ohms

[2]

[Total: 5]

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3 Ultrasound is used in hospitals.

It is used to look inside people by scanning the body.

(a) Write down one **other** use of ultrasound in hospitals.

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

(b) Ultrasound **cannot** be heard.

Explain why.

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

(c) Ultrasound is a longitudinal wave.

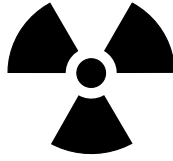
The waves are made up of a series of compressions and rarefactions.

What is a compression?

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

[Total: 3]

4 This question is about radiation and radioactive materials.



(a) X-rays and gamma rays are used in hospitals.

How are X-rays similar to gamma rays?

.....
 [1]

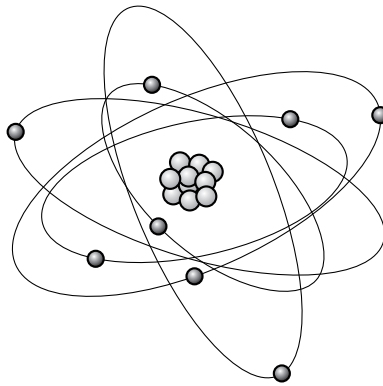
(b) Some radioactive sources emit alpha particles.

Write down **one** use of an alpha source.

..... [1]

(c) Some radioactive sources emit beta particles.

(i) Beta particles are emitted from radioactive atoms.



Which **part** of the atom gives out beta particles?

Write down its name.

..... [1]

(ii) What is a beta particle?

In your answer write about

- what type of particle it is
- its movement.

.....

.....

..... [2]

[Total: 5]

5 Nuclear power stations use a nuclear fuel to produce electricity.

(a) Which **fuel** is used in nuclear power stations?

Choose from:

coal

gas

oil

uranium

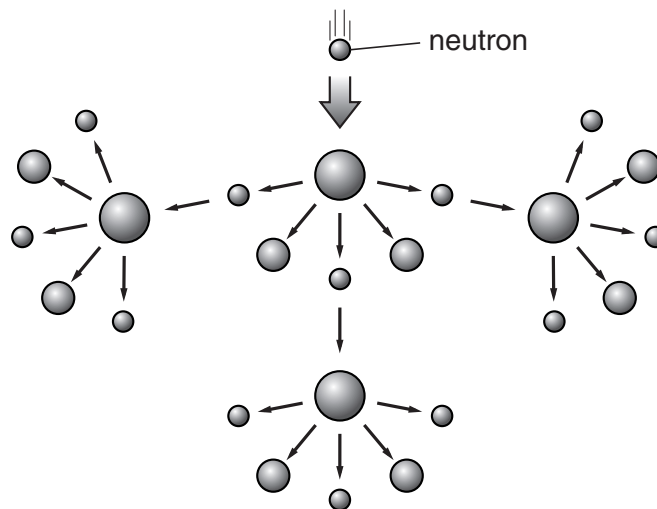
wood

answer [1]

(b) A chain reaction happens in a nuclear power station.

It also happens in a nuclear bomb.

Look at the diagram.



The chain reaction in a nuclear bomb is different from the chain reaction in a nuclear power station.

Explain how the nuclear bomb chain reaction is different.

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

(c) Tom wants to make a piece of copper radioactive.

How can he do this?

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

[Total: 3]

Section B – Module P5

6 A human cannonball is an example of a **projectile**.

Look at the picture of a man being fired as a human cannonball.



(a) Which two of the following are examples of **projectiles**?

Put ticks (✓) in the boxes next to the **two** correct answers.

- an athlete long-jumping
- a boxer punching
- a golf ball in flight
- a parachutist falling vertically
- a swimmer floating

[2]

(b) Finish the sentence by choosing the **best** word from this list.

orbit trajectory velocity

The **path** taken by a projectile is called the [1]

(c) All projectiles have a downward vertical force acting on them.

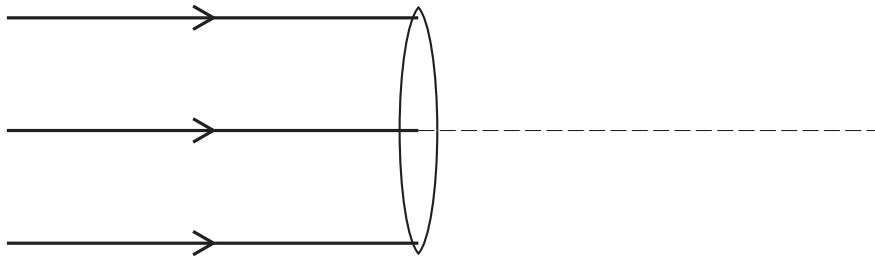
Write down the name of this force.

..... [1]

[Total: 4]

7 This question is about lenses.

(a) The diagram shows three rays of light and a lens.



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

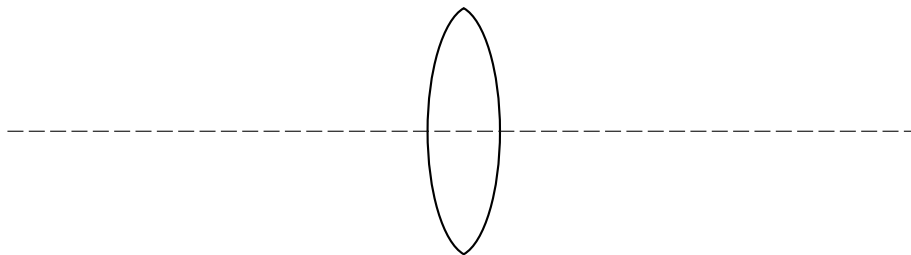
..... [1]

(ii) The rays pass through the lens.

Finish the diagram above by showing the paths they take. [2]

(iii) Label the diagram with an **F** to show the position of the focal point of the lens. [1]

(b) This lens is thicker at its centre.



What happens to the focal length when we use a thicker lens?

..... [1]

[Total: 5]

8 (a) Which of the following is **not** a description of a satellite?

Put a **ring** around the correct answer.

International Space Station orbiting Earth

Mars Odyssey orbiting Mars

space shuttle landing at Kennedy Space Centre

[1]

(b) The Earth has only one natural satellite.

Write down the name of this natural satellite.

..... [1]

(c) GOES is an **artificial** satellite above the Earth.

It is used for **weather** forecasting.

Write down two **other** uses of artificial satellites above the Earth.

1

2 [2]

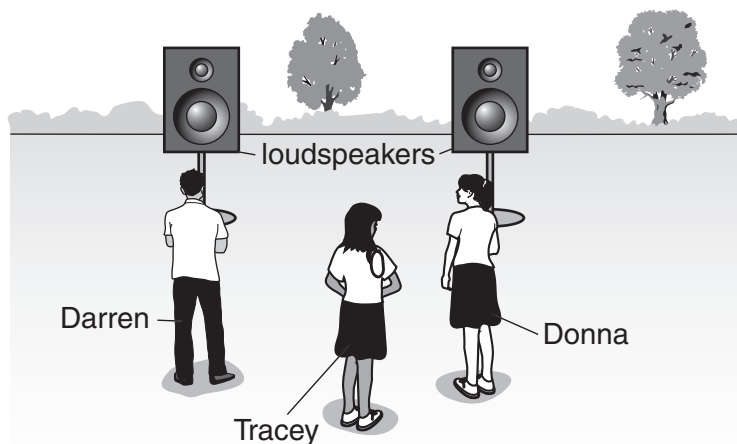
[Total: 4]

9 This question is about properties of sound and light.

(a) A teacher is playing the same sound through two loudspeakers.

The loudspeakers are set up outside on the school field. They are about 1 m apart.

The teacher asks her students what they can hear from the loudspeakers.



Tracey and Donna can both hear well normally.

Why does Tracey hear a loud sound while Donna does not hear anything?

.....

..... [2]

(b) The teacher looks at Darren.

Light from Darren travels towards the teacher.

Finish the sentences by choosing the **best** words from this list.

curved

medium

random

straight

vacuum

wave

Light travels in lines.

The air that the light goes through is called a

[2]

[Total: 4]

10 The Keirin is a sprint cycle race.



The cyclists follow a motorised cycle until they are travelling at a speed of 14 m/s.

The motorised cycle leaves the track.

The cyclists then accelerate from 14 m/s to 18 m/s at a steady rate.

This takes 3 seconds.

(a) What distance do the cyclists travel during the 3 seconds?

The equations on page 2 may help you.

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

answer = m [2]

(b) The motorised cyclist leaves the track travelling at a **speed** of 14 m/s.

Speed is a scalar quantity.

Velocity is a vector quantity.

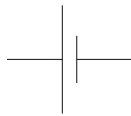
What is the difference between a **scalar** and a **vector** quantity?

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

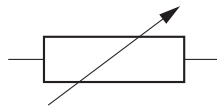
[Total: 3]

Section C – Module P6

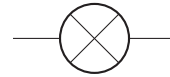
11 Look at the symbols of electrical components.



A



B



C



D



E

(a) Which is the symbol for a **capacitor**?

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

answer

[1]

(b) Which is the symbol for a **lamp (bulb)**?

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

answer

[1]

(c) Which is the symbol for a **diode**?

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

answer

[1]

(d) Which is the symbol for a **variable resistor**?

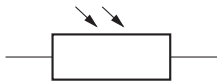
Choose from: **A** **B** **C** **D** **E**

answer

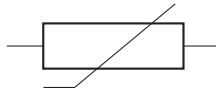
[1]

[Total: 4]

12 Look at the three electrical items.



LDR



thermistor



metal wire

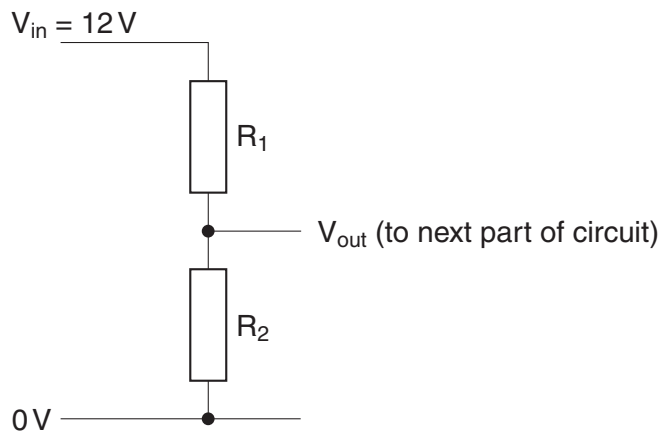
Draw a line from each **item** to its correct **description**.

item	description
LDR	when it becomes hotter resistance always increases
thermistor	responds to a change in temperature
metal wire	responds to a change in light

[2]

[Total: 2]

13 Look at the arrangement of two fixed resistors in series.



(a) What is the name given to this arrangement?

..... [1]

(b) What does this arrangement supply to the next part of the circuit?

..... [1]

(c) The input voltage is fixed at 12V.

The output voltage needs to be variable.

Explain how you could do this.

.....

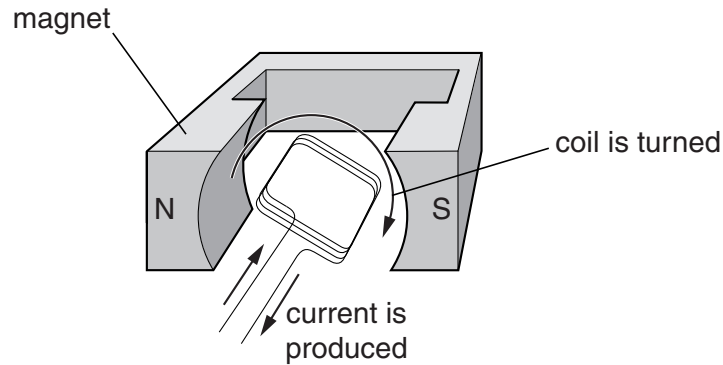
 [2]

[Total: 4]

14 Look at the diagram. It shows part of a DC (direct current) generator.

The coil is turned.

A current is produced.



(a) The DC generator can be made into a different electrical device by **supplying** the coils **with** a current.

Complete the sentences about **this** type of device.

When a DC generator is supplied with a current the coil turns.

It is now working as a

Some household appliances use this device.

One example is a [2]

(b) Power stations use a different type of generator.

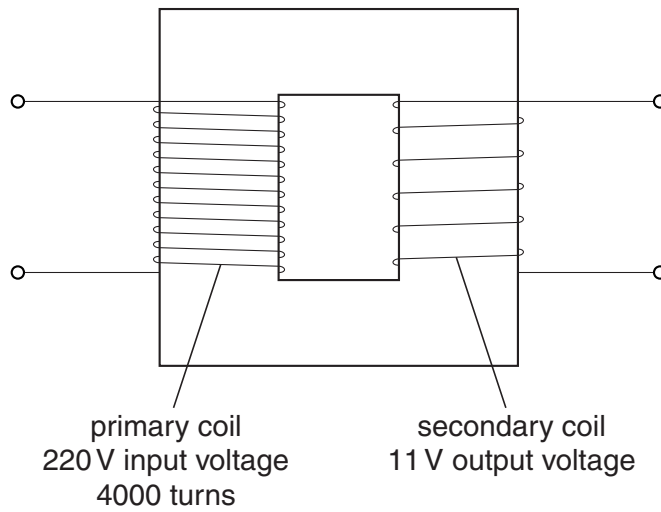
These generators produce AC (alternating current).

What is the **frequency** of the mains electricity supply in the UK?

..... hertz (Hz) [1]

[Total: 3]

15 Look at the diagram of a transformer.



(a) Calculate the number of turns in the secondary coil.

The equations on page 2 may help you.

.....

.....

.....

answer turns [2]

(b) The transformer in the diagram is a **step down** transformer.

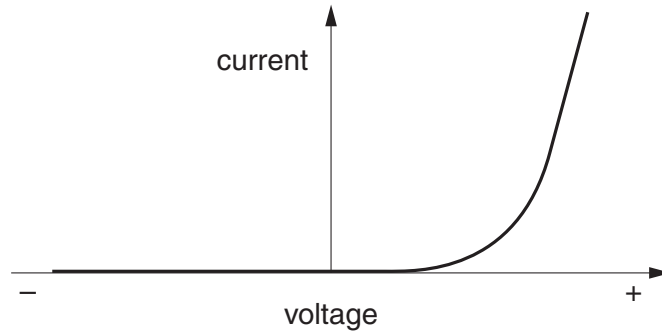
What is different in the construction of a **step up** transformer?

.....

..... [1]

[Total: 3]

- 16 Declan does an experiment with an electrical component.
 He measures the current and voltage for the component.
 He then draws a current-voltage graph.

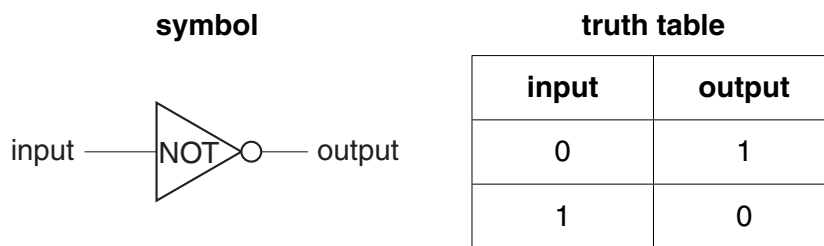


- (a) Look at the graph.

Complete the sentence.

The graph shows the current-voltage characteristics for a silicon [1]

- (b) A NOT gate is another type of electrical component.



Complete the sentences about the NOT gate.

The input signal to the NOT gate is either a high or a low

The output in the truth table is either **0** or **1**.

The values '0' and '1' represent the output [2]

- (c) A **latch** in a car alarm contains two logic gates.

What does the latch do once the alarm sounds?

..... [1]

[Total: 4]

END OF QUESTION PAPER

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