

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
PHYSICS B
Unit 1 Modules P1 P2 P3
FOUNDATION TIER
MONDAY 18 JUNE 2007

F B651/01

Morning
Time: 1 hour

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



* C O P / T 3 0 6 4 1 *

Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

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.

2

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

$$\text{speed} = \frac{\text{distance}}{\text{time taken}}$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

$$\text{force} = \text{mass} \times \text{acceleration}$$

$$\text{work done} = \text{force} \times \text{distance}$$

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

Answer **all** the questions.

Section A – Module P1

1 This question is about insulating a house.

(a) Anya reduces the energy loss from her house.

She uses different methods to do this.

Draw a straight line from each method to the place where it is used.

method	place where it is used
double glazing	around doors and windows
draught proofing	behind radiators
fibreglass insulation	windows
silver foil	loft

[3]

(b) Anya pays £300 to insulate her loft.

Her energy bills are £100 less each year because of the loft insulation.

Calculate the payback time.

.....

.....

.....

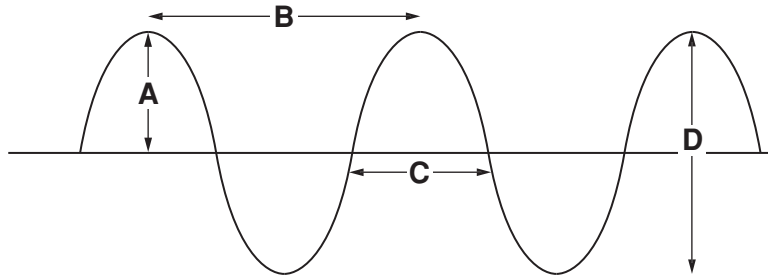
.....

..... [2]

[Total: 5]

2 This question is about waves.

(a) Look at the diagram of a wave.



(i) Which letter shows the amplitude?

Choose from: **A B C D**

..... [1]

(ii) Which letter shows the wavelength?

Choose from: **A B C D**

..... [1]

(b) The sound from Ewan's CD travels at 330 m/s in air.

The frequency of a sound is 256 Hz.

The frequency of the sound increases to 412 Hz.

What happens to the **wavelength**?

Choose from:

decreases

increases

stays the same

..... [1]

(c) Look at the list of waves from the **electromagnetic** spectrum.

- infrared**
- microwave**
- radio**
- ultraviolet**
- visible light**

(i) Which wave is used for mobile phone calls?

Choose from the list.

..... [1]

(ii) Which wave is used by burglar alarm sensors?

Choose from the list.

..... [1]

(d) Children often use mobile phones to **talk** to their friends.

Some people are concerned about children using mobile phones.

Suggest reasons why.

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

[Total: 7]

3 This question is about the energy absorbed by different materials.

(a) Ben investigates how metals heat up.

He notices that different materials heat up and cool down at different rates.

He measures the energy needed to increase the temperature of a block of steel by 1 °C.

(i) What does he use to measure the temperature?

..... [1]

(ii) Suggest **another** piece of equipment that he needs for the investigation.

..... [1]

(b) He finds that 500 units of energy are needed to increase the temperature of the block of steel by 1 °C.

Write down the **name** of the unit of energy.

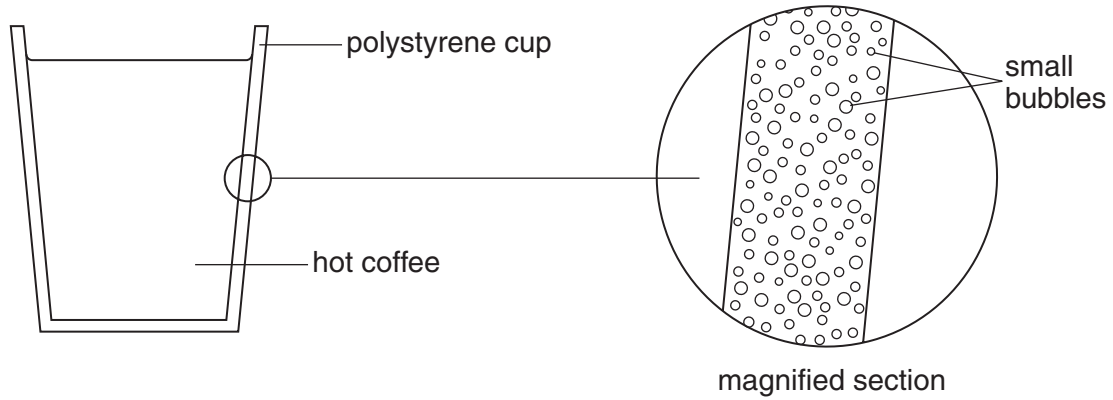
..... [1]

[Total: 3]

4 This question is about energy transfer.

Look at the diagram of a coffee cup.

It shows a section of the cup wall.



The cup wall helps to keep the coffee hot.

Explain how.

.....

.....

.....

..... [3]

[Total: 3]

5 Diana uses a CD player to listen to her favourite music.

The CD player contains a laser.

Use words from the list to complete the sentences below.

- alpha analogue digital electrical intense wide**

Electronic signals can be either analogue or

A laser produces an beam of light, which is reflected from the surface of the CD.

[2]

[Total: 2]

Section B – Module P2

6 Power stations produce electricity.

(a) A nuclear power station gets its energy from nuclear reactions.

Other power stations can get their energy from burning fuels.

Complete the sentences.

(i) A **fossil** fuel power station can get its energy from burning

Choose from:

- coal manure straw wood** [1]

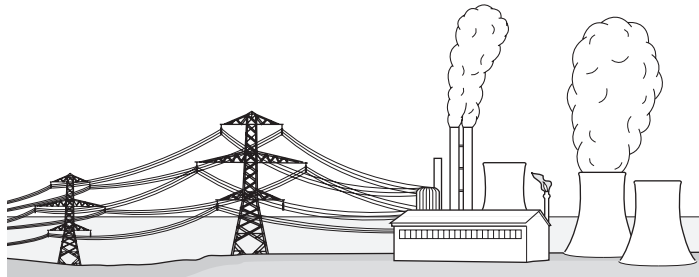
(ii) A **renewable** power station can get its energy from burning

Choose from:

- coal gas oil straw** [1]

(b) Not all the energy in the fuel is transferred into electrical energy.

Look at the picture.



Some of this energy is wasted.

Suggest how this energy is wasted in the power station.

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

(c) A generator is part of the power station.

The generator produces electricity.

A battery produces DC electricity.

What type of electricity does the generator produce?

..... [1]

(d) This electricity is sent through a transformer and onto the National Grid.

(i) What is the job of the **transformer**?

..... [1]

(ii) What does the **National Grid** do?

..... [1]

[Total: 6]

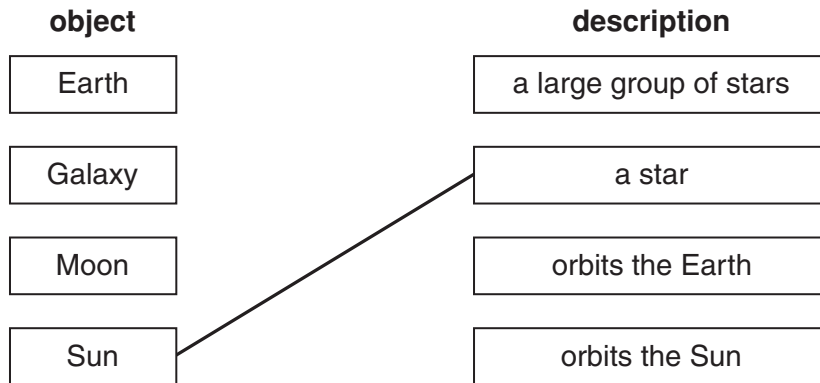
7 This question is about Earth and space.

(a) The Universe is made up of many objects.

The Sun is a star.

Draw a straight line to match each object to its description.

One has been done for you.



[2]

(b) Most stars are far away from Earth.

We can see stars even when they are far away.

Give **two** reasons why.

reason one

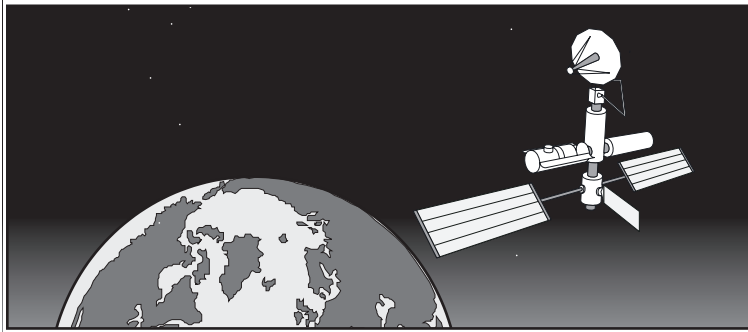
.....

reason two

..... [2]

[Total: 4]

8 (a) Artificial satellites are used for sending mobile phone signals.



not to scale

Name **two other different** uses of artificial satellites.

first use

second use [2]

(b) Solar flares from the Sun can interfere with satellite signals.

(i) What is a solar flare?

..... [1]

(ii) How does this interfere with satellite signals?

..... [1]

[Total: 4]

12
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PLEASE DO NOT WRITE ON THIS PAGE

9 (a) Asteroids orbit the Sun. They are made of hard rock.

In the past, asteroids have hit the Earth.

One asteroid may have led to the extinction of dinosaurs.

Suggest how this asteroid may have affected the Earth.

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

(b) Comets orbit the Sun.

The tail of a comet is a trail of debris.

Look at the picture.



© iStockphoto.com / Michael Puerzer

(i) What are comets made of?

..... [1]

(ii) What **shape** is a comet's orbit?

..... [1]

(iii) What happens to the **speed** of comets in orbit?

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

[Total: 6]

Section C – Module P3

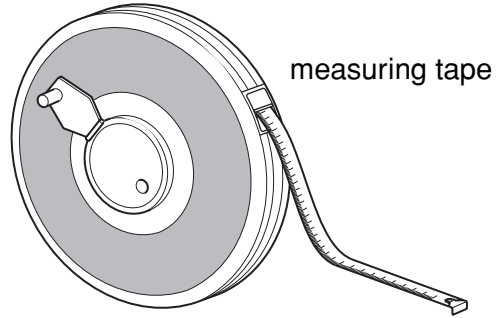
10 This question is about speed.

(a) Oliver wants to measure the speed of his friends in a race.

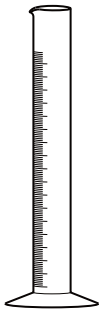
Look at the pictures.



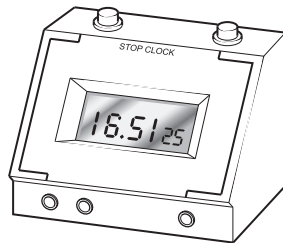
metre rule



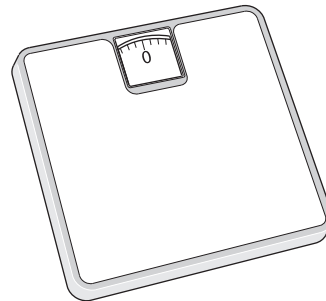
measuring tape



measuring cylinder



stop clock



bathroom scales

Which **two** pieces of equipment will he need?

Choose from:

metre rule

measuring tape

measuring cylinder

stop clock

bathroom scales

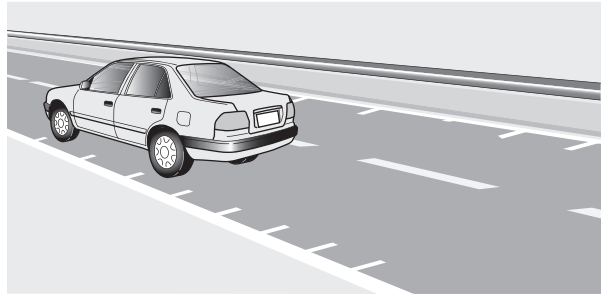
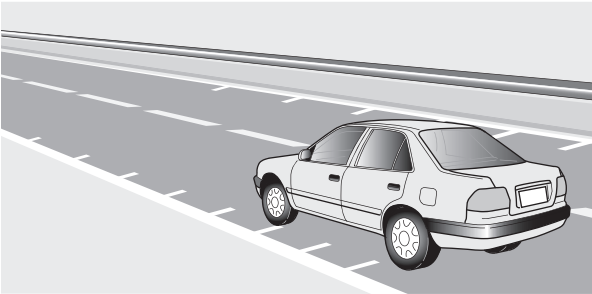
..... and [2]

(b) There is a speed camera outside Oliver's school.

There are lines marked on the road.

A car goes past very quickly.

The camera flashes twice as the car crosses the lines.



Explain how the pictures can be used to check speeds.

.....

.....

.....

.....

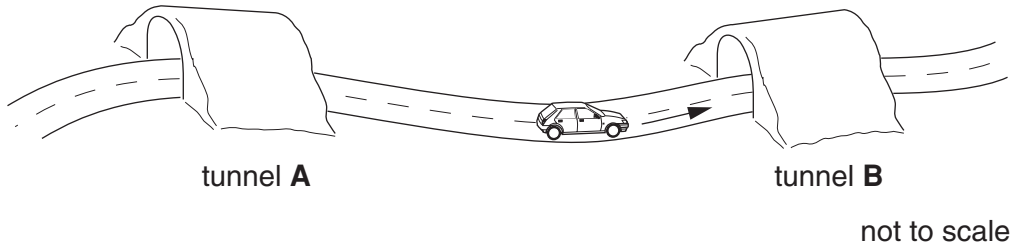
..... [3]

[Total: 5]

11 Cars travel along a road.

The road passes through two tunnels.

Look at the diagram.



The tunnels are both the **same length**.

The table shows the time taken for different cars to travel through the tunnels.

car	time to go through tunnel A in seconds	time to go through tunnel B in seconds
Fiat	5.0	5.0
Ford	7.2	7.9
Rover	4.8	4.6
Skoda	6.0	6.1

(a) (i) Which car is travelling at a **steady** speed?

Choose from:

- Fiat Ford Rover Skoda

..... [1]

(ii) Which car is **speeding up**?

Choose from:

- Fiat Ford Rover Skoda

..... [1]

(b) The stopping distance of a car is made up of two distances.

These are the **thinking** distance and the **braking** distance.

(i) What does **braking** distance mean?

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

(ii) Write down one factor that can **increase** the braking distance.

..... [1]

(iii) The car travels at 15 m/s.

The thinking distance is 10 m and the braking distance is 15 m at this speed.

Calculate the stopping distance.

..... m [1]

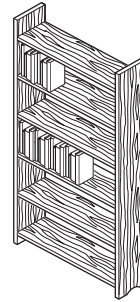
[Total: 6]

12 This question is about types of energy.

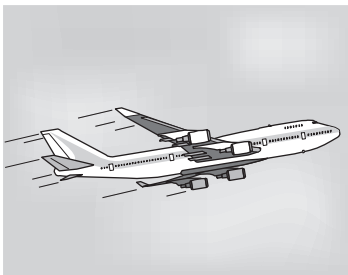
Look at the pictures.



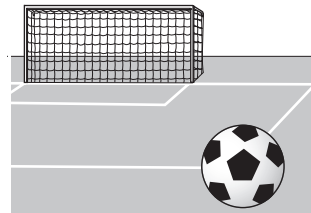
car travelling along flat road



books on shelf



aeroplane in flight



stationary ball on pitch

Some of the objects in the pictures have **kinetic energy**, some have **gravitational potential energy** and some have **both**.

(a) Which object has both gravitational potential energy and kinetic energy?

Choose from the pictures.

..... [1]

(b) Which object has **only** gravitational potential energy?

Choose from the pictures.

..... [1]

[Total: 2]

13 (a) New cars have a lot of active safety features.

One active safety feature is the seat belt.

Seat belts can reduce injuries in a crash.

Explain how.

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

(b) After a crash seat belts have to be replaced.

Explain why.

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

(c) Write down **another active** safety feature of cars.

..... [1]

[Total: 4]

14 Emma goes shopping.



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She pushes her shopping trolley to the car.

She uses a steady force of 85 newtons to move the trolley.

The trolley moves 50 m.

Calculate the work done in pushing the trolley 50 m.

.....

.....

.....

.....

.....

.....J [3]

[Total: 3]

END OF QUESTION PAPER

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