

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
PHYSICS B

Unit 1 Modules P1 P2 P3 (Foundation Tier)

MONDAY 21 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)



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.
- The total number of marks for this paper is 60.
- 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 **20** printed pages.

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 Mike keeps his house warm in winter.

His fuel bills are high.

He wants to save energy and reduce his fuel bills.

(a) Draw lines to show **where** he puts each type of **insulation**.

One has been done for you.

insulation		where
double glazing		wall
loft insulation		roof
carpet		window
cavity-wall insulation		door
draught proofing	—————	floor

[3]

(b) Mike has cavity-wall insulation fitted to his house.

(i) It costs **£800** to fit.

It saves him **£200** each year in fuel bills.

Calculate the **payback time** for cavity-wall insulation.

.....
answer..... years [1]

(ii) Cavity-wall insulation contains trapped **air**.

Why is this air important?

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

[Total: 5]

2 This question is about waves.

(a) Look at the diagram of the electromagnetic spectrum.

radio waves	microwaves	infrared waves	visible light	ultraviolet light	X-rays	gamma rays
-------------	------------	----------------	---------------	-------------------	--------	------------

(i) Which type of wave is used to **cook** food?

..... [1]

(ii) Which type of wave is used by a TV **remote** control?

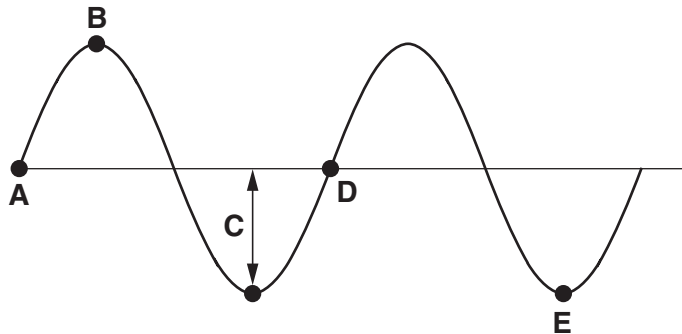
..... [1]

(iii) **Ultraviolet** waves can harm humans.

What **damage** can ultraviolet waves do to humans?

..... [1]

(b) Look at the diagram of a wave.



Complete the sentences.

The **crest** is shown by letter

The **amplitude** is shown by letter

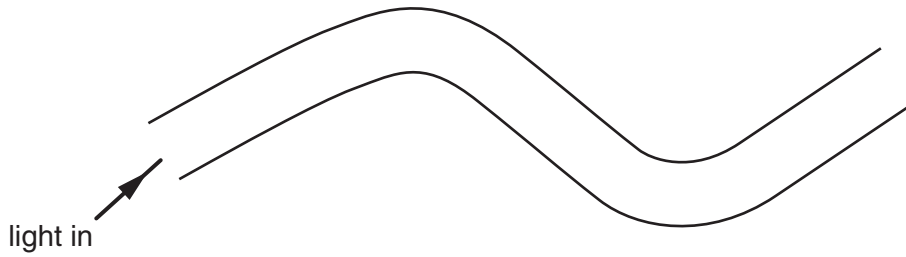
The distance between letters **A** and **D** is called the

[3]

[Total: 6]

3 This question is about communications.

(a) (i) Look at the diagram of an optical fibre.



A ray of light travels in the fibre.

It comes out at the other end.

Describe how the light travels through the fibre.

You may draw on the diagram to help your answer.

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

(ii) Optical fibres are used to transmit information.

The information can be carried by **analogue** or **digital** signals.

Write down two **differences** between analogue and digital signals.

1
.....
2
..... [2]

(b) Look at the two types of telephone.



mobile phone



office phone

The mobile phone uses wireless technology.

Write about the **advantages** of using wireless technology to communicate.

.....

.....

..... [2]

[Total: 6]

4 Amrit puts three cups on the table.

They contain different materials at different temperatures.



ice at -15°C



hot tea at 90°C



warm milk at 25°C

The room temperature is 20°C .

(a) (i) Which one gets **warmer**?

Choose from the list.

ice

hot tea

warm milk

answer..... [1]

(ii) Which one cools **quickest**?

Choose from the list.

ice

hot tea

warm milk

answer..... [1]

(b) The ice melts at 0°C . It stays at 0°C for a long time.

Suggest why.

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

[Total: 3]

Section B – Module P2

5 (a) The Sun produces a lot of energy.

It transfers energy to Earth as light and heat.

Photocells absorb light energy.

(i) Complete the sentence that explains the job of a photocell.

Photocells absorb light energy from the sun and transfer it into
energy. [1]

(ii) Write down **one** other way in which the Sun's energy can be harnessed.

..... [1]

(b) (i) Describe **one** advantage of using photocells.

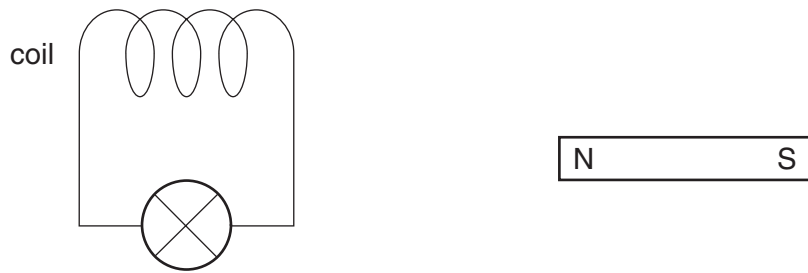
advantage
..... [1]

(ii) Describe **one** disadvantage of using photocells.

disadvantage
..... [1]

[Total: 4]

6 Look at the equipment in the diagram.



(a) Describe how to make electricity using the equipment in the diagram.

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

(b) The amount of electricity made is very small.

Describe **two** ways in which the current produced could be made larger.

1
.....
2
..... [2]

(c) A generator produces alternating current (ac).

What type of current does a battery produce?

..... [1]

[Total: 5]

7 (a) Power stations can use fossil fuels or renewable fuels.

Look at the list of fuels.

- coal natural gas oil wood

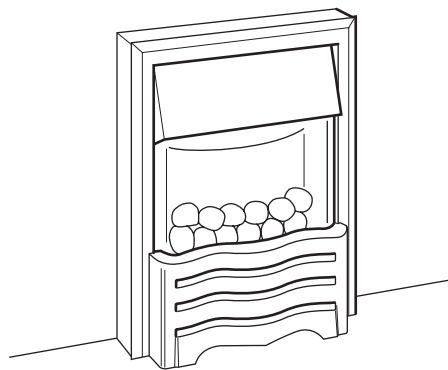
Write down a **renewable** energy source.

Choose **one** from the list.

answer [1]

(b) Una has an electric fire.

Look at the diagram.



She connects it to the 230V mains and switches it on.

There is a current of 8 amps.

Calculate the **power rating** of the electric fire.

The list of equations on page 2 may help you.

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

answer..... W [2]

(c) Look at the table.

It gives information about domestic appliances.

appliance	power in watts
lamp	100
microwave	850
oven	6000
television	450

Each appliance is used for 30 minutes.

Which appliance is the most expensive to use?

..... [1]

[Total: 4]

8 This question is about nuclear radiation.

Nuclear radiation can be harmful or useful.

(a) Write down **one** use of nuclear radiation.

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

(b) Nuclear radiation can be harmful because it damages living cells.

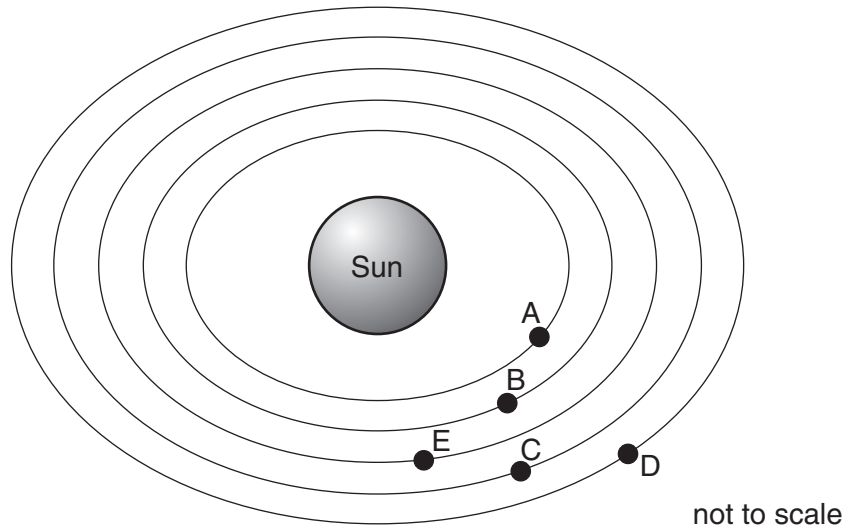
Describe how to handle radioactive materials safely so that the nuclear radiation from them does not damage living cells.

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

[Total: 3]

9 This question is about the Solar System.

Look at the diagram.



E is the Earth.

A, B, C, and D are objects that orbit (go round) the Sun.

(a) What do we call these objects?

Choose from this list.

comets

galaxies

meteors

planets

stars

answer [1]

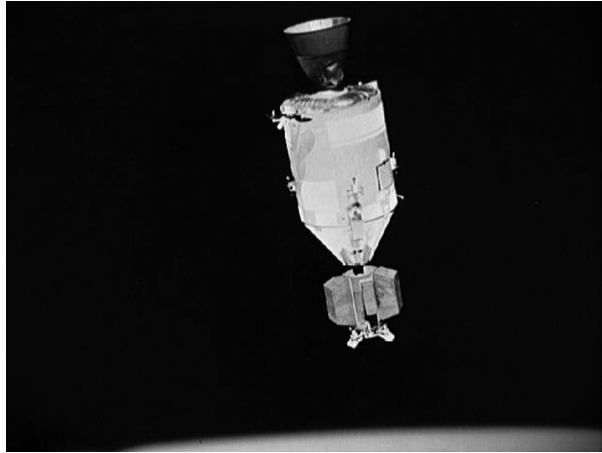
(b) We can see stars at night, even though they are a long way off.

Suggest why.

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

(c) It takes a long time to get to other parts of our Solar System.

Look at the picture of a manned spacecraft.



© NASA Johnson Space Center, <http://images.jsc.nasa.gov/>
Apollo spacecraft in orbit

Manned spacecraft missions need to make sure that the crew stay alive until they return to Earth.

What do the people in this spacecraft need if they are to stay alive during this long journey?

.....

.....

.....

..... [2]

[Total: 4]

Section C – Module P3

10 Adam investigates the speed of cars outside his school.

(a) He takes some measurements to calculate the speed.

(i) What measurements must he take?

What equipment does he use?

Complete the table.

measurement	equipment	unit
distance	m
.....	stopwatch	s

[2]

(ii) What are the correct units for **speed**?

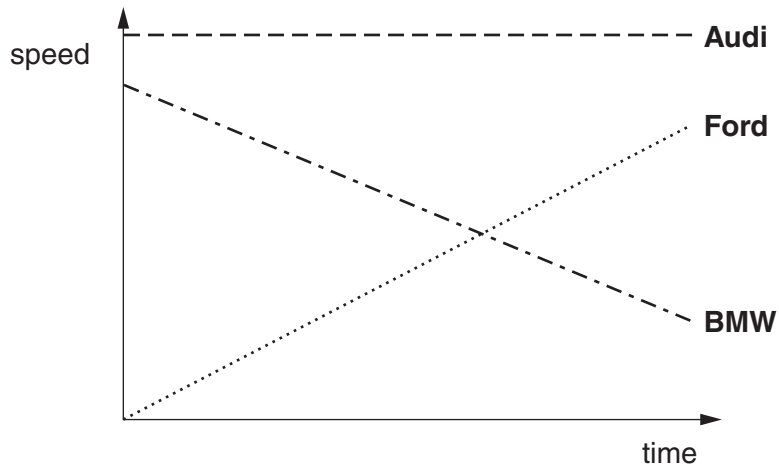
Choose from:

m **m/s** **N** **s**

answer.....

[1]

(b) Look at the speed-time graphs of three cars.



(i) Which car has a **steady** speed?

Choose from the list.

Audi **BMW** **Ford**

answer..... [1]

(ii) Which car gets **slower**?

Choose from the list.

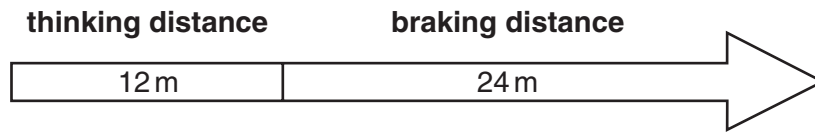
Audi **BMW** **Ford**

answer..... [1]

[Total: 5]

11 This question is about stopping distances.

(a) Look at the diagram about the stopping distance for a car.



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

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

(ii) Calculate the **stopping distance** for the car.

.....
answer..... m [1]

(b) Higher speed increases the braking distance.

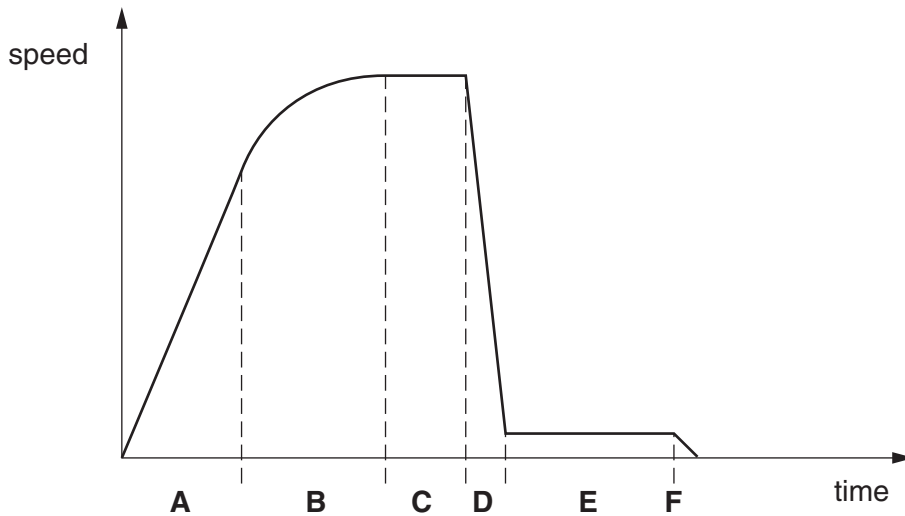
Name two **other** factors that will increase the braking distance.

- 1
- 2 [2]

[Total: 5]

12 Amy investigates parachutes at school.

Look at the graph for a falling parachute.



(a) Look at **part A** of the graph.

At the start the parachute has gravitational **potential energy**.

The parachute falls.

What **other** sort of energy does it have as it falls?

..... [1]

(b) There are two forces acting on the parachute – **weight** and **drag**.

In **part C** the speed is **steady**.

Explain why. Use ideas about weight and drag in your answer.

.....
 [1]

(c) Which part of the graph shows the parachute **opening**?

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

answer [1]

(d) Which **two** parts of the graph show steady **terminal speeds**?

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

answer and [2]

[Total: 5]

13 Cars use fuel.

(a) Which are the two **main** fuels used in cars?

Choose from the list.

- coal
- diesel
- hydrogen
- petrol
- water

answer and [1]

(b) Look at the data on cars.

	Georgio's car	Glenn's car	Sue's car
fuel consumption in kilometres per litre	10	6	12
maximum driving force in newtons	5000	3000	1500

(i) Which car has the **best** fuel consumption?

Choose from:

- Georgio's
- Glenn's
- Sue's

answer [1]

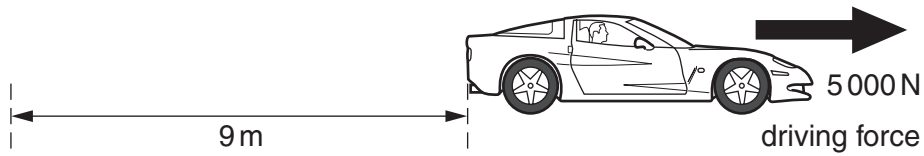
(ii) Georgio's car uses 8 litres of fuel.

Suggest how far it travels on 8 litres of fuel.

.....

answer km [1]

(c) Look at the diagram of Georgio's car.



The driving force is 5 000 N. It moves the car 9 m.

Calculate the **work done** on the car.

The list of equations on page 2 may help you.

.....
.....

answer J [2]

[Total: 5]

END OF QUESTION PAPER

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