

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
GATEWAY SCIENCE  
PHYSICS B**

**B651/01**

Unit 1 Modules P1 P2 P3 (Foundation Tier)

**WEDNESDAY 11 JUNE 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.
- 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	
<b>TOTAL</b>	<b>60</b>	

This document consists of **18** printed pages and **2** blank pages.

## 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 Look at the list of foods. They are at different temperatures.

foods	temperature in °C
chips	120
ice cream	-5
milk	3
orange juice	22
coffee	90

Cameron puts the foods on the table. The room temperature is 22°C.

(a) (i) Which two will **cool** down?

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

(ii) Which two will **warm** up?

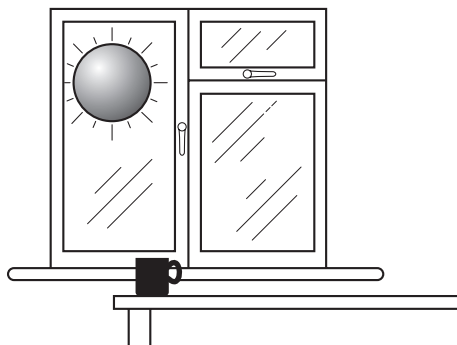
..... and ..... [1]

(iii) Which one will stay the **same** temperature?

..... [1]

(b) Cameron puts his orange juice in a **black** cup.

He puts the black cup by a **sunny** window.



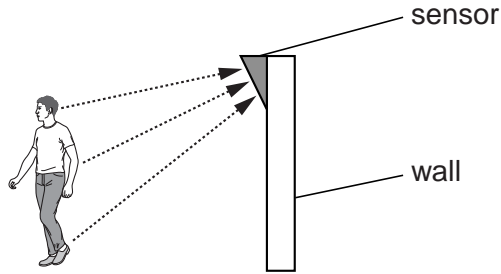
The black cup heats up more quickly than a white cup. Suggest why.

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

2 This question is about using waves.

(a) Infrared sensors detect body heat.

Look at the diagram.



(i) Infrared sensors like this are used in the home.

Suggest what they are used for.

..... [1]

(ii) Name **one other** use of infrared waves.

..... [1]

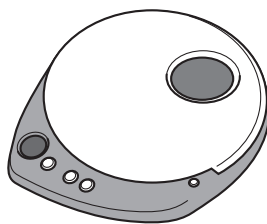
(b) Complete the sentences. Choose words from the list.

- absorption**                      **digital**                      **reflection**                      **refraction**

Data is transmitted using analogue and ..... signals.

These signals can be sent along optical fibres by ..... [2]

(c) A CD player uses a laser beam.



What is special about the light in a laser beam?

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

[Total: 6]

3 Earthquakes produce shock waves.

Scientists measure these shock waves.

(a) What equipment do they use to detect shock waves?

Choose from the list.

**ammeter**

**joulemeter**

**seismometer**

answer ..... [1]

(b) Scientists study two types of shock wave:

- p-waves
- s-waves

The p-waves and s-waves behave differently when they reach rock.

There are two states of rock:

- solid rock
- liquid rock

(i) Which state(s) of rock will p-waves go through?

Choose from the list.

**solid only**

**liquid only**

**solid and liquid**

answer ..... [1]

(ii) Which state(s) of rock will s-waves go through?

Choose from the list.

**solid only**

**liquid only**

**solid and liquid**

answer ..... [1]

(iii) Which of these statements is correct?

- A** p-waves travel faster
- B** p-waves and s-waves travel at the same speed
- C** s-waves travel faster

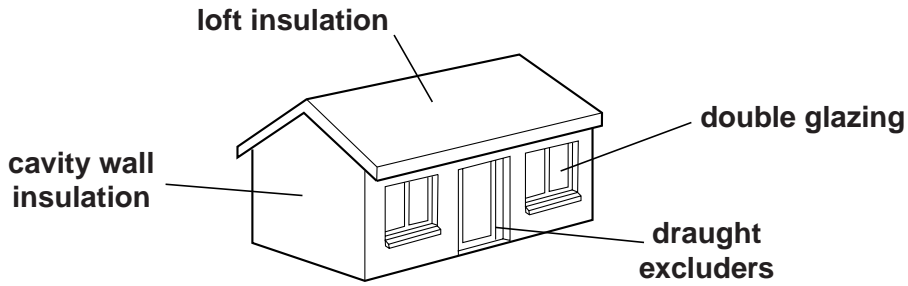
Choose from **A**, **B** or **C**.

answer ..... [1]

[Total: 4]

4 Sam wants to reduce her fuel bills.

She needs more insulation in her home.



(a) Look at the information in the table.

insulation method	cost to fit in £	money saved each year in fuel bills in £	payback time in years
cavity wall insulation	1000	250	4
double glazing	3000	200	
draught excluders		100	0.5
loft insulation	200		2

Some information is missing from the table.

(i) What is the payback time for her **double glazing**?

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

(ii) What is the cost to fit **draught excluders**?

.....  
 answer £..... [1]

(iii) What is the money saved each year by fitting **loft insulation**?

.....  
 answer £..... [1]

(b) The loft insulation contains air.

Why is air important in loft insulation?

..... [1]

(c) Sam puts shiny aluminium foil on the wall behind the radiators.

The shiny foil helps to reduce fuel bills.

Explain how the shiny foil reduces fuel bills.

.....

.....

..... [2]

[Total: 6]

Section B – Module P2

5 This question is about the Sun's energy.

(a) The Sun's energy can be transferred into electricity using photocells.

Look at the picture of a photocell.



© iStockphoto.com / Philip Lange

(i) Write down **one advantage** of using a photocell to provide electricity.

advantage ..... [1]

(ii) Write down **one disadvantage** of using a photocell to provide electricity.

disadvantage ..... [1]

(b) Describe **one other** way in which the Sun's energy can be harnessed (used).

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

(c) Batteries produce direct current (DC).

What type of current do photocells produce?

..... [1]

[Total: 4]

6 Electricity is generated in a power station.

The power station is connected to factories.

They are connected by over-ground power lines (cables), attached to pylons.

(a) (i) What name do we give to the system of power lines?

..... [1]

(ii) The power lines are connected to transformers.

What is the job of a transformer?

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



(b) Power stations use fuel to generate electricity.

Name **one** fuel used in power stations.

..... [1]

(c) Alan uses an electric iron.

Look at the picture.



© OCR

The iron is connected to the 230V mains.

Alan switches the iron on. A current of 3.5A flows through the circuit.

Calculate the **power rating** of the iron.

The equations on page 2 may help you.

.....  
.....

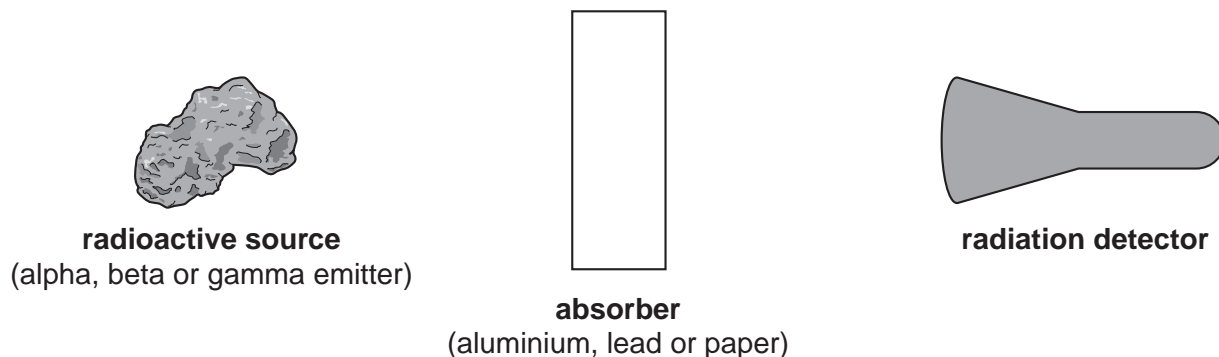
answer.....W [2]

[Total: 5]

7 This question is about radioactivity.

(a) Claire investigates the penetrating power of different radiations.

Look at the diagram of her apparatus.



The boxes show the different radiations and their penetrating power.

Draw straight lines to show which **penetrating power** belongs to which **radiation**.

radiation	penetrating power
alpha	stopped by several centimetres of lead
beta	stopped by a few millimetres of aluminium
gamma	stopped by one millimetre of paper

[2]

(b) Nuclear radiation can be beneficial (useful) or harmful.

(i) Write down **one benefit** of nuclear radiation.

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

(ii) Write down **one danger** of nuclear radiation.

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

[Total: 4]

8 (a) Manned spacecraft are sent into space.

They carry all the things needed to keep the astronauts alive.

Write about the things that are needed to keep the astronauts alive.

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

(b) There are many **artificial** satellites in orbit around the earth.

Some of these are used to transmit television programmes.

Write down **one other** use of artificial satellites.

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

(c) The Moon is a **natural** satellite of the Earth.

Suggest how scientists think that the Moon might have been made.

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

(d) In the past, asteroids have collided with the Earth.

(i) Comets are made from ice and dust.

What are asteroids made from?

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

(ii) Describe some of the effects of a large asteroid hitting the Earth.

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

[Total: 7]

**12**  
**BLANK PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

Section C – Module P3

9 This question is about motion and speed.

Brian runs a hundred metre race.

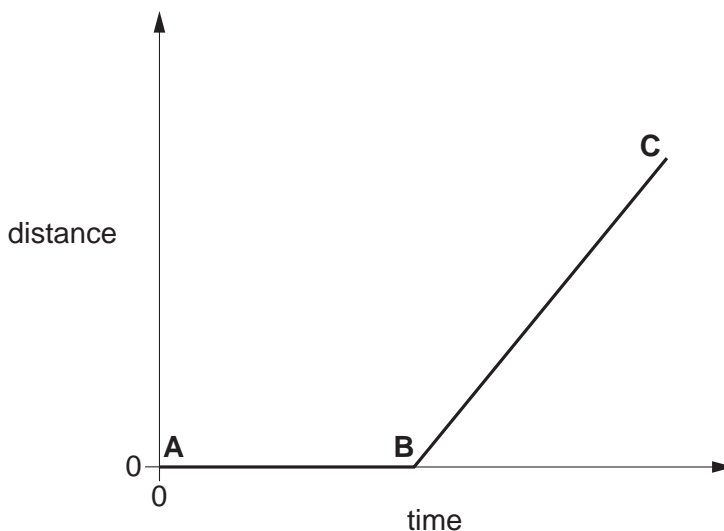
The distance he travels is measured **before the start** of the race **and** during the first part of the race.

(a) What equipment must be used to measure the **distance**?

..... [1]

(b) Brian draws a graph of his results. It is a **distance-time** graph.

Look at the graph.



(i) Which **part** of the graph shows Brian **not** moving?

Choose from the list.

**between A and B**

**between A and C**

**between B and C**

answer ..... [1]

(ii) Which **part** of the graph shows Brian **running** at a steady speed?

Choose from the list.

**between A and B**

**between A and C**

**between B and C**

answer ..... [1]

(iii) Which **letter** shows when he started moving?

..... [1]

[Total: 4]

10 This question is about cars **accelerating**.

(a) What is meant by accelerating?

..... [1]

(b) Pat measures the speed of two cars. Both cars had started **from rest** (speed = zero).

The speeds were measured at the same time.

Look at the diagram.

car A



speed of **car A** = 10 m/s

car B



speed of **car B** = 15 m/s

Pat measured the speed of **both** cars after 3 seconds.

Calculate the acceleration of **car A**.

The equations on page 2 may help you.

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

answer .....m/s<sup>2</sup> [2]

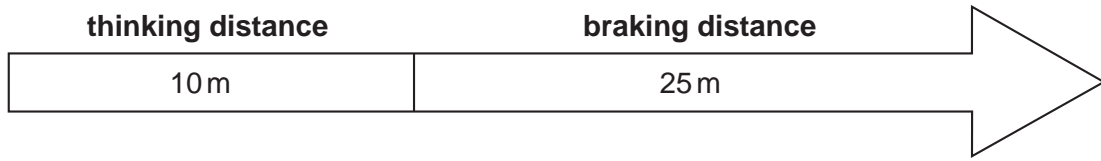
(c) Pat thinks that **car B** has a greater acceleration in the 3 seconds.

Why?

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

(d) The driver of **car B** presses the brakes. The car stops.

Look at this information about the car stopping.



(i) What is meant by **stopping distance**?

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

(ii) Write down **one** factor that could **increase**

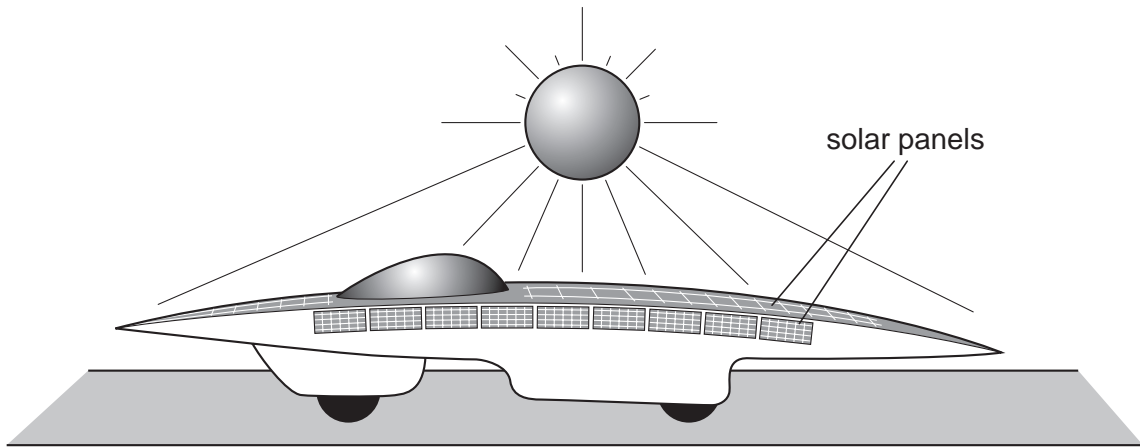
**thinking** distance .....

**braking** distance ..... [2]

[Total: 7]

11 This question is about energy. Energy can be converted from one form to another.

Look at the diagram. It shows a car powered by energy from the Sun.



Complete the crossword puzzle using the clues given. One has been done for you.

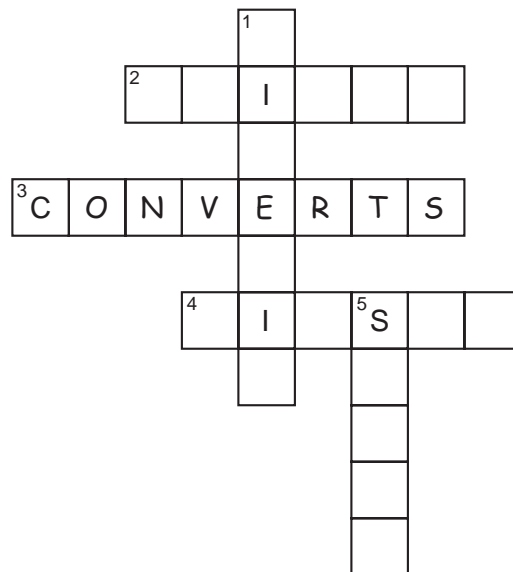
**clues down**

- 1 Moving objects have this form of energy.
- 5 The car in the diagram is powered by this energy resource from the Sun.

**clues across**

- 2 If this is increased, the object gains potential energy.
- 3 A car engine ----- the energy in the fuel.
- 4 Petrol and ----- are fuels used in cars.

clues across →



↓ clues down

[4]

[Total: 4]



12 This question is about **work done**.

Manisha walks up the stairs in her house.

Work is being done.



(a) Work done depends on the **size** of the **force**.

What **other** thing does work done depend on?

..... [1]

(b) Give **one other** example where work is being done.

..... [1]

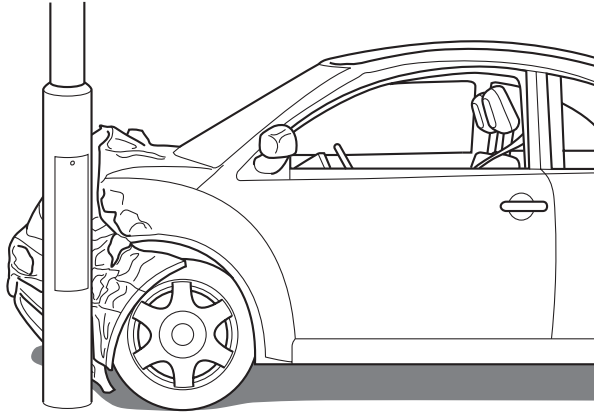
(c) Complete the sentence. Force is measured in units called **Newtons** (N).

Work and energy are both measured in units called .....

[Total: 3]

13 Cars have many safety features.

Look at the diagram of a car that has been in a crash.



(a) Some parts of the **car body** are designed to change shape in a crash.

It is a safety feature of the car. What is this safety feature called?

Choose from the list.

**safety cage**

**ABS brakes**

**crumple zones**

**electric windows**

answer ..... [1]

(b) These parts of a car reduce the risk of injury in a crash.

How do these parts reduce injuries in a crash?

.....

..... [1]

[Total: 2]

**END OF QUESTION PAPER**

**19**  
**BLANK PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

**PLEASE DO NOT WRITE ON THIS PAGE**

---

*Copyright Acknowledgements:*

Q.5a photo                      © iStockphoto.com / Philip Lange

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (OCR) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

OCR is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.