

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

**B651/01**

Unit 1 Modules P1 P2 P3 (Foundation Tier)

Candidates answer on the Question Paper  
A calculator may be used for this paper

**Wednesday 20 January 2010  
Morning**

**OCR Supplied Materials:**  
None

**Duration:** 1 hour

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)



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, however additional paper may be used if necessary.

**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 **20** pages. Any blank pages are indicated.

**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 Newspapers often have headlines about the **effects** of global warming.

**Arctic ice melting shows global warming serious**

**Global warming? It's the coolest winter in decades**

**Global warming threatens world's trees**

(a) Write down two possible **causes** of global warming.

1 .....

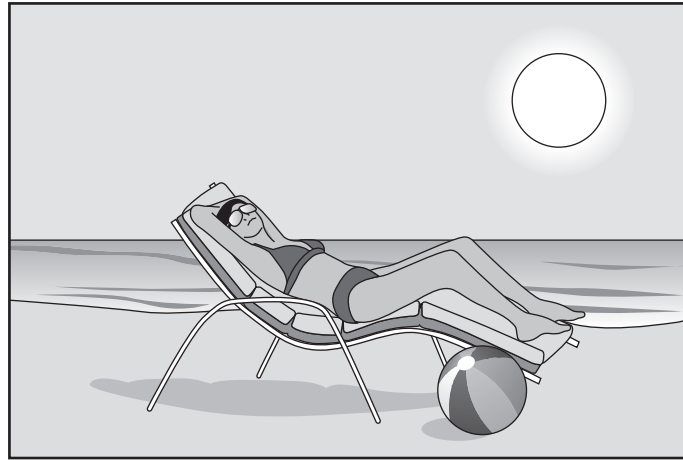
.....

2 .....

..... [2]

(b) Donna thinks global warming is a good thing.

She thinks it means she will get a suntan quicker.



(i) The Sun gives out different types of radiation.

Which type of radiation from the Sun causes the skin to tan?

..... [1]

(ii) Tracey tells Donna that she must be careful when she sunbathes.

What can happen to Donna if she spends too much time in the Sun?

..... [1]

(iii) Donna takes Tracey's advice and spends less time in the Sun.

What else can Donna do to protect herself when sunbathing?

..... [1]

[Total: 5]

2 Tom's house has cavity walls.

Foam is injected into the gap between the inner and outer brick walls.



The foam contains a lot of trapped air.

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

- conduction      conservation      deflector
- insulator      defraction      reflector

Trapped air is a good .....

This means it reduces energy loss by ..... [2]

(b) Suggest two **other** things Tom can do to reduce energy loss from the house.

1 .....

2 ..... [2]

(c) It costs £500 to have the foam injected into Tom's house.

This saves Tom's family £125 per year on their energy bills.

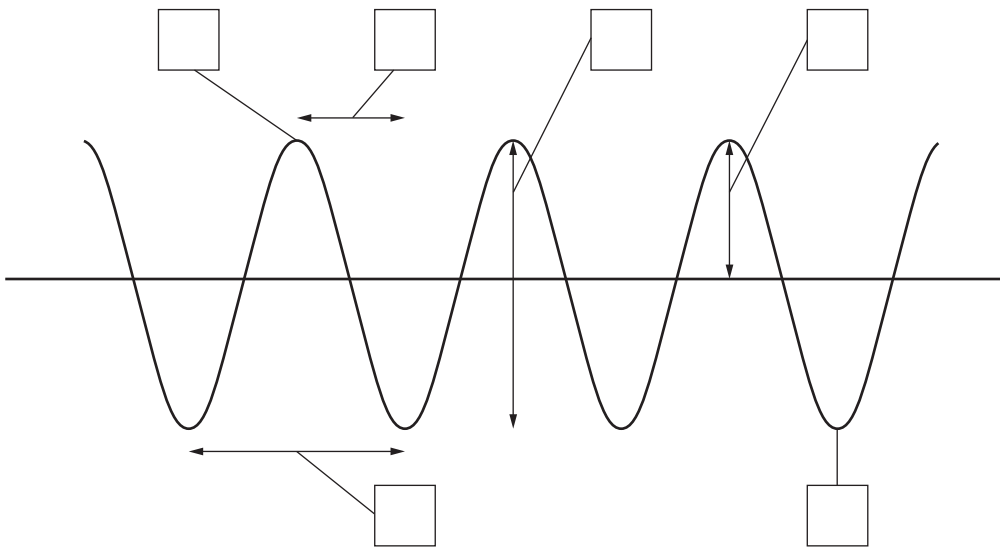
The **payback time** is four years.

What is meant by payback time?

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

[Total: 5]

3 The diagram shows a transverse wave.



(a) Write each letter in the **correct** box.

- (i) Label the amplitude **A**.
- (ii) Label a crest **C**.
- (iii) Label a trough **T**.
- (iv) Label the wavelength **W**.

[4]

(b) The wavelength of a transverse water wave is 0.15 m.

The frequency of the wave is 5 Hz.

Calculate the speed of the wave.

The equations on page 2 may help you.

.....

.....

.....

answer ..... m/s

[2]

[Total: 6]

4 Wireless technology is used to transmit information.



Debbie is listening to her radio. The radio is an example of a device that uses wireless technology.

(a) Write down **one** advantage of using wireless technology.

..... [1]

(b) Debbie's radio receives **analogue** signals.

Other radios use **digital** signals.

Write about analogue **and** digital signals. Explain how they are different.

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

(c) Debbie is listening to her favourite programme on her radio.

She can hear the music from another radio station as well as her favourite programme.

The waves from the two radio stations cause interference.

Why does **interference** happen?

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

[Total: 4]

Section B – Module P2

5 This question is about generating electricity

(a) Wind is used to drive wind turbines.



What is the **source** of the wind's energy?

..... [1]

(b) In a science lesson Becky makes a model electrical generator.

The electrical output from the generator is very low.

Write down two ways in which she could **increase** the electrical output of her generator.

1 .....

.....

2 .....

..... [2]

[Total: 3]



6 (a) Photocells produce direct current (DC).

Write down one other device that **produces** DC.

..... [1]

(b) Power stations use fuel to produce electricity.

Only some of the energy in the fuel is transferred to electricity. The rest of the energy is wasted.

Describe what happens to the energy that is wasted.

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

[Total: 3]

7 Look at the information in the table.

appliance	power rating in watts	time used each day in hours
iron	1000	2.0
kettle	3000	0.5
lamp	60	7.0
toaster	500	0.1
vacuum cleaner	1500	1.0

(a) If the appliances were all switched on for the same time, which would cost the most to use?

..... [1]

(b) The toaster costs the least to use **each day**. Which appliance costs the **most** to use each day?

..... [1]

[Total: 2]

8 (a) Waste products from nuclear reactors give out nuclear radiation.

(i) Why is this nuclear radiation **dangerous**?

..... [1]

(ii) **Plutonium** is a waste product from a nuclear reactor.

One use for plutonium is as a fuel in some types of reactor.

Give one **other** use for plutonium.

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

(b) Engineers work at nuclear power stations.

They have to work with radioactive materials safely.

One thing they do is to wear protective clothing.

Write down two **other** safety precautions they should take.

1 .....

.....

2 .....

..... [2]

[Total: 4]

**11**  
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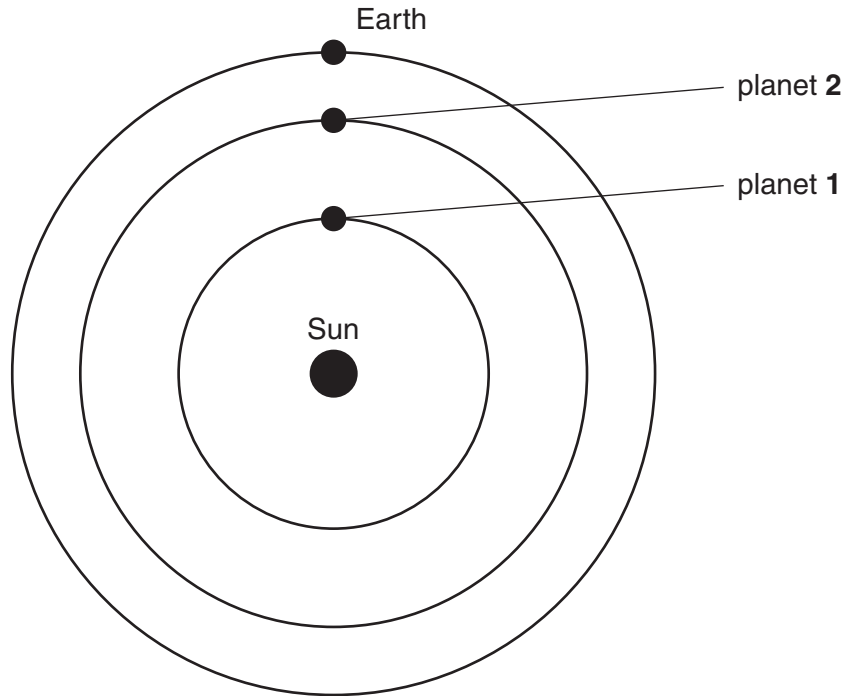
**Question 9 begins on page 12.**

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9 This question is about our Solar System

(a) Look at the diagram.

It shows some of the planets in our Solar System.



Write down the names of planets 1 and 2.

planet 1 .....

planet 2 .....

[1]

(b) Write down the name of the force that keeps the planets in orbit.

.....

[1]

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

**compass**

**copper**

**electrostatic**

**electric**

**iron**

**lead**

**magnetic**

**protractor**

**ruler**

The type of field surrounding the Earth is .....

The direction of the field is shown by a .....

The core of the Earth contains a lot of molten ..... [3]

[Total: 5]

10 This question is about objects in space.

(a) Large asteroids sometimes collide with the Earth.

These collisions can cause large craters to form on the Earth.

Write down two **other** effects of an asteroid colliding with the Earth.

1 .....

.....

2 .....

..... [2]

(b) Unmanned spacecraft do not need to carry oxygen or water.

Explain why.

.....

.....

..... [1]

[Total: 3]

Turn over

Section C – Module P3

11 Students in a science class are finding out who can run the fastest.

(a) (i) The students measure the **time** taken.

What equipment do they use to measure the time?

..... [1]

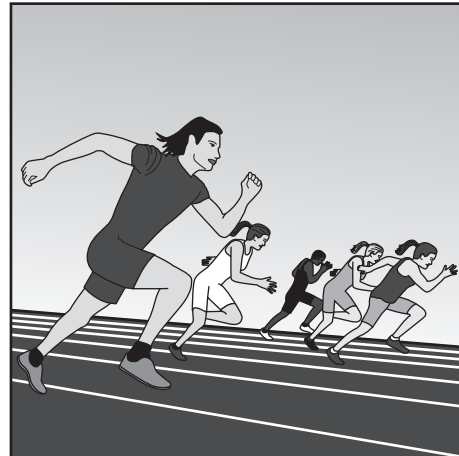
(ii) The students measure the **distance** each person runs.

What equipment do they use to measure the distance?

..... [1]

(b) The table shows how far each student runs in 60 seconds.

name	distance in metres
Alana	344
Brian	401
Cassie	394
David	455
Ellie	360



(i) Write down the name of the **fastest** runner.

..... [1]

(ii) What is **Ellie's** average speed?

The equations on page 2 may help you.

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

answer ..... m/s [2]

[Total: 5]

12 (a) Different quantities sometimes have the same unit.

Which two of these quantities have the same unit?

Put **rings** around the **two** correct answers.

**energy**

**force**

**mass**

**power**

**work**

[1]

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

**energy**

**force**

**mass**

**power**

**speed**

Work is done when an object is moved by a .....

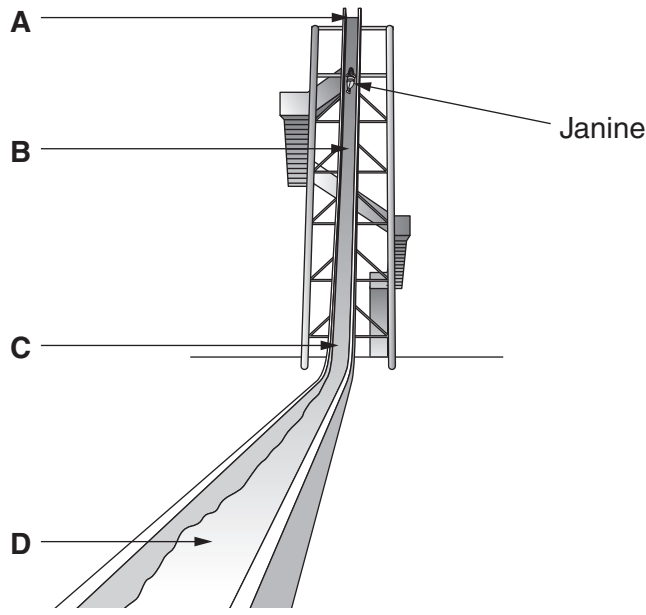
..... is needed when work is being done.

..... is a measure of how quickly work is done.

[3]

[Total: 4]

13 Janine is on a water slide.



(a) Janine slides down the water slide.

Where does Janine have the greatest **gravitational potential** energy?

Choose from **A B C D**

answer ..... [1]

(b) What happens to her gravitational potential energy as she moves from **A** to **C**?

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

(c) Janine tries a dry slide at the theme park.

It is exactly the same height and at the same angle as the water slide.

She travels much faster down the water slide. Explain why.

In your answer, write about

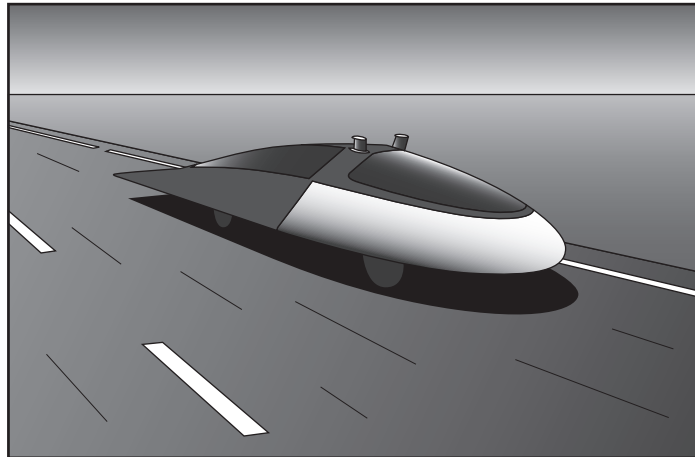
- the **forces** involved in both slides
- how the water on the slide **helps** her to go faster.

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

[Total: 5]



14 The car in this picture uses the Sun as its source of energy.



Most cars use a fuel made from a fossil fuel.

(a) Write down the names of **two** fuels used by cars.

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

(b) The Vehicle Certification Agency publishes data on car fuel consumption.

The table shows the information for six of the top ten cars sold in November 2008.

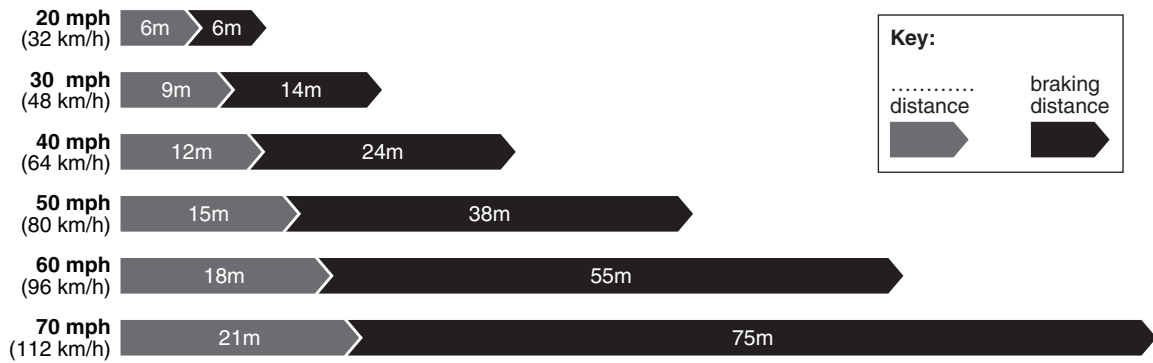
vehicle	fuel consumption in litres/100 km
Audi A3	4.5
BMW 3 series	4.8
Ford Fiesta	4.4
Peugeot 207	4.5
Vauxhall Corsa	4.6
Volkswagen Golf	4.5

Write down the car with the **best** fuel consumption.

..... [1]

[Total: 3]

15 The diagram shows a chart from the Highway Code.



The braking distance for a car travelling at 30 mph is 14 m.

(a) The key to the chart has a word missing.

Finish this sentence.

The ..... distance for a car travelling at 30 mph is 9 m. [1]

(b) What is the **braking** distance of a car travelling at 70 mph?

..... m [1]

(c) What is the **stopping** distance of a car travelling at 70 mph?

Use the chart to calculate your answer.

..... m [1]

[Total: 3]

END OF QUESTION PAPER

**19**  
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