



Rewarding Learning

General Certificate of Secondary Education
2012–2013

Centre Number

71

Candidate Number

Science: Single Award

Unit 3 (Physics)

Foundation Tier

[GSS31]

WEDNESDAY 29 FEBRUARY, 2012

9.30 am–10.30 am



TIME

1 hour.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Answer **all eight** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in question **8(a)**.

For Examiner's
use only

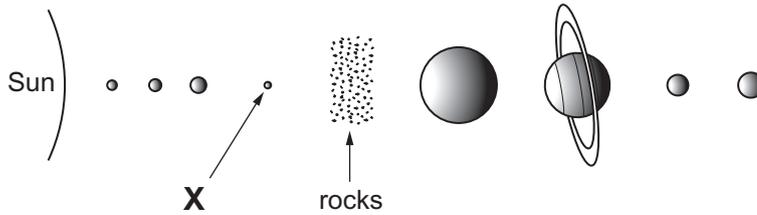
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	

Total
Marks

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1 The diagram below shows some of the objects in our Solar System.



(a) (i) Name the planet labelled X.

Answer _____ [1]

(ii) What name is given to the rocks shown in the diagram?

Choose from:

stars asteroids moons comets

Answer _____ [1]

(b) Our Solar System has been described and named in two models, one of which we now know is wrong. Use lines to match each name with its correct description.

Name

Description

Heliocentric

The Sun is at the centre

Geocentric

The Moon is at the centre

The Earth is at the centre

[2]

Examiner Only	
Marks	Remark

- (c) The table below gives information on some planets in our Solar System.

Planet	Distance from Sun/ million km	Time to orbit the Sun/years
Mercury	60	0.2
Venus	110	0.6
Earth	150	1
Jupiter	780	12
Uranus	2900	84

- (i) Complete the following sentence to describe the trend shown in the table.

As the distance from the Sun increases, the time to orbit the

Sun _____ [1]

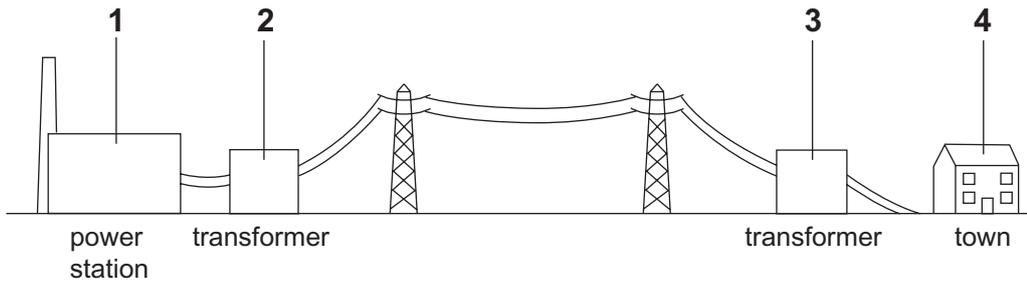
- (ii) Use the information in the table to suggest which planet will be the coldest. Explain your answer.

 _____ [2]

Examiner Only

Marks Remark

2 (a) The diagram below shows part of the National Grid.



Match the statements below with the correct label (1–4) from the diagram.

(i) Where is most electricity used?

Answer _____ [1]

(ii) Where is electricity produced?

Answer _____ [1]

(b) The picture below shows a television.



© Philips

Answer the following questions about the television.

Choose from:

heat sound light electrical

(i) Name the type of energy the television set uses.

_____ [1]

(ii) Name the type of energy the television wastes.

_____ [1]

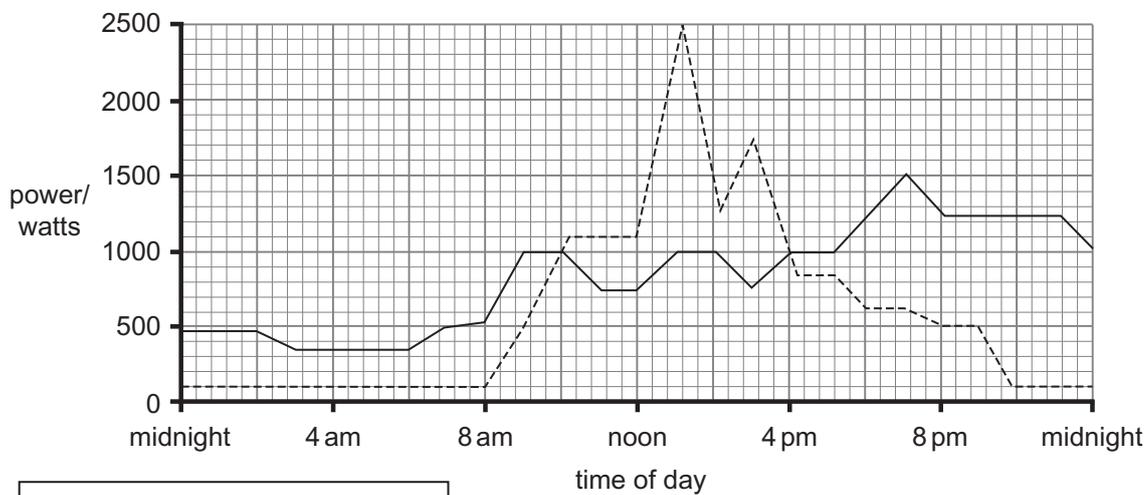
Examiner Only	
Marks	Remark

- (c) The picture below shows a house that uses a wind turbine to generate some of its electricity.



© iStockphoto / Thinkstock

The graph below shows the power output from the wind turbine and the household demand for electricity over a 24 hour period.



Key

- Output from wind turbine
 - - - Household demand

- (i) During which period of the day is the household demand greater than the wind turbine output?

Choose from:

4 am to 10 am : 10 am to 4 pm : 4 pm to 10 pm

Answer _____ [1]

- (ii) What is the maximum power output from the **turbine**?

Answer _____ watts [1]

Examiner Only

Marks Remark

(iii) Suggest **one** reason for the household demand being low from 10pm to 8am.

_____ [1]

Examiner Only	
Marks	Remark

3 The table below gives information for two different types of light bulb.

	Low-energy bulb	Ordinary bulb
Electrical power input	15 W	60 W
Light power output	3 W	3 W
Cost to buy	£3.50	£0.50
Expected lifetime	8 years	1 year
Annual running cost	£1.00	£4.00

(a) (i) Give two reasons for choosing a low-energy light bulb.

1. _____

2. _____ [2]

(ii) Give **one** reason for choosing the ordinary light bulb.

_____ [1]

(b) Calculate the efficiency of the **low-energy** bulb using the equation:

$$\text{efficiency} = \frac{\text{light power output}}{\text{electrical power input}}$$

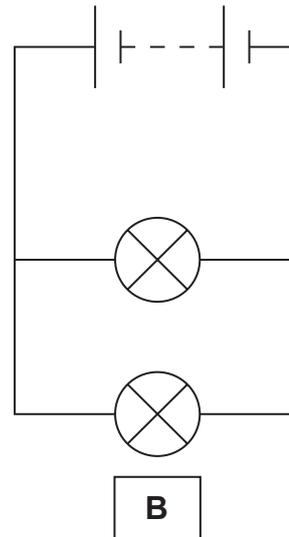
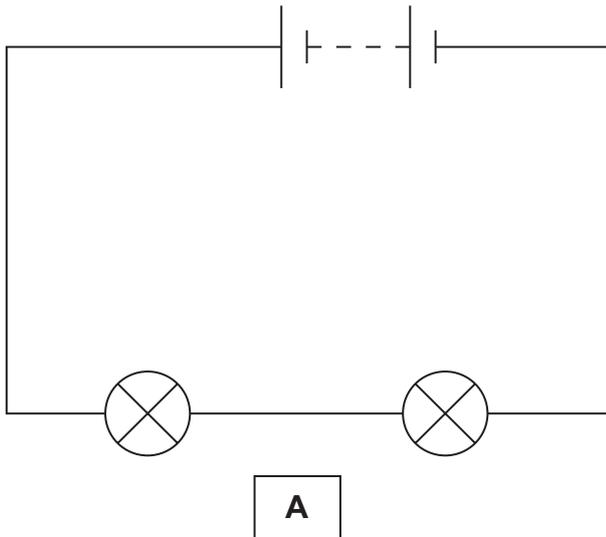
(Show your working out.)

Answer _____ [2]

Examiner Only

Marks Remark

4 Shown below are two simple electrical circuits.



(a) Complete the following sentences.

(i) The bulbs in circuit **A** are connected in _____ [1]

(ii) The bulbs in circuit **B** are connected in _____ [1]

(b) State what will happen in each circuit if one bulb is broken.

(i) Circuit **A**

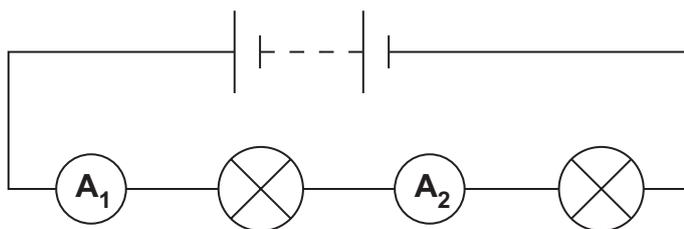
_____ [1]

(ii) Circuit **B**

_____ [1]

Examiner Only	
Marks	Remark

(c) Below is another electrical circuit.



In the circuit above the ammeter reading A_1 shows 2A.

(i) What is the meter reading on A_2 ?

Choose from:

4A 1A 2A

Answer _____ [1]

(ii) The bulbs are connected to a 8V power supply.

Use the equation:

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

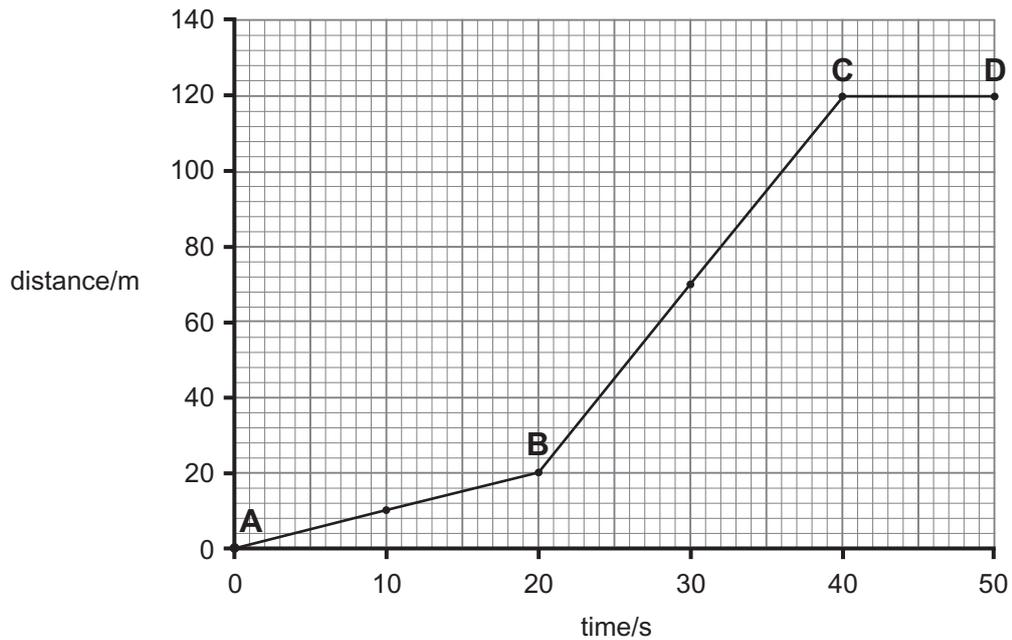
to calculate the resistance of the circuit.
(Show your working out.)

Answer _____ ohms [2]

Examiner Only

Marks Remark

5 The distance–time graph for a car journey is shown below.



(a) Describe the motion of the car from:

1. **A to B** _____ [1]

2. **C to D** _____ [1]

(b) What happens to the motion of the car at point **B**?

Choose from:

slows down : **turns a corner** : **gets faster**

Answer _____ [1]

Examiner Only	
Marks	Remark

(c) Use the equation:

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

to calculate the average speed of the car from **A** to **C**.
(Show your working out.)

Answer _____ m/s [2]

(d) State two ways in which car designers have tried to reduce the risk of serious injuries to the driver and passengers in an accident.

1. _____

2. _____ [2]

(e) Speed bumps are a common feature in built-up areas.

(i) Explain fully the benefit of having speed bumps.

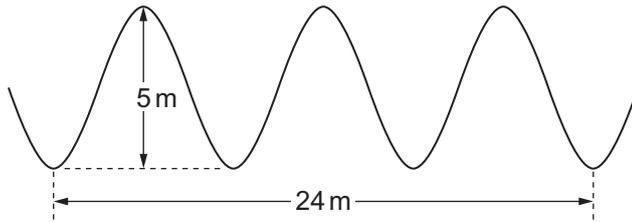
_____ [2]

(ii) Suggest a disadvantage in having speed bumps.

_____ [1]

Examiner Only	
Marks	Remark

6 The diagram below shows some sea waves.



(a) Use the information in the diagram to answer the following questions.

(i) What is the amplitude of these waves?

Answer _____ m [1]

(ii) What is the wavelength of these waves?

Answer _____ m [1]

(b) A student notes that **four** complete waves pass him in **two** seconds.

What is the frequency of these waves?

Answer _____ Hz [1]

(c) (i) Sea waves are transverse waves. Describe the motion of the particles in a transverse wave.

 _____ [2]

(ii) Name another example of a transverse wave.

_____ [1]

Examiner Only	
Marks	Remark

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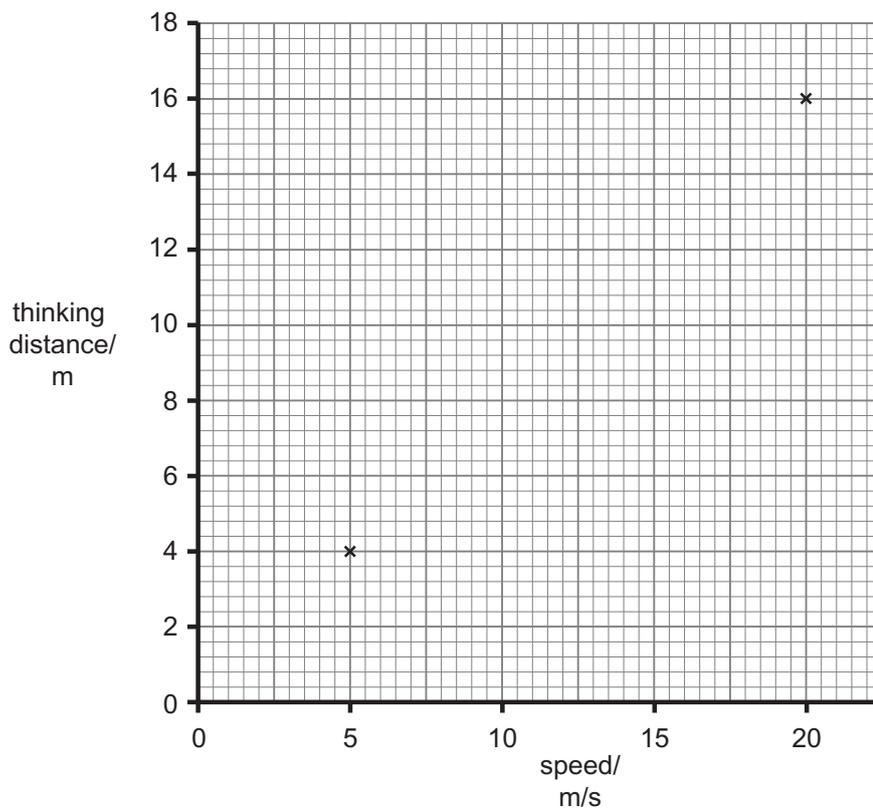
- 7 (a) Complete the following equation about the stopping distance of a car.

Stopping distance = thinking distance + _____ distance
[1]

- (b) The table below gives the thinking distance at different speeds on a dry day.

Speed/ m/s	Thinking distance/ m
5	4
8	6.4
12	9.6
15	12
20	16

- (i) Complete the plots for these values and draw a line graph on the grid below.



[2]

- (ii) State the trend shown in this information.

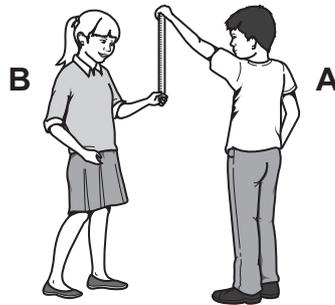
_____ [1]

Examiner Only	
Marks	Remark

- (iii) Suggest how the thinking distances shown in the table opposite will change, if at all, if taken on a wet day.

_____ [1]

- (c) The picture below shows two people investigating how fast their reactions are.



The boy on the right (**A**) drops the metre stick and the girl on the left (**B**) catches it as quickly as possible.

- (i) Explain fully how the distance the metre stick falls is used to show how good the girl's reactions are.

 _____ [2]

- (ii) State what can be done to make the results as:

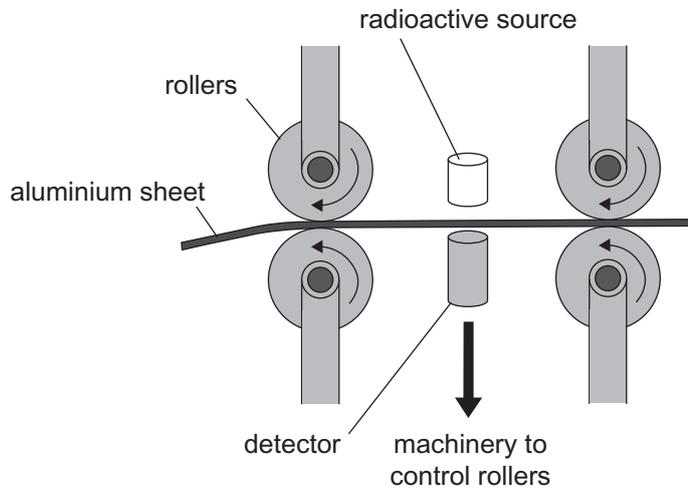
1. reliable as possible.

2. accurate as possible.

 _____ [2]

Examiner Only	
Marks	Remark

- 8 The diagram below shows how a radioactive source is used to monitor the thickness of an aluminium sheet during manufacture. If the thickness of the aluminium sheet changes, the force applied to the rollers will adjust to maintain the correct thickness.



- (a) Beta is the best type of radiation to use as a source. With reference to the penetration properties of all types (alpha, beta and gamma) explain fully why beta is the best.

In this question you will be assessed on your written communication skills including the use of specialist science terms.

[6]

Examiner Only	
Marks	Remark

- (b) Radiation is used to kill bacteria and fungi found in fresh food to stop decay. The radiation is applied after packaging.

The table below gives details of some isotopes.

Isotope	Type of radiation emitted	Half-life
Radon-220	Alpha	54.5 seconds
Polonium-210	Alpha	138 days
Bismuth-83	Beta	61 minutes
Hydrogen-3	Beta	12 years
Technetium-99	Gamma	6 hours
Cobalt-60	Gamma	5 years

Which isotope would be best for a food producer to use with a packet of fresh strawberries? Explain your answer.

Isotope _____ [1]

Explanation _____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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