



Centre Number

71

Candidate Number

General Certificate of Secondary Education  
2011–2012

## Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5

Higher Tier

[GSC52]

MONDAY 14 NOVEMBER 2011  
1.30 pm–2.15 pm



### TIME

45 minutes.

### 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 six** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 45.

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

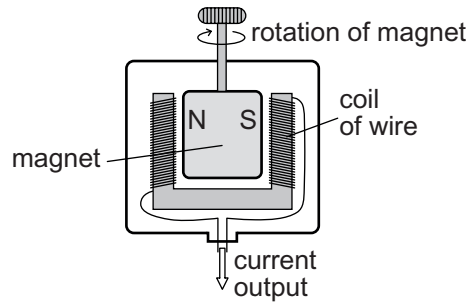
For Examiner's  
use only

Question Number	Marks
1	
2	
3	
4	
5	
6	

Total  
Marks



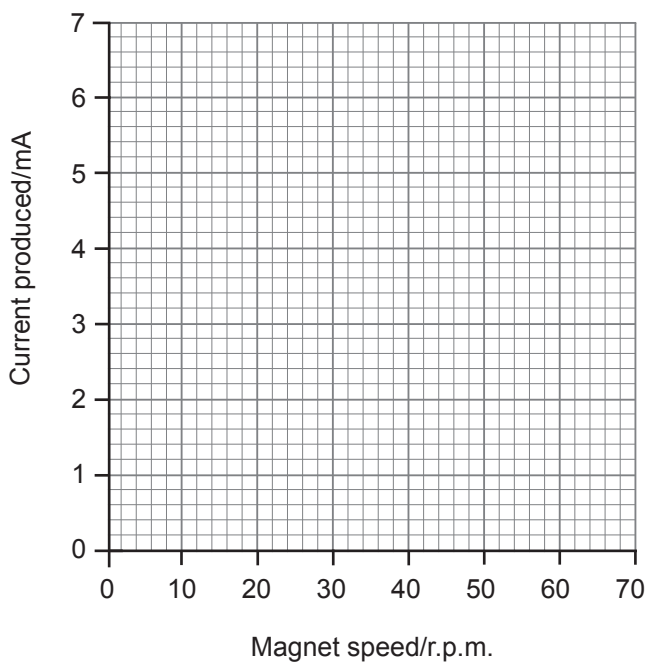
- 1 An investigation was carried out using a bicycle dynamo to find how the amount of current produced depends on the speed of rotation of a magnet.



The investigation results are given below.

Magnet speed/r.p.m.	Current produced/mA
0	0
20	2.2
30	3.4
40	4.4
50	5
60	5
70	5

- (a) Plot the points and draw a line graph on the grid below.



[3]

Examiner Only	
Marks	Remark

(b) (i) State fully the conclusion that can be drawn from these results.

\_\_\_\_\_ [2]  
\_\_\_\_\_

(ii) Suggest the effect on the amount of current produced if:

- a weaker magnet is used.

\_\_\_\_\_ [1]

- more coils of wire are used.

\_\_\_\_\_ [1]

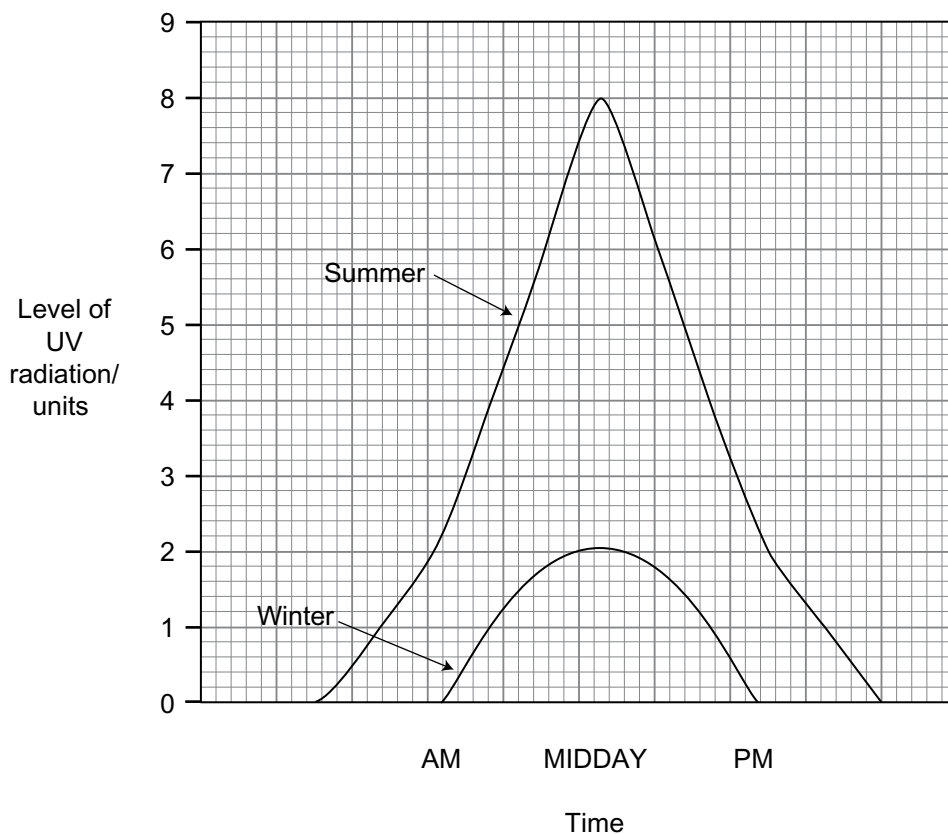
(c) Forty years ago bicycles were fitted with dynamo powered lights similar to the one used in this investigation.

Suggest and explain why battery powered lights replaced dynamo powered lights.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

- 2 The graph below shows how the level of ultraviolet (UV) radiation changed during typical summer and winter days. Skin needs protection above 3 units of UV.



- (a) Use the information to suggest why sunscreen (sun protection) sales are greater in summer.

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[1]

Examiner Only	
Marks	Remark



3 The device shown below can be used to measure the length of a room.



© Digiflex Ltd

It produces ultrasound waves and times how long it takes the wave to travel to a wall and back again.

(a) Describe fully why we cannot hear the waves produced by this measuring device.

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[2]

(b) A signal takes 0.04s to travel from one wall of a room to another wall and back. The speed of sound in air is 330m/s.

Use the equation:

$$\text{distance} = \text{speed} \times \text{time}$$

to calculate the distance between these two walls.

Distance \_\_\_\_\_ m [3]

Examiner Only	
Marks	Remark

- (c) Ultrasound and X-rays are both used for scanning the human body. Explain fully why ultrasound is used to scan pregnant women rather than X-rays.

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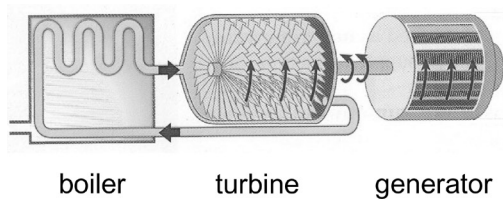
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[2]

- 4 The diagram below shows some component parts of a fossil fuel power station.



© CCEA GCSE Single Award in Science Foundation Tier by A McFarland, C Murphy & J Napier, published by Hodder Education, 2009. ISBN 9780340974728 Reproduced by permission of Hodder Education.

- (a) Describe fully the main energy change that takes place within each named component part.

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[3]

- (b) Some people suggest that any new power stations should be nuclear rather than fossil fuel power stations.

Describe fully the environmental advantages of this suggestion.

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[2]

Examiner Only	
Marks	Remark

- 5 The picture below shows a volume control switch found on an electric guitar. The switch controls how much current flows to the amplifier producing the sound.



© Tone Deaf Music

- (a) (i) Use your knowledge of variable resistors to explain how the current going to an amplifier is controlled by the length of wire inside this component.

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[3]

- (ii) Apart from length of wire give **two** other factors that affect the resistance.

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[2]

- (b) Calculate the current flowing to a 30 W amplifier connected to the 230 V mains.

Use the equation:

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

Current \_\_\_\_\_ A [2]

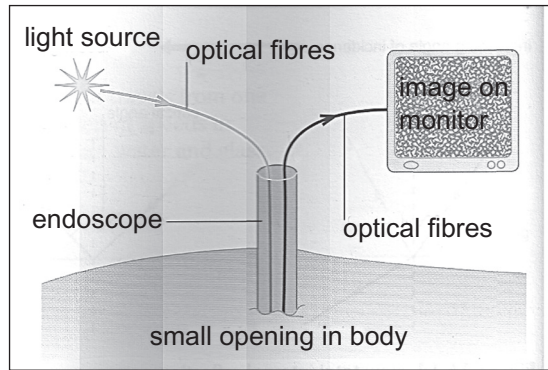
Examiner Only

Marks Remark





(c) The diagram below shows an endoscope being used in keyhole surgery. Endoscopes use optical fibres.



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Describe fully how optical fibres transmit light.

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[2]

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**THIS IS THE END OF THE QUESTION PAPER**

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Examiner Only	
Marks	Remark



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