Rewarding Learning

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

GSC52

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.

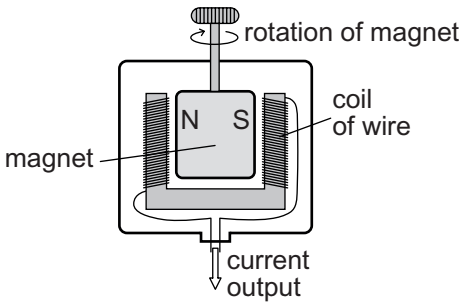
INFORMATION FOR CANDIDATES

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	

Examiner Only	
Marks	Remark

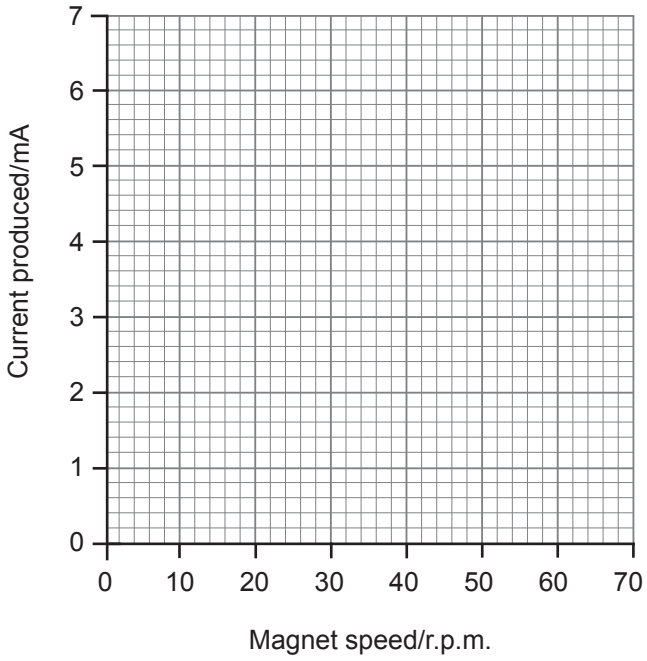
1 An investigation was carried out using a bicycle dynamo to find how the amount of current produced depends on the speed of rotation of a magnet.



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]

(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.

_____

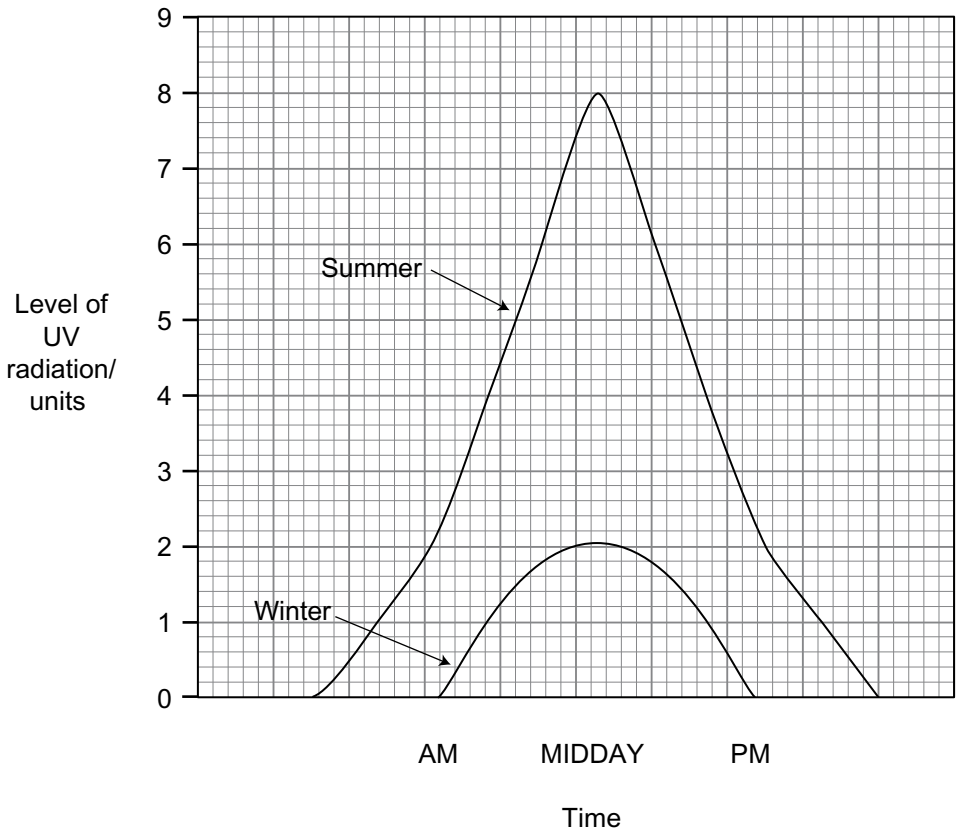
_____

_____ [2]

Examiner Only	
Marks	Remark

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.

_____

_____ [1]

(b) UV radiation is just one part of the electromagnetic spectrum and all electromagnetic waves are transverse waves.

Examiner Only	
Marks	Remark

(i) Describe fully the movement of the particles in a transverse wave.

_____

_____

_____ [2]

(ii) Apart from being transverse waves state **two** features that all electromagnetic waves have in common.

_____

_____

_____ [2]

(iii) Apart from transverse waves name another type of wave.

_____ [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.

_____

_____

_____ [2]

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

Use the equation:

distance = speed × time

to calculate the distance between these two walls.

Distance _____ m [3]

Examiner Only	
Marks	Remark

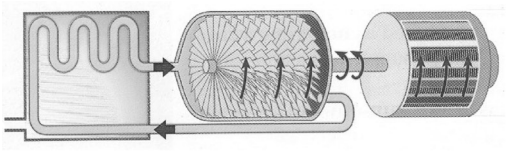
(c) Ultrasound and X-rays are both used for scanning the human body. Explain fully why ultrasound is used to scan pregnant women rather than X-rays.

_____

_____

_____ [2]

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



boiler turbine generator

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

_____

_____

_____ [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.

_____

_____

_____ [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.

_____

_____

_____ [3]

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

_____

_____ [2]

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

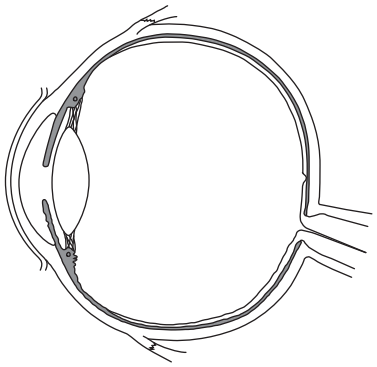
Use the equation:

power = voltage × current

Current _____ A [2]

Examiner Only	
Marks	Remark

6 The diagram below shows the human eye.



Two common eyesight problems are long sight and astigmatism.

(a) (i) Describe the cause and explain fully the effect of long sight.

_____

_____

_____

_____ [3]

(ii) Explain fully how long sight can be corrected.

_____

_____

_____

_____ [3]

(b) (i) What is the cause of astigmatism?

_____ [1]

(ii) Suggest how an optician might check for astigmatism.

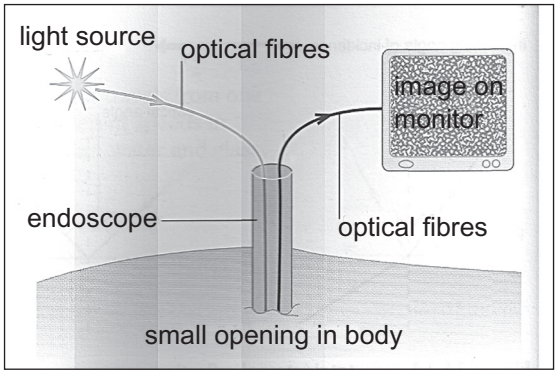
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

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



Describe fully how optical fibres transmit light.

_____

_____

_____ [2]

THIS IS THE END OF THE QUESTION PAPER

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