



Rewarding Learning

General Certificate of Secondary Education
2011–2012

Science: Single Award (Modular)
Electricity, Waves and Communication

Module 5

Higher Tier

[GSC52]



THURSDAY 24 MAY 2012, MORNING

Centre Number

71

Candidate Number

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

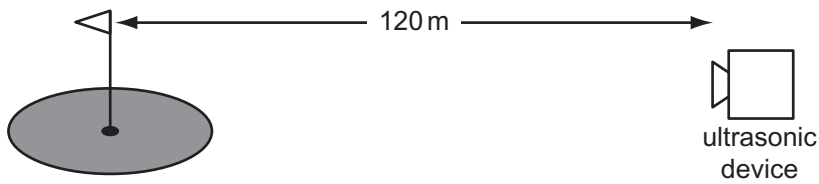
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	

Total Marks	
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- 1 The diagram below shows how a golfer can use an ultrasonic (ultrasound) device to measure the distance to the flag.



- (a) The device shows a distance of 120m and the return time for the signal was 0.8s.

Use the equation:

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

to calculate the speed of sound in air.

(Show your working out.)

Answer _____ m/s [3]

- (b) (i) Explain fully what is meant by the term 'ultrasound'.

_____ [2]

- (ii) Apart from measuring distance give another use of ultrasound.

_____ [1]

Examiner Only	
Marks	Remark

(c) Ultrasound is a longitudinal wave and light is an example of the other type of wave.

(i) Name this other **type** of wave.

_____ [1]

(ii) State **one** feature both light and sound waves have in common.

_____ [1]

Examiner Only	
Marks	Remark

2 The table below shows the cost per unit of generating electricity from some energy sources available in the UK.

Energy source	Building cost/p	Fuel cost/p	Running cost/p	Decommissioning cost/p	Total cost/p
Coal	1.1	1.5	0.3	0.1	3.0
Gas	0.4	2.5	0.5	0.1	3.5
Nuclear	1.5	0.5	0.5	2.5	5.0
Wind	4.2	none	0.9	0.2	5.3
Tidal	4.9	none	1.7	0.2	

(a) Calculate the total cost per unit of using **tidal** energy.

Answer _____ p [1]

(b) Use the information in the table to state two differences between the costs of using renewable sources compared to using non-renewable sources for electricity generation.

1. _____

2. _____
_____ [2]

Nuclear power has the most expensive decommissioning cost.

(c) Describe fully what happens during decommissioning and suggest **one** reason why it is so expensive.

_____ [3]

(d) Apart from cost give **one** disadvantage of using tidal energy.

_____ [1]

Examiner Only	
Marks	Remark

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(Questions continue overleaf)

3 The picture below shows a dynamo connected to a bicycle wheel and lamp.

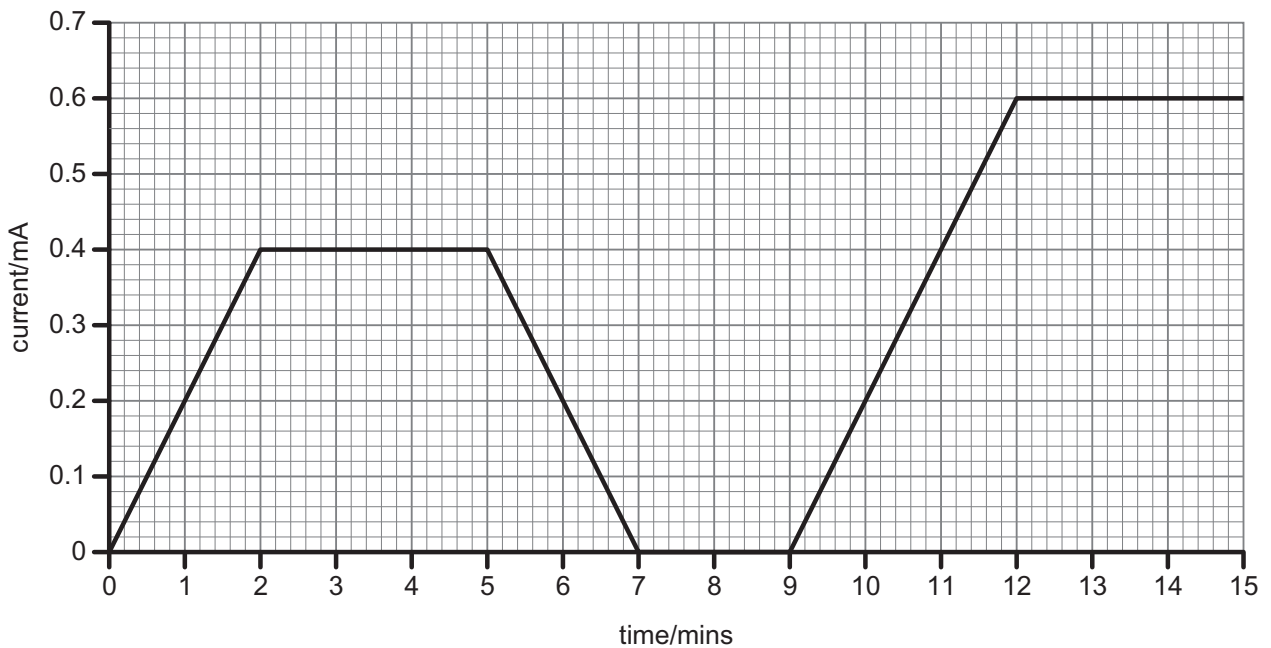
Examiner Only	
Marks	Remark

"Picture of a dynamo"

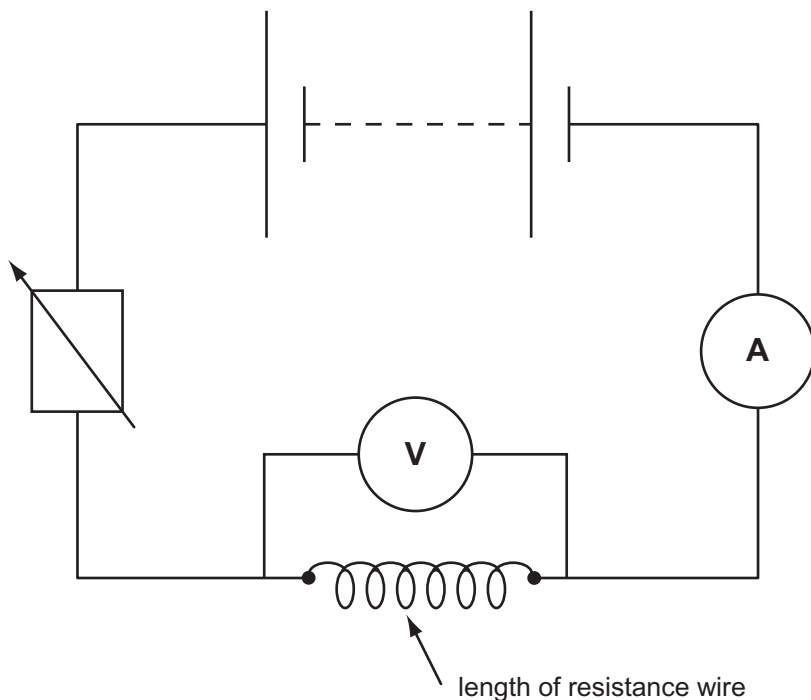
(a) A dynamo is a small generator. Describe fully what happens inside the dynamo to generate the electricity.

[2]

(b) The graph below shows how much current is flowing from the dynamo to the lamp during a 15 minute cycle ride.



4 The circuit below was set up to measure the resistance of a length of wire.



(a) How can the current through the resistance wire be changed without changing the batteries?

_____ [1]

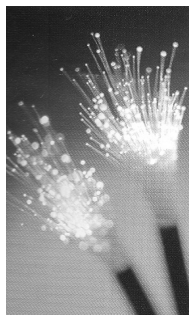
(b) (i) Draw an arrow on the diagram to show the direction of conventional current flow. [1]

(ii) Explain fully the difference between conventional current flow and how the current actually flows around the circuit.

 _____ [2]

Examiner Only	
Marks	Remark

5 The picture below shows two bundles of optical fibres.



© Science Photo Library / Lawrence Lawry

(a) Total internal reflection allows light to pass along optical fibres. Explain fully how total internal reflection is achieved inside optical fibres.

[2]

(b) (i) Suggest two reasons why optical fibres are replacing copper wire in telephone communications.

1. _____
_____ [1]

2. _____
_____ [1]

(ii) Apart from communications give another use for optical fibres.

_____ [1]

Examiner Only	
Marks	Remark

(iii) What is the cause of astigmatism?

[1]

(iv) Suggest how an optician could test for astigmatism.

[2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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