



General Certificate of Secondary Education
2010–2011

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

Module 5
Higher Tier
[GSC52]



FRIDAY 20 MAY 2011, 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

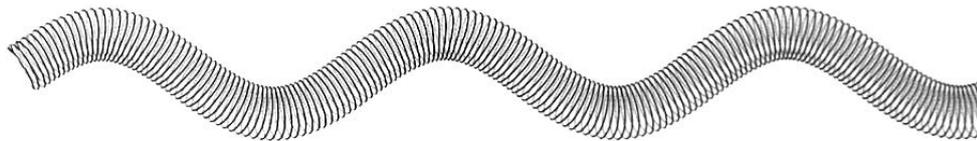
The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

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

Total Marks	
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- 1 The picture below shows a wave produced on a slinky spring.



- (a) (i) Name the type of wave shown.

_____ [1]

- (ii) Waves are caused by vibrations. In what direction do the vibrations occur as this wave travels from left to right?

Choose from:

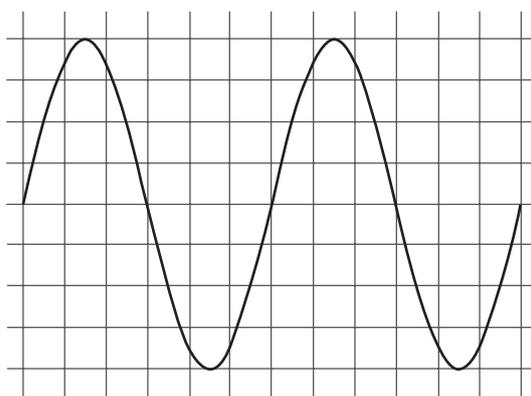
The vibrations are in the same direction as the wave

The vibrations are at right angles to the direction of the wave

The vibrations are in the opposite direction to the wave

_____ [1]

- (b) The diagram below represents a sound wave.



1 square = 1 cm

- (i) What is the amplitude of the wave shown above?

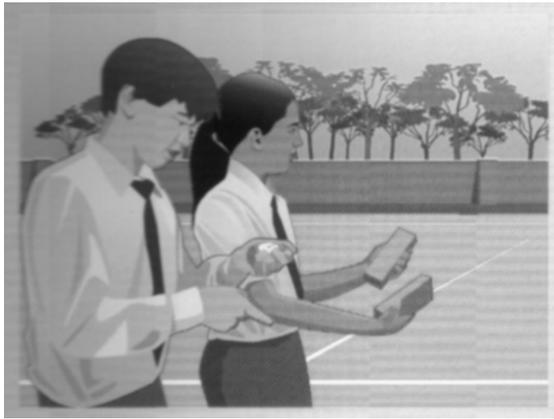
_____ [1]

- (ii) What is the wavelength of the wave shown above?

_____ [1]

Examiner Only	
Marks	Remark

- (c) The picture below shows two pupils experimenting to find the speed of sound in air.



- (i) Describe a method that pupils could use.

[3]

- (ii) How can the pupils ensure that their results are:

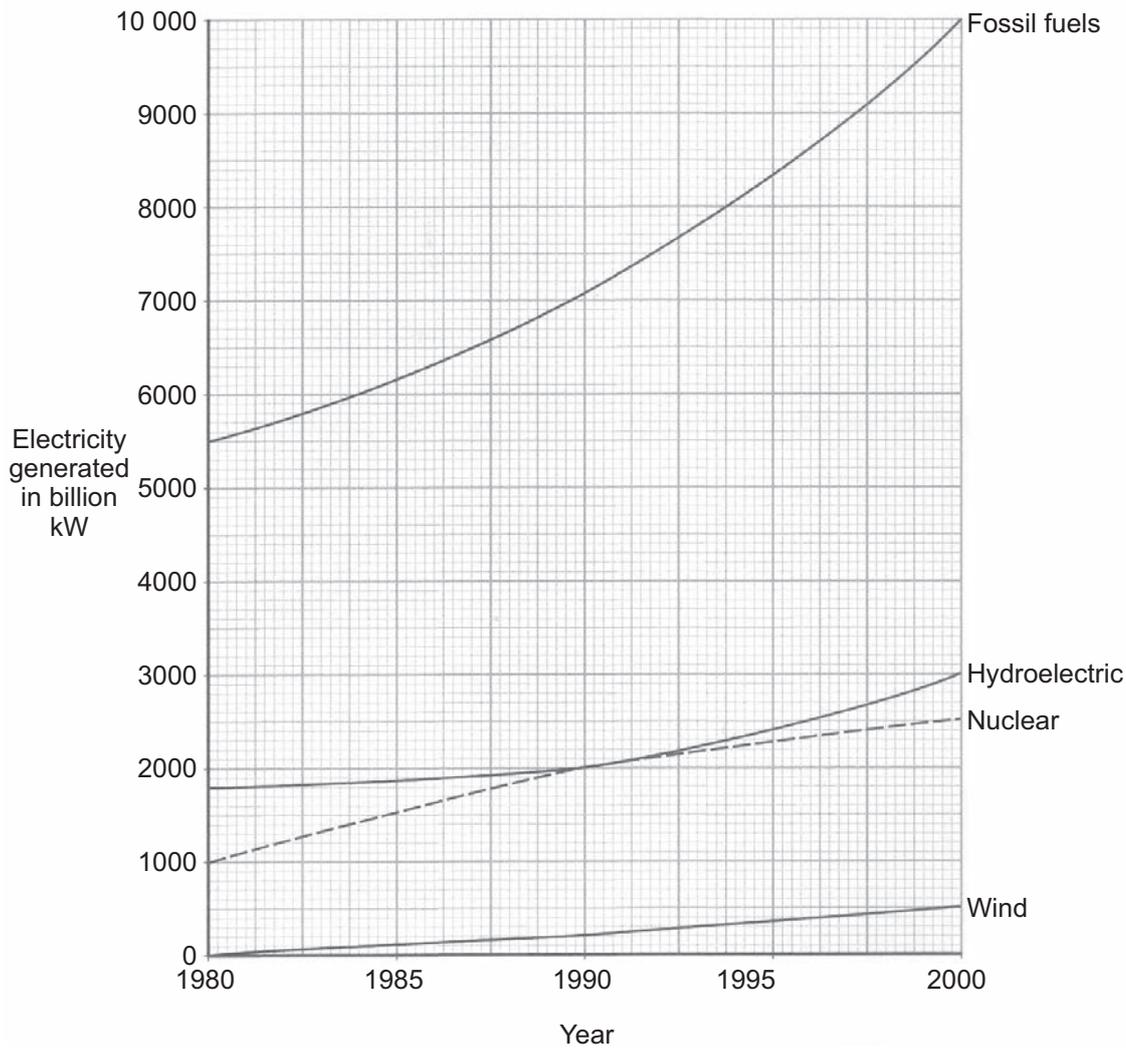
accurate? _____
 _____ [1]

reliable? _____
 _____ [1]

Examiner Only	
Marks	Remark

2 The graph below shows how much electricity was generated worldwide from four different energy sources between 1980 and 2000.

Examiner Only	
Marks	Remark



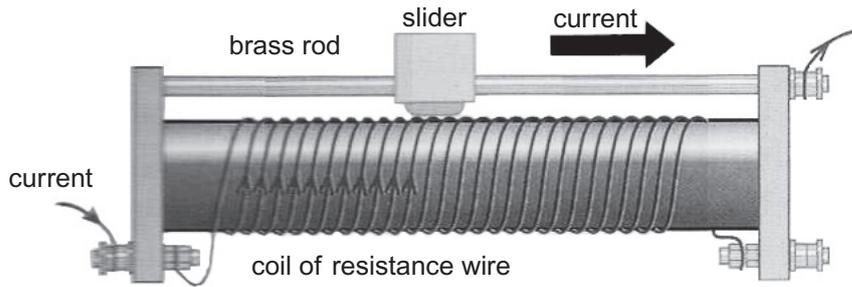
(a) Calculate the increase in generation from fossil fuels during this 20 year period.

_____ billion kW [1]

(b) Suggest **two** reasons why the increase in the use of renewables has not been as dramatic as with fossil fuels. (Your answer must state which renewable source you are referring to.)

_____ [2]

3 The diagram below shows a variable resistor.



© GCSE Single Award Science for CCEA by T Lavery, J Napier & R White, published by Hodder Murray, 2006. ISBN 978 0340926000. Reproduced by permission of Hodder Education.

(a) Describe fully how the variable resistor works to change the current flowing in a circuit.

[2]

(b) Name **one** other factor, apart from length, that would affect the resistance of a piece of wire.

[1]

(c) Suggest **one** everyday use for a variable resistor.

[1]

(d) State the unit of resistance.

[1]

Examiner Only

Marks Remark

- 4 The picture below shows a dental surgery. The dentist can use ultrasound to clean teeth.



© iStockphoto / Thinkstock

- (a) Explain fully what ultrasound is.

_____ [2]

- (b) The dentist also uses X-rays to take pictures of teeth and jaw bones.

- (i) Name a possible harmful effect of using X-rays.

_____ [1]

- (ii) Explain why the dentist leaves the room while the patient is having an X-ray but yet it is safe enough for the patient to remain.

_____ [1]

- (c) Gamma rays can be used to sterilise dental equipment.

State what makes gamma rays the most dangerous type of electromagnetic wave.

_____ [1]

Examiner Only	
Marks	Remark

5 The picture below shows a mobile phone charger.



© iStockphoto / Thinkstock

- (a) To fully charge a phone the charger must be connected to the 230 V mains for 45 mins and the current flowing is 0.7 A.

The cost of each unit (kWhr) of electricity is 18p.

Use the equations:

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

and

$$\text{electrical cost} = \text{power} \times \text{time} \times \text{cost per unit}$$

to calculate the cost of charging a phone.

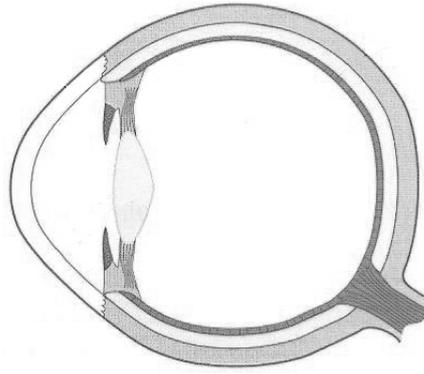
Cost = _____ pence [4]

Examiner Only

Marks

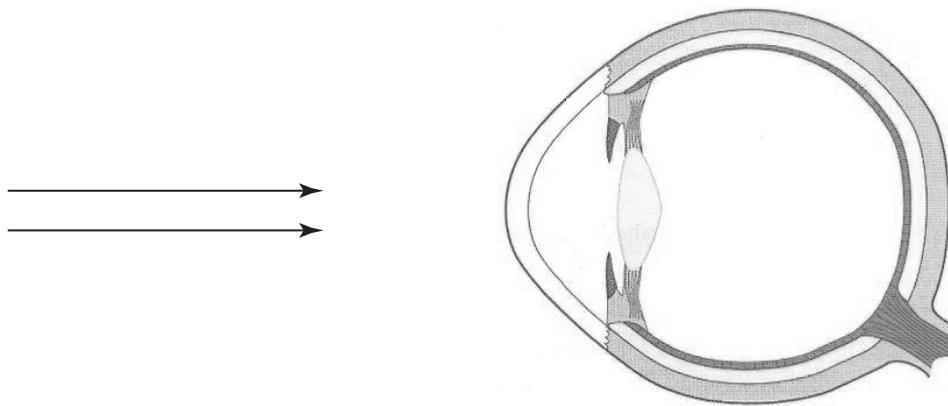
Remark

6 The diagram below shows the human eye.



(a) Label the lens, cornea and retina on the diagram. [2]

(b) Complete the diagram below to show how short sight can be corrected by inserting the correct type of lens and continuing the rays of light. [3]



(c) (i) Describe the cause of astigmatism and its effect.

_____ [2]

(ii) Suggest how an optician would test for astigmatism.

_____ [2]

Examiner Only	
Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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