Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5

Higher Tier

[GSC52]

GSC52

FRIDAY 20 MAY 2011, MORNING

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 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:

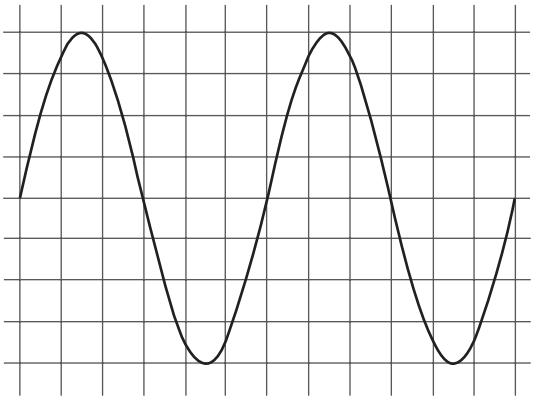
The vibrations are in the same direction as the wave

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? _____

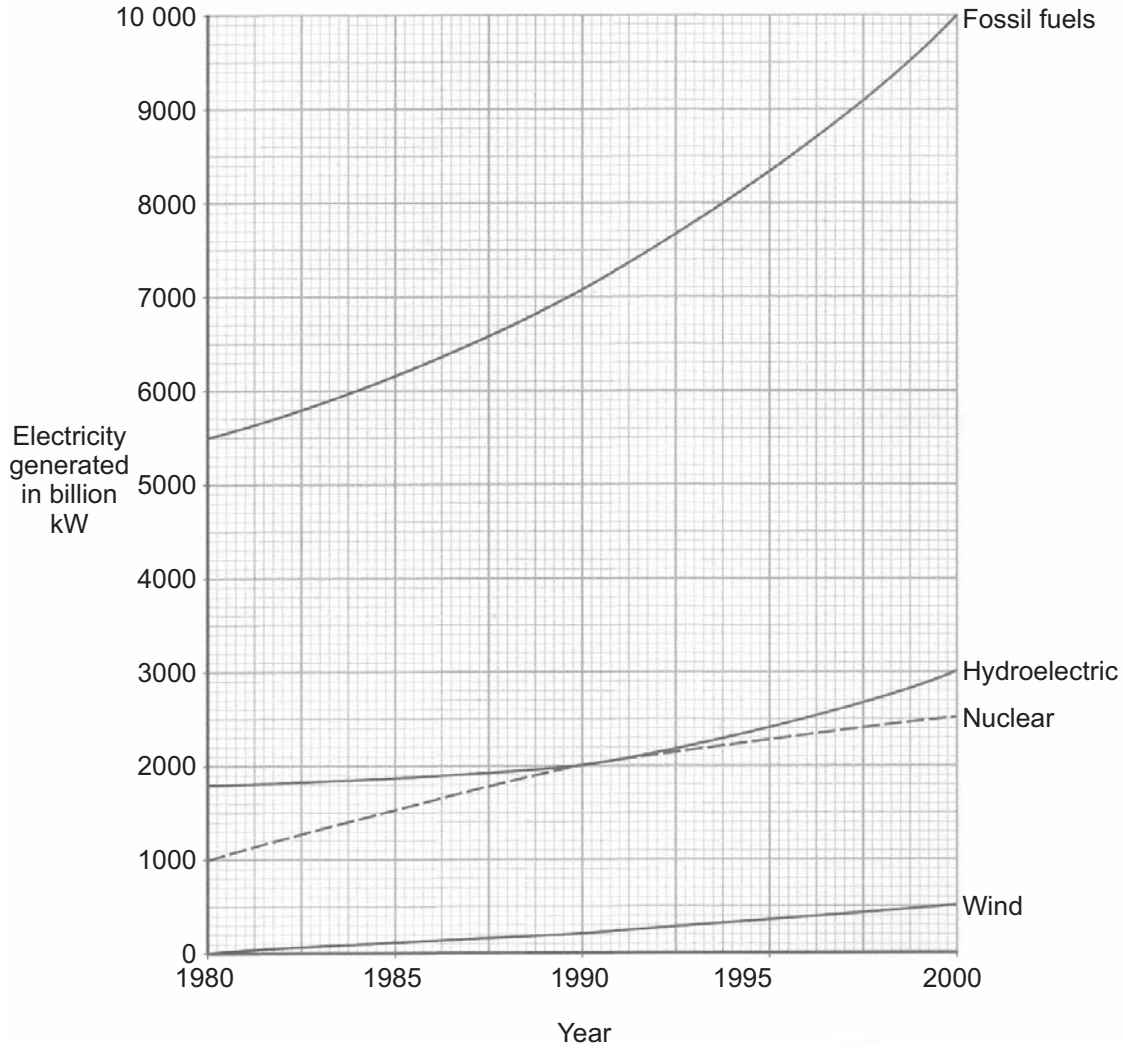
_____ [1]

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.



(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]

(c) In the year 2030 the amount of electricity generated from nuclear power is expected to be 5 times what it was in 2000.

(i) Calculate how much electricity could be generated from nuclear power in 2030.

_____ billion kW [1]

(ii) Explain fully why using nuclear power instead of fossil fuels is better for the environment.

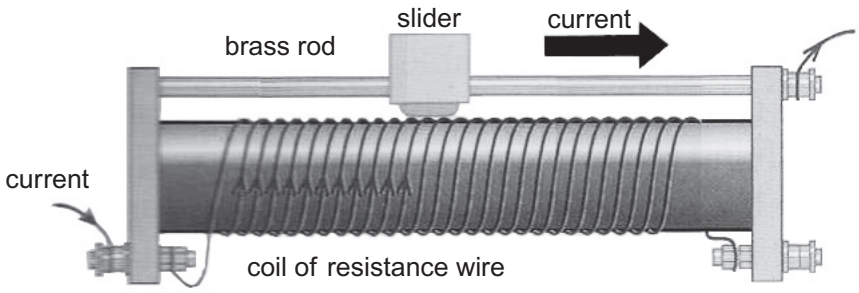
_____

_____

_____ [2]

Examiner Only	
Marks	Remark

3 The diagram below shows a variable resistor.



(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

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]

5 The picture below shows a mobile phone charger.

(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:

power = voltage × current

and

electrical cost = power × time × cost per unit

to calculate the cost of charging a phone.

Cost = _____ pence [4]

Examiner Only	
Marks	Remark

(b) Mobile phones can use digital or analogue signals.

(i) Describe the difference between analogue and digital signals.

_____

_____

_____ [2]

(ii) Give **two** reasons why digital signals are better than analogue signals.

_____

_____

_____ [2]

(c) Microwaves are used in cooking. Explain fully how microwaves produce heat to cook food.

_____

_____

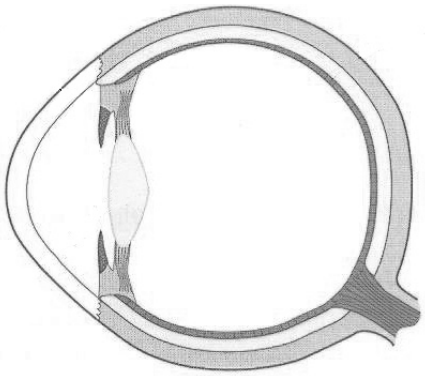
_____

_____ [3]

Examiner Only	
Marks	Remark

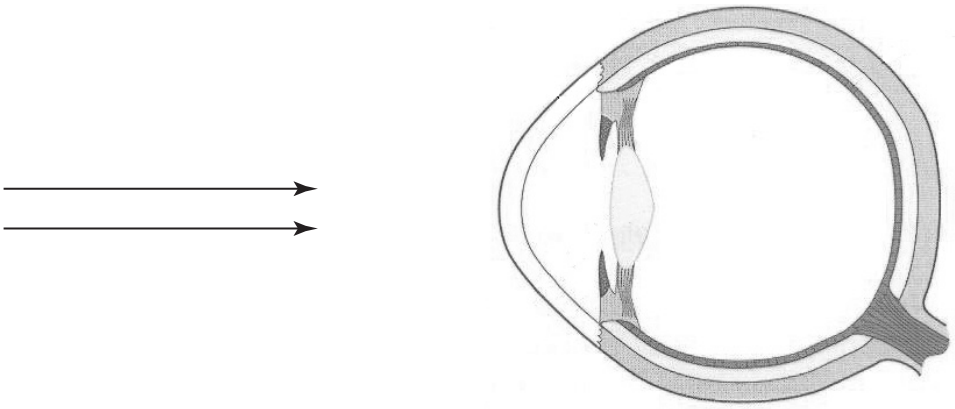
Examiner Only	
Marks	Remark

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]

THIS IS THE END OF THE QUESTION PAPER

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