Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2010–2011

Science: Single Award (Modular)

Electricity, Waves and Communication

Module 5

Foundation Tier

[GSC51]

GSC51

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 dentist's surgery.

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(a) (i) Name the type of wave the dentist sees reflected by a mirror when looking at teeth.

Choose from:

infra-red **visible light** **gamma rays**

_____ [1]

(ii) Complete the following sentence.

Choose from:

ultraviolet **microwaves** **X-rays**

Dentists can take pictures of jaw bones using _____ . [1]

(iii) Name the spectrum of waves that includes all those named in parts **(i)** and **(ii)** above.

Choose from:

electromagnetic **electric** **magnetic**

_____ [1]

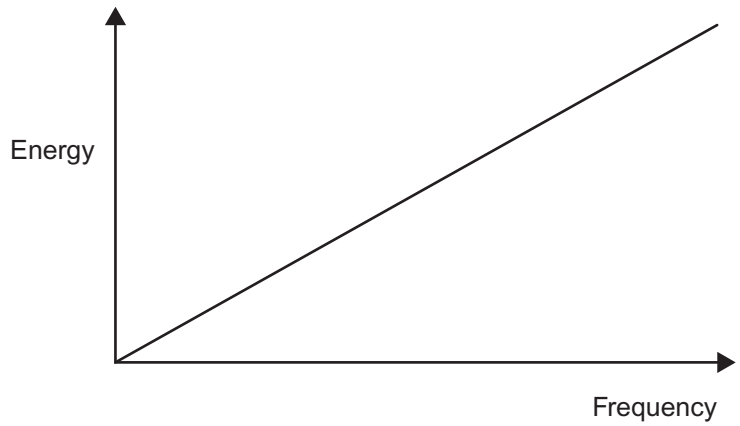
Examiner Only	
Marks	Remark

(b) The dentist can use ultrasound to clean teeth.
Which **two** of the following statements are true?

1. Ultrasound is sound too high for humans to hear
2. Ultrasound has a frequency below 20 000 Hz
3. Ultrasound scanning is more dangerous than X-rays
4. Ultrasound is sound that humans can hear
5. Ultrasound has a frequency above 20 kHz

_____ and _____ [2]

(c) The graph below shows the relationship between the energy and frequency of waves.



(i) Which statement below describes the relationship between frequency and energy?

Circle the correct answer.

The lower the frequency of a wave, the more energy it has.

The higher the frequency of a wave, the more energy it has.

The higher the frequency of a wave, the less energy it has. [1]

(ii) What are the units of frequency?

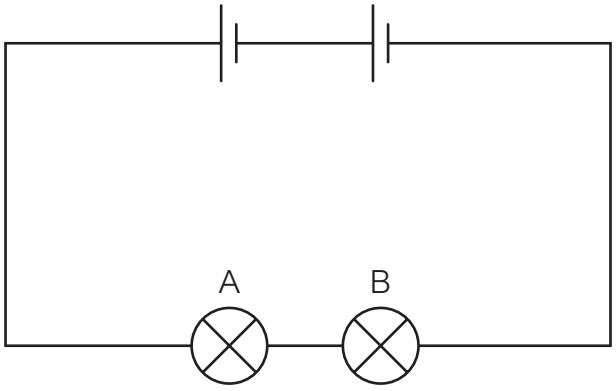
Choose from:

metres **hertz** **metres per second**

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** The circuit diagram below shows two identical bulbs (A and B) connected in series.



(i) Using the correct symbol show how a voltmeter is added to the circuit to measure the voltage across bulb A. [2]

(ii) Describe what will happen to the bulbs if extra batteries are added to the circuit and give a reason.

_____

_____ [2]

(iii) If one of the bulbs (A or B) goes out, describe and explain what happens to the other bulb.

_____

_____ [2]

(b) The batteries supply 6 V and the current flowing is found to be 2 A.

Use the equation:

$$\textbf{resistance} = \frac{\textbf{voltage}}{\textbf{current}}$$

to calculate resistance.

resistance = _____ Ω [2]

(c) Resistance wire is used in fuses. What happens when too much current flows through a fuse?

_____ [1]

(d) Apart from the fuse, name two other safety features of a 3-pin plug.

1. _____ [1]

2. _____ [1]

Examiner Only	
Marks	Remark

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Marks	Remark

3 **(a)** The picture below shows a mobile phone charger.

© iStockphoto / Thinkstock

(i) When the charger is being used it supplies a voltage of 5 V and a current of 2 A to the phone.

Use the equation:

power = voltage × current

to calculate the power supplied to the phone.

power = _____ [2]

(ii) What is the unit of power?

Choose from:

joule **ohm** **watt**

_____ [1]

(b) Mobile phones use microwaves to transmit signals.

(i) Name a possible health risk associated with the use of microwaves in mobile phones.

_____ [1]

(ii) Suggest two ways to reduce this health risk.

1. _____ [1]

2. _____ [1]

(c) Mobile phones can use digital and analogue signals. Give **one** advantage of using digital signals.

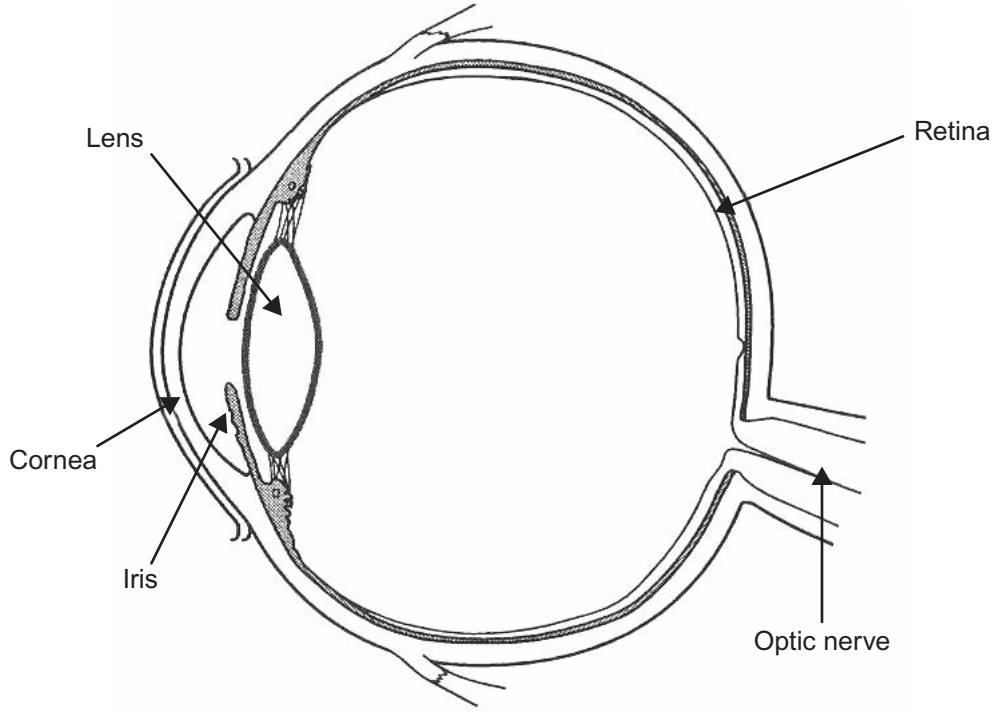
_____

_____ [1]

Examiner Only	
Marks	Remark

Examiner Only	
Marks	Remark

4 The diagram below shows parts of the eye.



(a) (i) Name the type of lens found in the eye.

_____ [1]

(ii) Explain fully the function of the eye lens.

_____

_____ [2]

(b) (i) Name the common eyesight problem caused by the lens being too strong.

_____ [1]

(ii) Suggest how this problem could affect a person's vision.

_____

_____ [1]

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(Questions continue overleaf)

Examiner Only	
Marks	Remark

5 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:

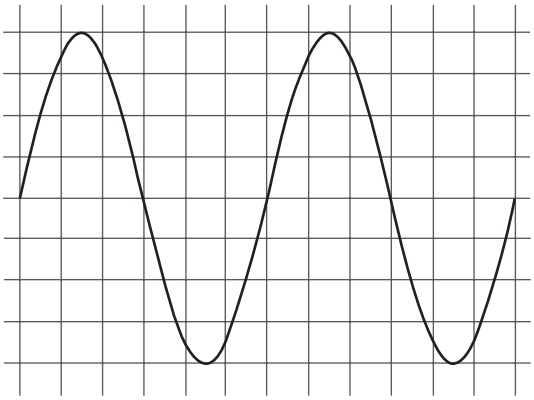
The vibrations are in the same direction as the wave

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]

(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? _____

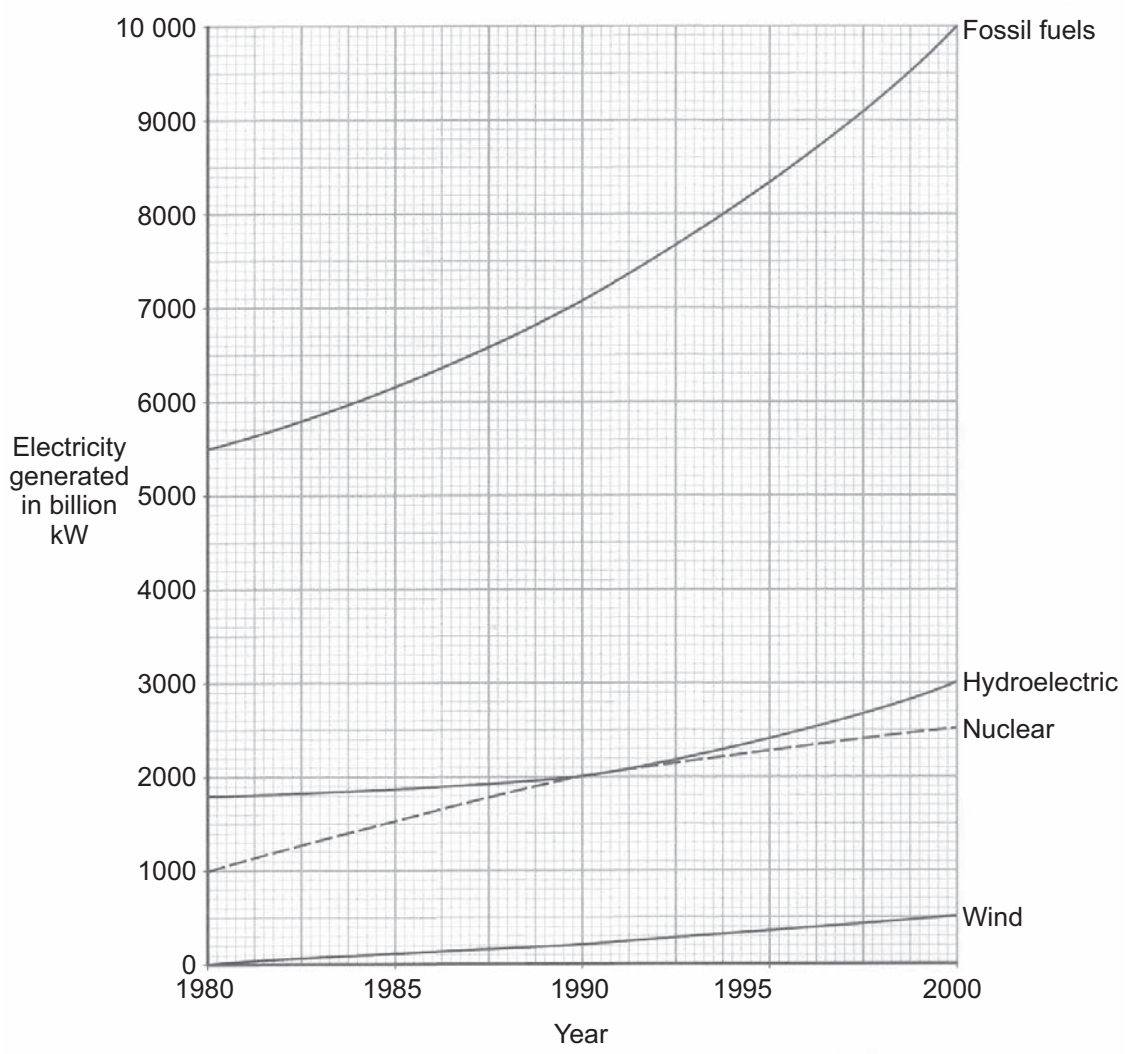
_____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

6 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

THIS IS THE END OF THE QUESTION PAPER

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