Rewarding Learning

Centre Number	
71	

Candidate Number

General Certificate of Secondary Education
2009–2010

Science: Single Award (Modular)

Electricity, Waves and Communication
Module 5

Foundation Tier

[GSC51]

THURSDAY 25 FEBRUARY 2010, MORNING

GSC51

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.

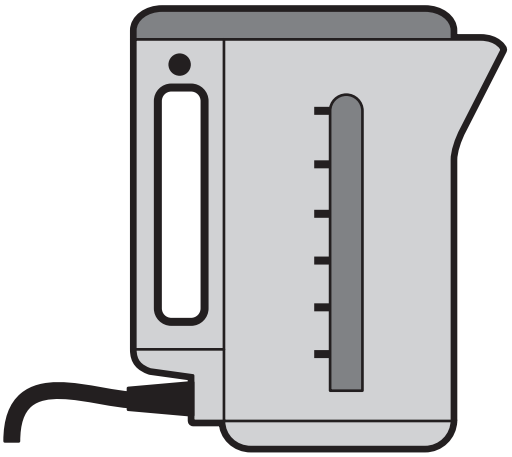
INFORMATION FOR CANDIDATES

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 **(a)** The kettle shown below uses the heating effect of electricity.



(i) What causes this heating effect?

Choose from:

voltage **current** **resistance**

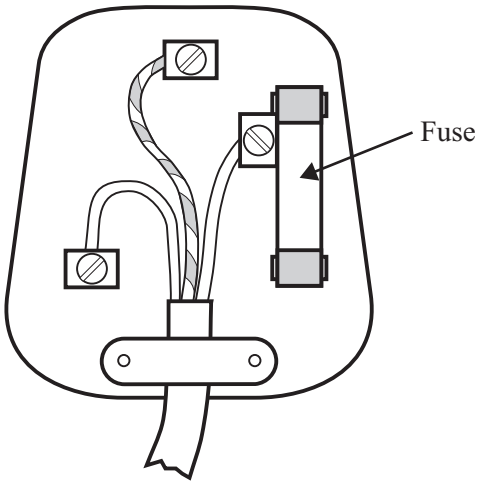
Answer _____ [1]

(ii) Name **two** other electrical appliances that use the heating effect of electricity.

_____ and _____ [2]

Examiner Only	
Marks	Remark

(b) The plug shown below is fitted to a kettle. The kettle uses 1000 W of power and is connected to the 250 V mains.



(i) Calculate the current flowing through the plug.
Use the equation:

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

Answer _____ A [2]

(ii) What size of fuse should be fitted inside the plug above?

Choose from:

3A **5A** **13A**

Answer _____ [1]

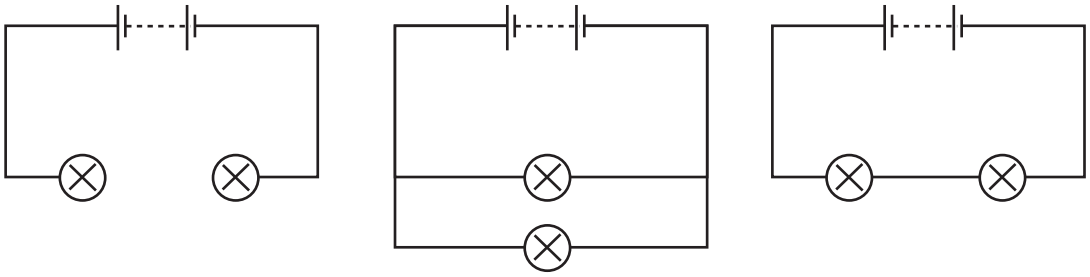
(iii) Apart from the fuse, name two other safety features found in a 3-pin plug.

1. _____

2. _____ [2]

Examiner Only	
Marks	Remark

2 Shown below are three simple circuit diagrams.



A **B** **C**

(a) Which circuit (A, B or C):

(i) will have the brightest bulbs?

Answer _____ [1]

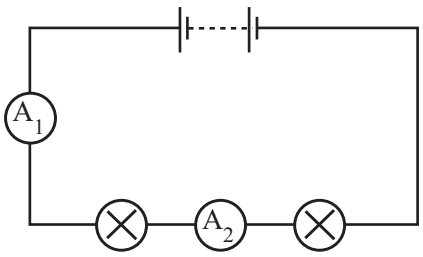
(ii) does not allow the bulbs to light?

Answer _____ [1]

(b) If one bulb goes out in circuit B, what will happen to the other bulb?

_____[1]

(c) Shown below is a series circuit.



(i) If the current flowing through A_1 is 2 A, what will be the current flowing through A_2?

A_2 = _____ A [1]

(ii) Name the meters A_1 and A_2.

Choose from:

voltmeter **ammeter** **ohmmeter**

Answer _____ [1]

(iii) What are the units of current?

Choose from:

ohms **volts** **amps**

Answer _____ [1]

(iv) What does the symbol ⊣----⊢ represent?

Answer _____ [1]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

3 **(a)** Below are five statements, but only three are correct descriptions of wave features.

The wavelength is the length of one complete vibration

The amplitude is the length of one complete vibration

The frequency is the number of vibrations per second

The wavelength is the maximum height of a wave

The amplitude is the maximum height of a wave

Which two statements are **not** correct?

1. _____

2. _____ [2]

(b) Complete the sentences below.

Choose from:

energy **longitudinal** **vibrations** **wavelength**

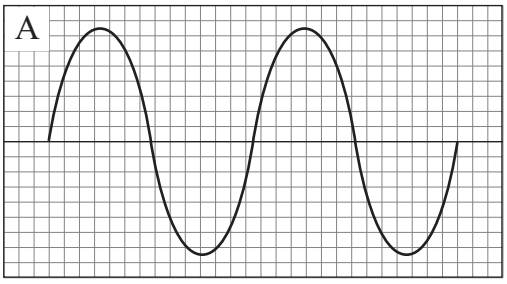
A wave is a series of _____.

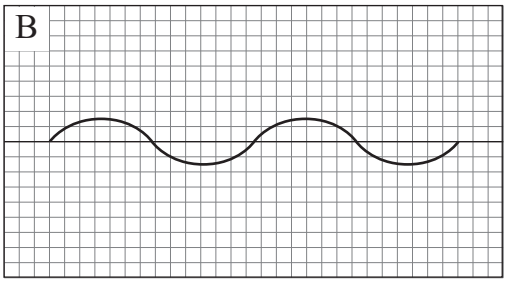
Waves carry _____ from one place to another.

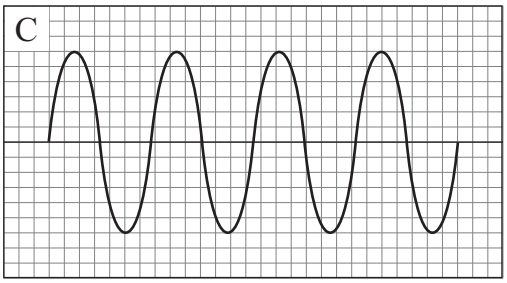
There are two types of waves, transverse and _____. [3]

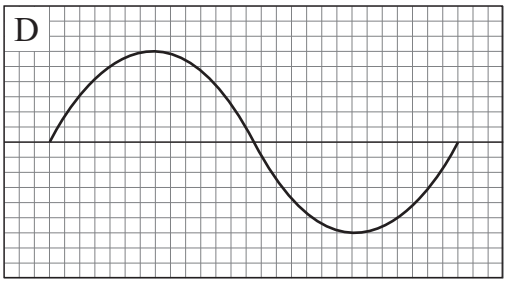
(c) The diagrams below show four waves taken over the same time.

Examiner Only	
Marks	Remark









(i) Which wave (A, B, C or D) has the largest amplitude?

Answer _____ [1]

(ii) Which wave (A, B, C or D) has the longest wavelength?

Answer _____ [1]

(iii) Which **two** waves have the same frequency?

Answer _____ and _____ [1]

Examiner Only	
Marks	Remark

4 The table below shows part of the electromagnetic spectrum.

gamma rays	X-rays	ultra-violet		infra-red	micro-waves	

(a) Name **one** of the missing waves from the diagram above.

_____[1]

(b) X-rays are useful, but can be dangerous.

(i) Give **one** use of X-rays. _____

_____[1]

(ii) Why are X-rays dangerous? _____

_____[1]

(c) Give two features that all electromagnetic waves have in common.

1. _____[1]

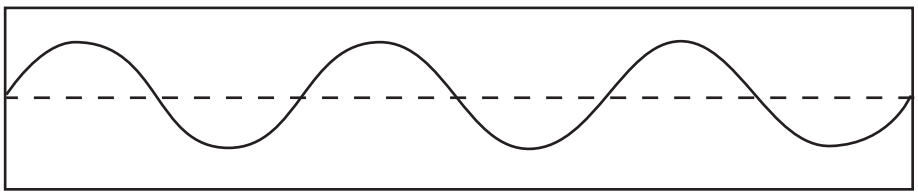
2. _____[1]

(d) Microwaves can be used to send digital communication signals, e.g. satellite television.

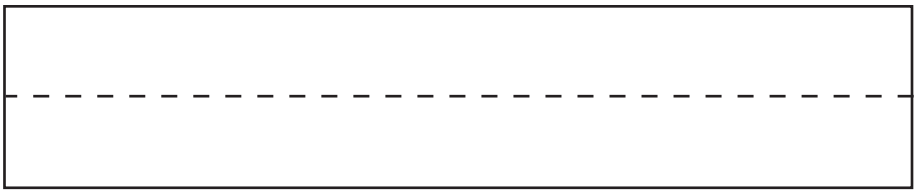
(i) Name another type of electromagnetic wave that can be used in communications.

_____[1]

The diagram below shows how an analogue signal varies with time.



(ii) In the box below, show how a digital signal varies with time. [1]



Examiner Only	
Marks	Remark

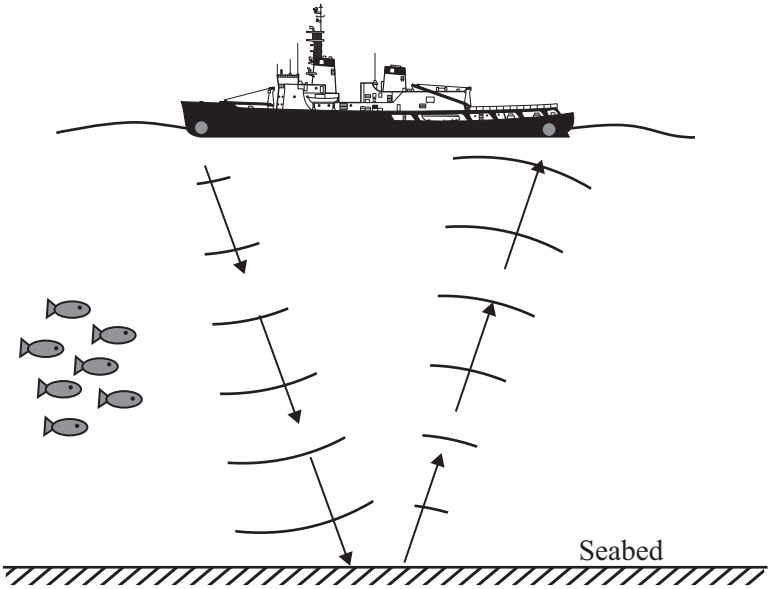
5 Humans can hear sounds of frequencies between 20 Hz and 20 kHz. This is called the human audible range.

(a) Explain fully how the audible range will change as we grow older.

_____

_____[2]

(b) Ultrasound can be used to measure the depth of the sea and to find fish as shown in the diagram below.



Sound travels at 1500 m/s in water.

The ship sends out an ultrasound pulse and the echo returns 4 seconds later.

(i) Use the equation below to calculate the depth of the sea.

distance = speed × time

Depth = _____m [3]

(ii) Use the information above to explain how the ship's captain will know when the shoal of fish swims under the boat.

_____

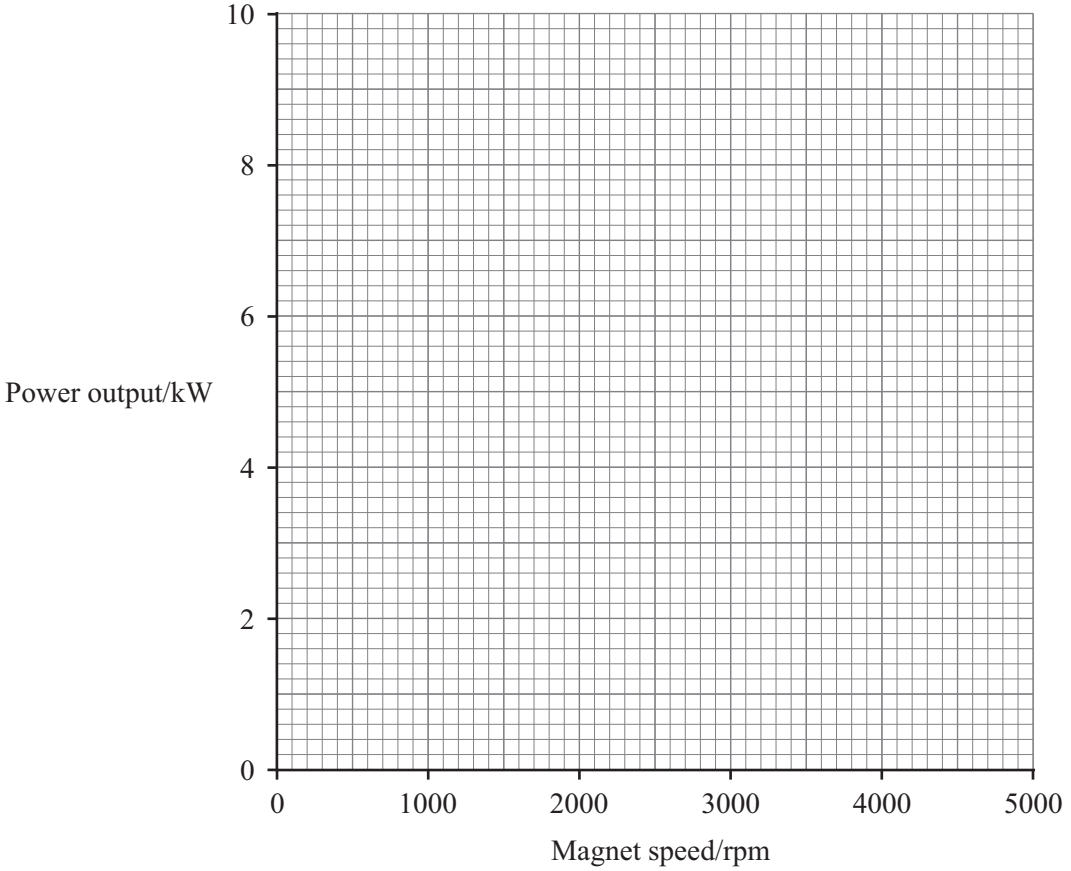
_____[2]

Examiner Only	
Marks	Remark

6 The generator inside a power station produces electricity by having a magnet spin inside a coil of wire. The table below gives the power output for different magnet speeds in an investigation.

Magnet speed/rpm	Power output/kW
0	0
800	1.6
2000	4
3200	6.4
4000	7.8
4500	8
5000	8

(a) Plot a **line graph** for the figures shown in the table.



[3]

(b) Describe fully the conclusion shown by the results of the investigation.

_____

_____

_____[2]

(c) It is proposed that fossil fuel power stations should be replaced with nuclear power stations. Describe **two** environmental advantages of this proposal.

_____

_____

_____[2]

(d) Fossil fuels and nuclear power are described as non-renewable energy sources. Explain the term **non-renewable**.

_____

_____[1]

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Marks	Remark

THIS IS THE END OF THE QUESTION PAPER

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