Rewarding Learning

Centre Number

71	

Candidate Number

General Certificate of Secondary Education
2011

Science: Double Award (Modular)

Paper 3
Foundation Tier

[G8203]

WEDNESDAY 25 MAY, MORNING

G8203

TIME

1 hour.

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 four** questions.

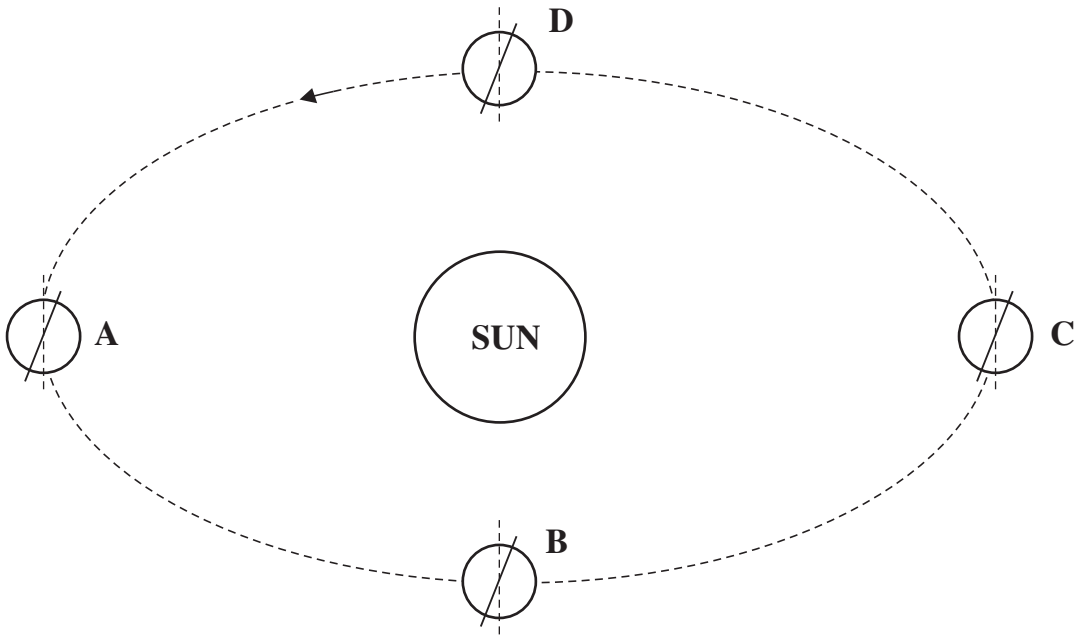
INFORMATION FOR CANDIDATES

The total mark for this paper is 80.
Quality of written communication will be assessed in Question **4(c)(i)**.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Details of calculations should be shown.
Units must be stated in numerical answers where appropriate.

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

Examiner Only	
Marks	Remark

1 The orbit of the Earth round the Sun is shown in the following diagram.



(a) (i) In which position **A**, **B**, **C**, or **D** is winter experienced in the Northern hemisphere?

_____ [1]

(ii) Give a reason for your answer to **(i)**.

_____ [1]

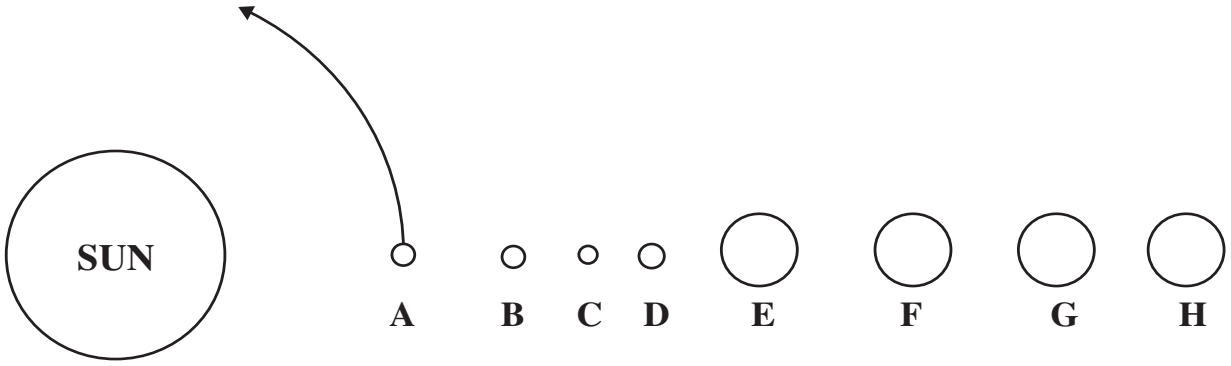
(iii) Shade the part of the Earth that is in darkness in position **A**. [1]

(iv) What is the name of the force which causes the Earth to orbit the Sun?

Force is called _____ [1]

Below is a diagram of the Solar System. It is not to scale.

Examiner Only	
Marks	Remark



(b) (i) Name planets **B** and **H**.

B _____ **H** _____ [2]

(ii) Draw a curved arrow to indicate the direction of motion of planet **C** round the Sun. [1]

Planet **A** has a "year" equal to 88 days and a "day" equal to 58.6 days.

(iii) What does planet **A** do every 88 days?

_____ [1]

(iv) What does planet **A** do every 58.6 days?

_____ [1]

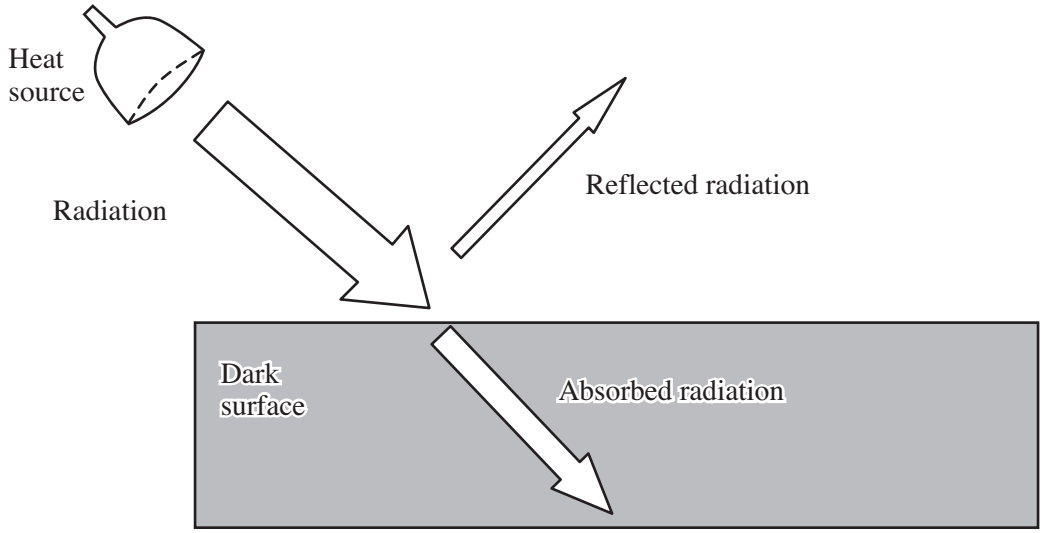
(v) The above diagram shows the present model of the Solar System. What scientific theory existed before the Sun-centred model?

_____ [1]

(vi) Our Sun is a member of a galaxy. What is the name of this galaxy?

_____ [1]

The following diagram shows radiation from a hot object striking a dark surface.



37% of the radiation is reflected.

(c) (i) What percentage of radiation is absorbed by the dark surface?

_____ % [1]

(ii) How would the percentage of reflected radiation change if the dark surface were replaced by a light coloured surface of the same material?

_____ [1]

Underground hot water pipes are often insulated to prevent heat loss.

(d) (i) Name a suitable material for insulating the water pipes.

_____ [1]

(ii) Why is this material suitable?

_____ [1]

Examiner Only

Marks	Remark

Coffee can be stirred with a metal spoon or a plastic spoon.

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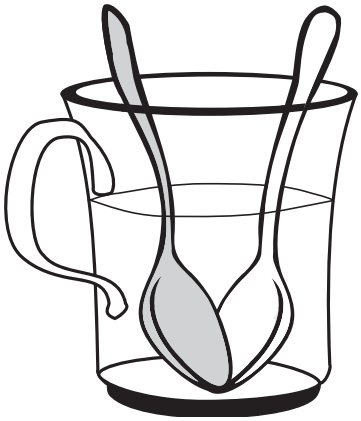
Marks	Remark



(e) (i) Name the method of heat transfer through these spoons.

_____ [1]

(ii) Which particles are mainly responsible for the transfer of heat along the metal spoon?

_____ [1]

(iii) Describe how heat passes through the plastic spoon.

_____

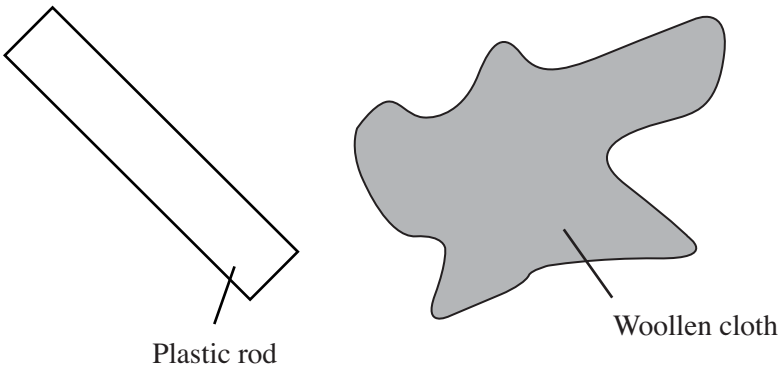
_____ [2]

(iv) How can heat loss from the top surface of a cup of coffee be reduced?

_____ [1]

Examiner Only	
Marks	Remark

2 **(a)** When insulators are rubbed together static electricity is produced.
A plastic rod becomes negatively charged when it is rubbed with a woollen cloth.



(i) What charged particles move from the woollen cloth to the plastic rod?

_____ [1]

(ii) What charge is left on the woollen cloth?

_____ [1]

(b) Before a racing car is refuelled, a conducting metal strip is connected between the car and the ground.
This is called "earthing".

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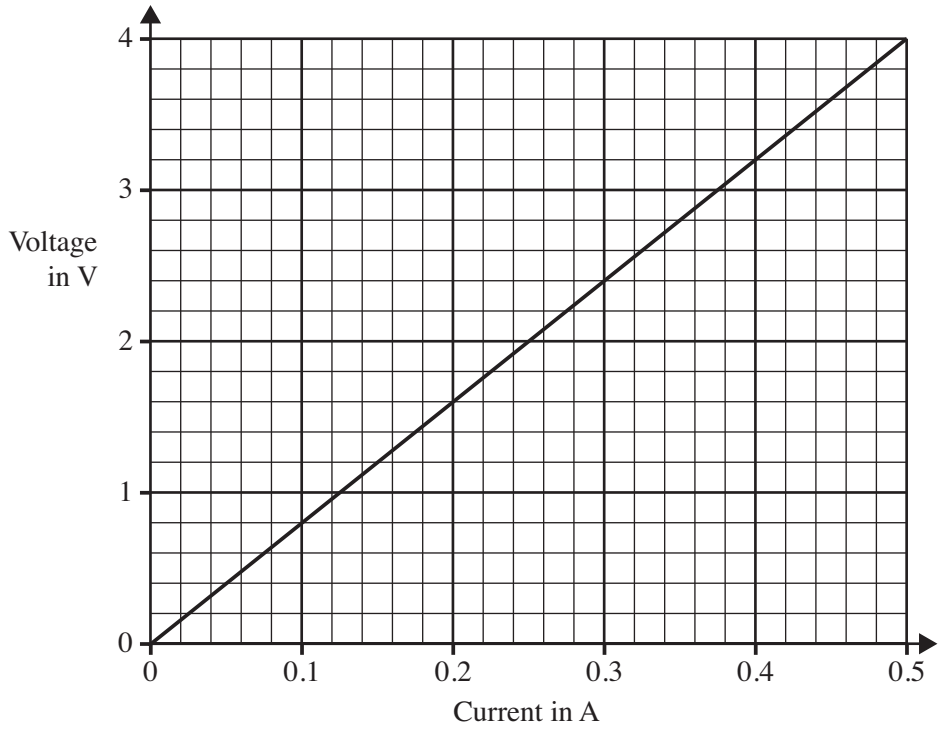
Explain why it is essential to earth the racing car when refuelling.

_____

_____ [2]

Examiner Only	
Marks	Remark

(c) A pupil plots a graph of voltage against current for a metal wire.



(i) What is the voltage across the wire when the current flowing through it is 0.3 A?

_____ V [1]

(ii) Calculate the resistance of the wire when the current is 0.5A.

You are advised to show your working out

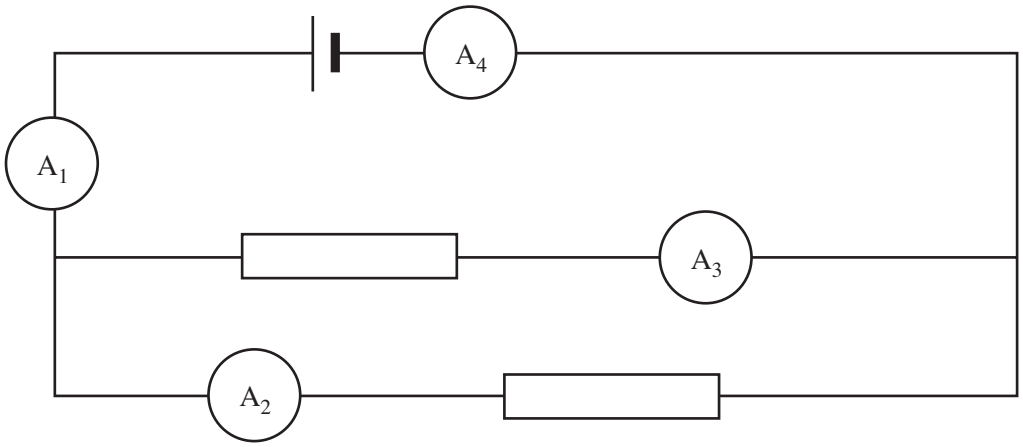
Resistance = _____ Ω [3]

(iii) Which two features of the graph show that the voltage is directly proportional to the current?

1. _____

2. _____ [2]

(d) A pupil sets up the following circuit to measure currents through **identical** resistors.



Ammeter A_1 reads 40 mA. What are the readings on the other ammeters?

(i) Ammeter A_2 reads _____ mA

(ii) Ammeter A_3 reads _____ mA

(iii) Ammeter A_4 reads _____ mA [3]

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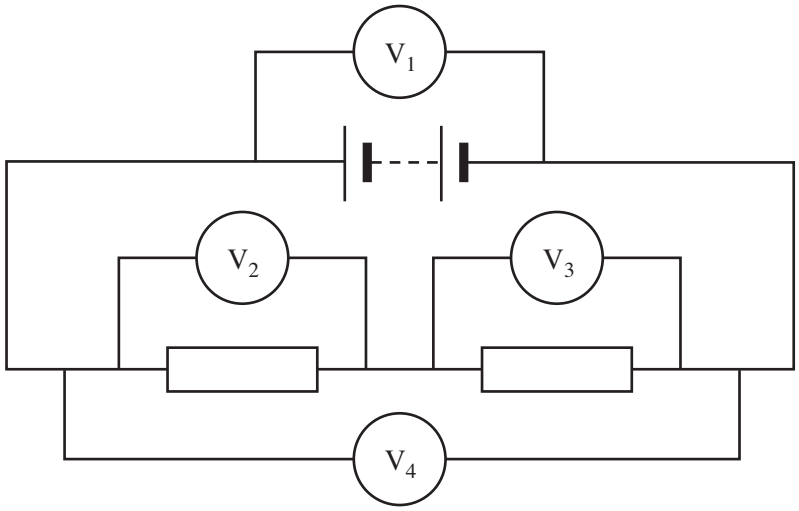
Marks	Remark

Examiner Only	
Marks	Remark

(e) The pupil now measures voltages across **identical** resistors.



Voltmeter V_1 reads 8.0 volts. What are the readings on the other voltmeters?

(i) Voltmeter V_2 reads _____ V

(ii) Voltmeter V_3 reads _____ V

(iii) Voltmeter V_4 reads _____ V [3]

(f) **(i)** The power of a vacuum cleaner is 1.25 kW.
Calculate the number of units of electrical energy in kWh used by the vacuum cleaner in 2 hours.

You are advised to show your working out.

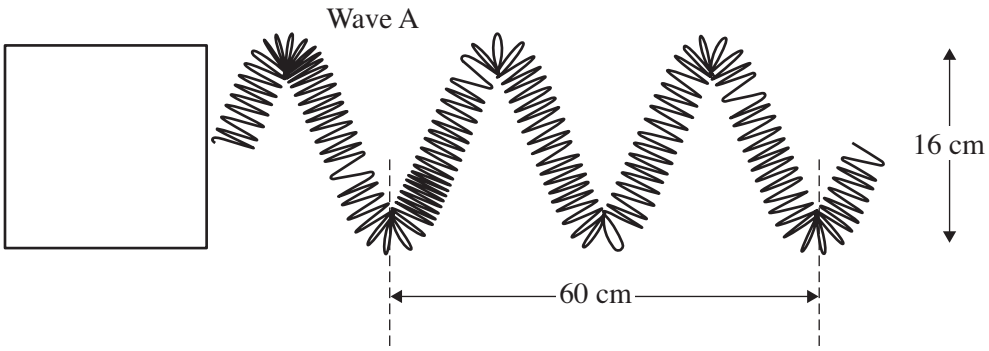
Energy used = _____ kWh [3]

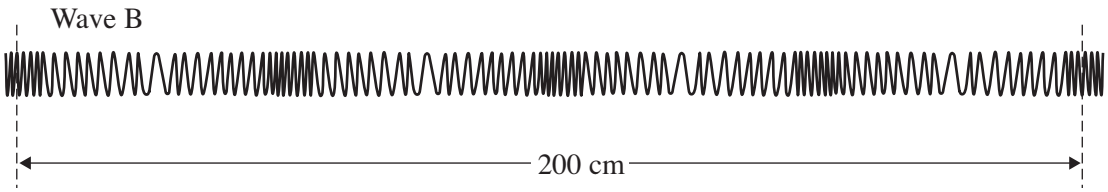
(ii) How much does it cost to operate the vacuum cleaner for 2 hours if 1 unit of electricity costs 12p?

Cost = _____ p [1]

Examiner Only	
Marks	Remark

3 **(a)** A stretched slinky spring can be used to demonstrate waves.





(i) What do both waves transfer as they move from left to right?

_____ [1]

(ii) In the box to the left of wave A indicate the direction of vibration of a particle in the spring. [1]

(iii) What types of wave are A and B?

Wave A _____ Wave B _____ [2]

(iv) What is the wavelength of wave A?

_____ cm [1]

(v) What is the wavelength of wave B?

_____ cm [1]

(vi) What is the amplitude of wave A?

_____ cm [1]

The end of wave B vibrates 40 times in 10 seconds.

(vii) How many times does the end of wave B vibrate in one second?

_____ [1]

(viii) What is the frequency of vibration of wave B?

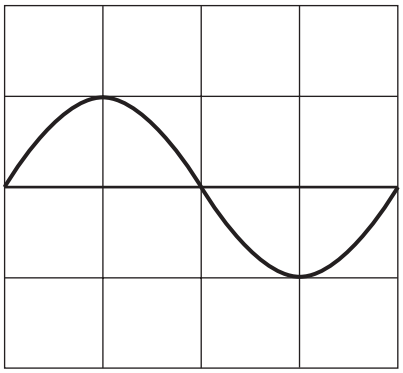
_____ Hz [1]

(b) A wave has a frequency of 6 Hz and a wavelength of 0.4 m.
Calculate the speed of the wave.

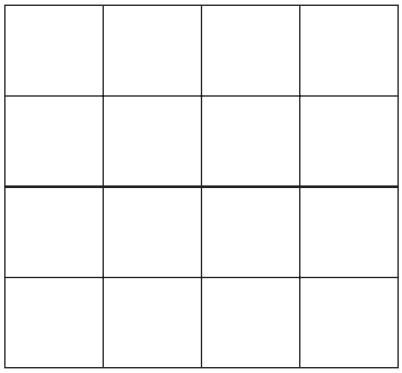
You are advised to show your working out.

Speed = _____ m/s [3]

(c) The sound wave produced by a tuning fork is displayed on a CRO.



In the space below draw the sound wave produced by a tuning fork of greater loudness and the same frequency.



[2]

Examiner Only

Marks	Remark

(d) For each statement tick (✓) the box to show whether it is true or false.

Statement	True	False
Sound and light travel at the same speed in air.		
Light can travel through a vacuum.		
Sound is a longitudinal wave motion.		

[3]

(e) **(i)** What damage can a long exposure to loud sound cause to the ears?

_____ [1]

(ii) What precaution can people who operate very noisy machines take to reduce damage to their ears?

_____ [1]

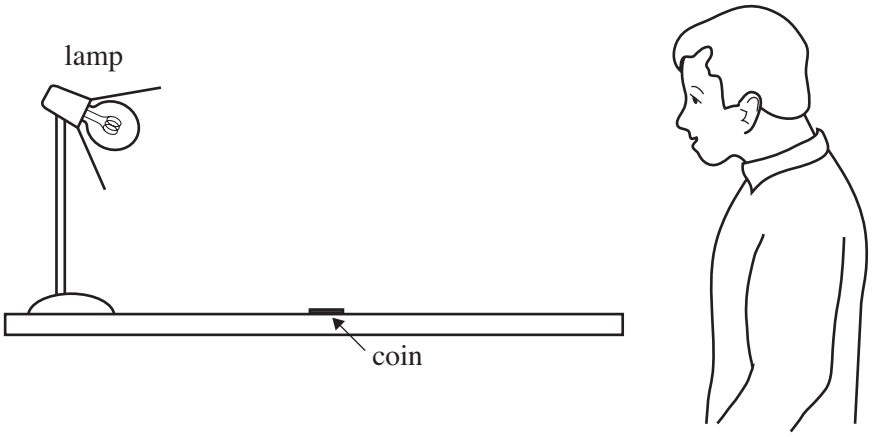
(iii) What happens to the upper frequency limit of hearing with increasing age?

_____ [1]

Examiner Only

Marks	Remark

4 John observes a coin sitting on a table.

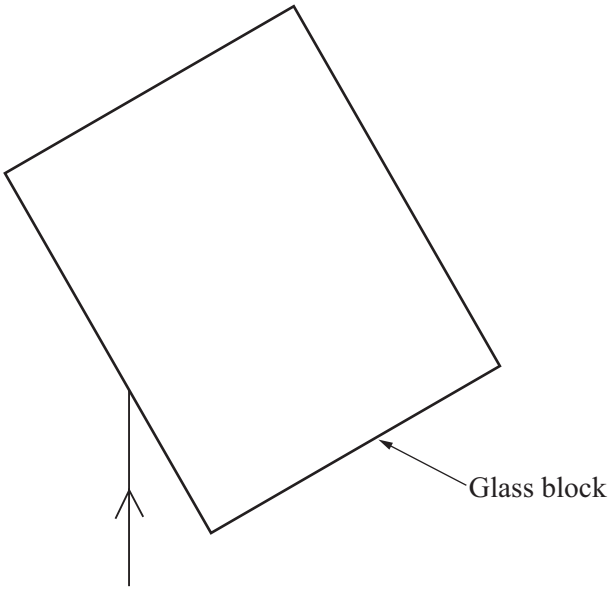


(a) (i) Draw an incident ray and a reflected ray to show how John sees the coin. Include an arrow to show the direction of the light. [3]

(ii) John sees the coin because of reflected light. Other objects are seen by the light they emit. Give an example of an object seen because of the light it emits.

Name of object _____ [1]

A ray of light travels from air into glass. The incident ray is shown.



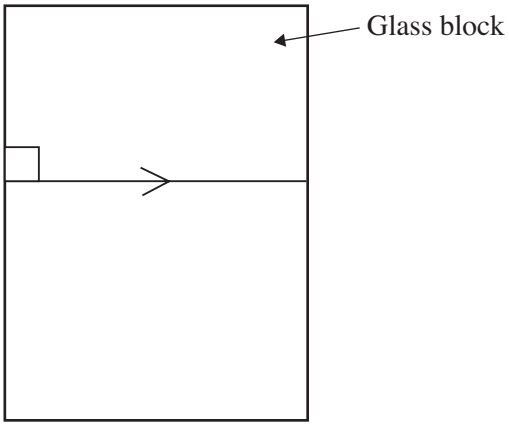
(b) (i) Draw in the normal and show the refracted ray inside the glass. [3]

Examiner Only

Marks	Remark

Examiner Only	
Marks	Remark

(ii) Draw in the incident ray which produces the ray inside the glass block as illustrated below.



[1]

(iii) Choose the correct statement below to show what happens to light when it travels from air into glass. Tick (✓) the correct box.

The light travels faster in glass than in the air. ☐

The light travels at the same speed in air and glass. ☐

The light travels faster in air than in glass. ☐ [1]

(c) (i) Explain fully the meaning of the term **dispersion**.

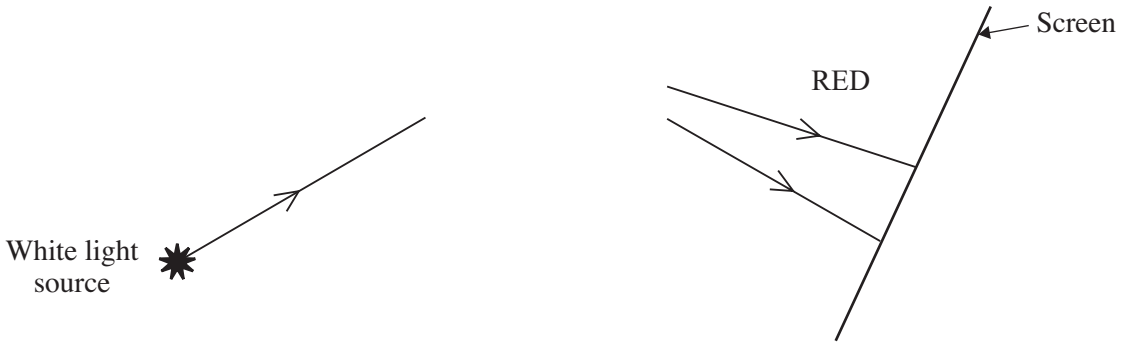
_____

_____

_____ [2]

Quality of written communication [1]

The diagram shows part of an arrangement which is used to demonstrate dispersion.



(ii) What piece of apparatus is missing?

_____ [1]

(iii) What is the name of the band of colours produced on the screen?

_____ [1]

(iv) State the colours, in order, starting with red in the diagram above.

Red, _____ [1]

Examiner Only

Marks	Remark

Freda attempts to list the parts of the electromagnetic spectrum in order of increasing wavelength. However, one part is missing and another two parts have been interchanged.

X-Rays	Gamma Rays		Visible	Infra-red	Micro-waves	Radio

Increasing wavelength →

(d) (i) Which part is missing?

_____ [1]

(ii) Which two parts have been interchanged?

_____ and _____ [1]

Different parts of the spectrum have different uses. Identify the following parts from the information given.

(e) (i) This part is used to check for broken bones.

_____ [1]

(ii) This part is used in communication when two people wave to each other.

_____ [1]

(iii) This part is emitted from hot bodies.

_____ [1]

THIS IS THE END OF THE QUESTION PAPER

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Marks	Remark

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