



Rewarding Learning

ADVANCED

General Certificate of Education

2023

Centre Number

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Candidate Number

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Life and Health Sciences

Assessment Unit A2 4

assessing

Sound and Light

[AZ041]

WEDNESDAY 21 JUNE, MORNING



AZ041

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Answer **all ten** questions.

Write your answers in the spaces provided.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question, or part question.

You may use an electronic calculator.

Quality of written communication will be assessed in question **9(a)**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
Total Marks	

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(Questions continue overleaf)

- 4 A noise level safety test was completed for a power drill and a circular saw. The measurements were taken at a distance of 1.0 m from each piece of equipment.

Equipment	Decibel level /dB
Power drill	98
Circular saw	102

- (a) Why is a logarithmic scale useful when describing human hearing?

_____ [1]

- (b) (i) Calculate the sound intensity of the circular saw at a distance of 1.0 m.

You are advised to show your working.

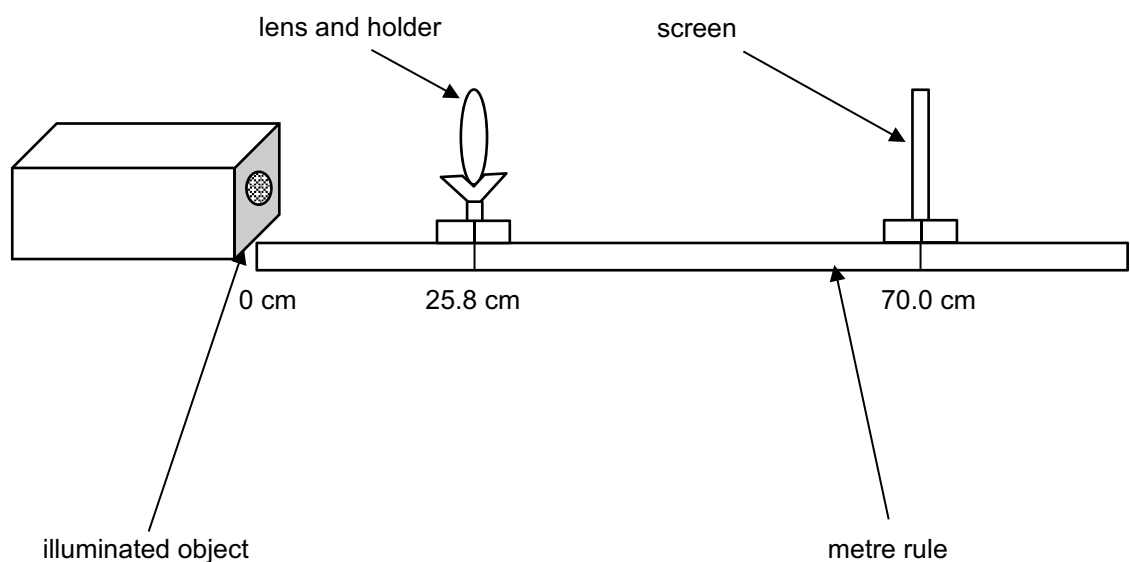
Intensity = _____ Wm^{-2} [3]

Examiner Only	
Marks	Remark

- 5 A student completes an experiment to determine the focal length of a converging lens.

The student sets up the following apparatus.

The metre rule is placed with the object at the 0 cm mark and the screen is placed at the 70.0 cm mark as shown.



Source: Principal Examiner

The lens was moved until a sharp image formed on the screen. The position of the lens was recorded as 25.8 cm.

- (i) Calculate the focal length of the converging lens.

You are advised to show your working.

Focal length = _____ cm

[4]

Examiner Only

Marks Remark

- 6 (a) (i) The near point for a normal eye is 25.0 cm.
What is meant by the term near point?

_____ [1]

- (ii) A girl has a near point of 69.0 cm.
Calculate the power of the reading glass lenses required to
correct her near point.

You are advised to show your working.

Power = _____ D [3]

- (iii) Before putting on the reading glasses the girl can focus clearly on
objects which were 69 cm away and beyond.

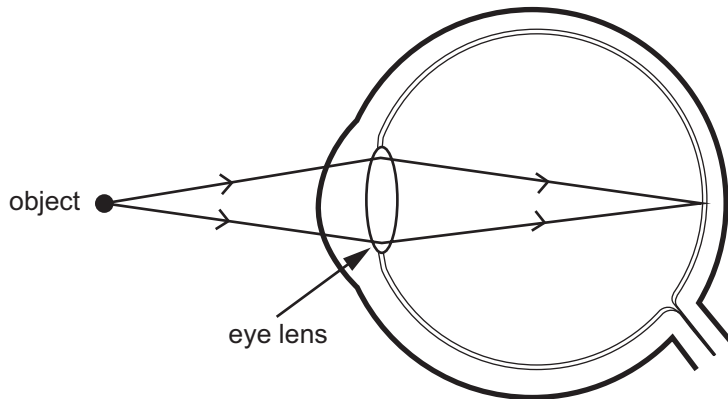
When wearing the reading glasses, the girl can only focus on
objects up to the focal length of the lens.

What is the new range of vision for the girl when wearing the
reading glasses?

Range from _____ cm to _____ cm [2]

Examiner Only	
Marks	Remark

(b) The following diagram shows how a normal eye focuses on a close up object.

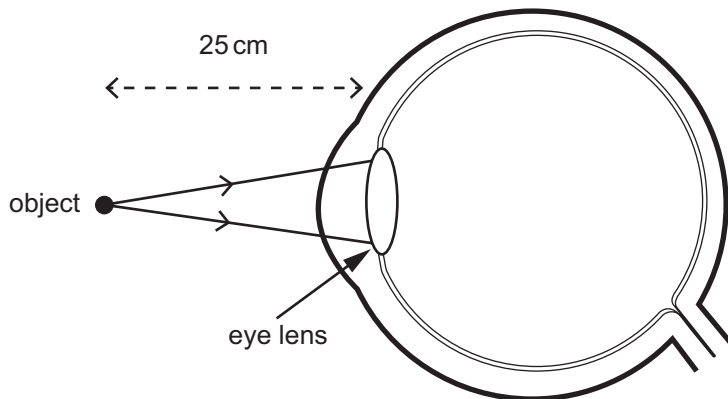


Source: Principal Examiner

(i) Label the position of the retina and the cornea on the diagram above.

[1]

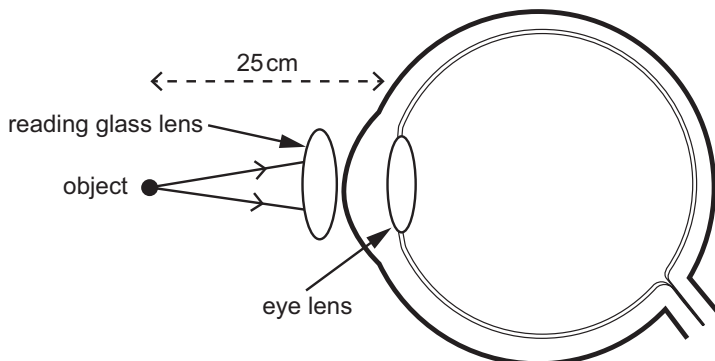
(ii) Complete the following diagram to show the rays of light passing through a long-sighted eye **before** a lens is used to correct the eyesight.



Source: Principal Examiner

[1]

(iii) A reading-glass lens is used to correct the vision of a person with long sight. Complete the following diagram to show the rays of light passing through a long-sighted eye.



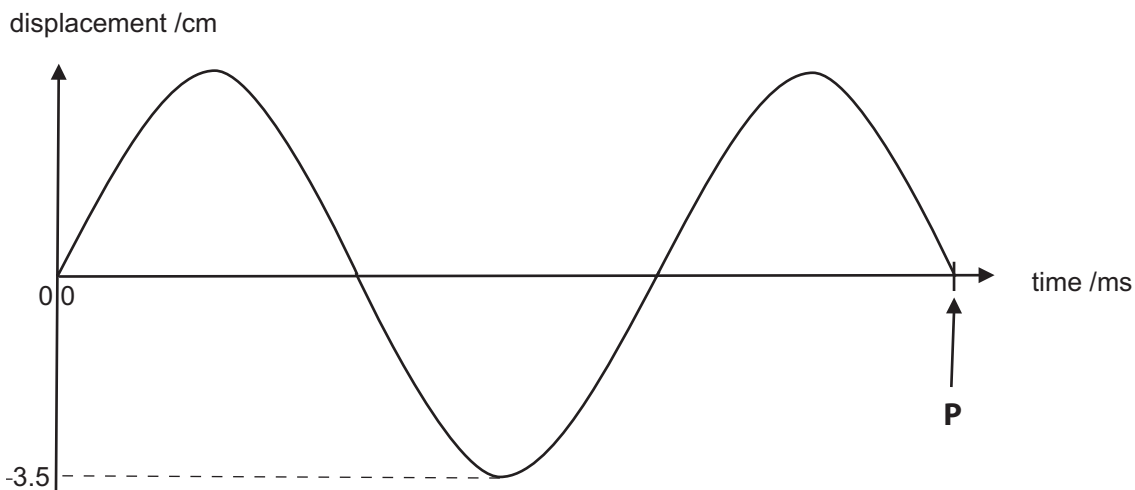
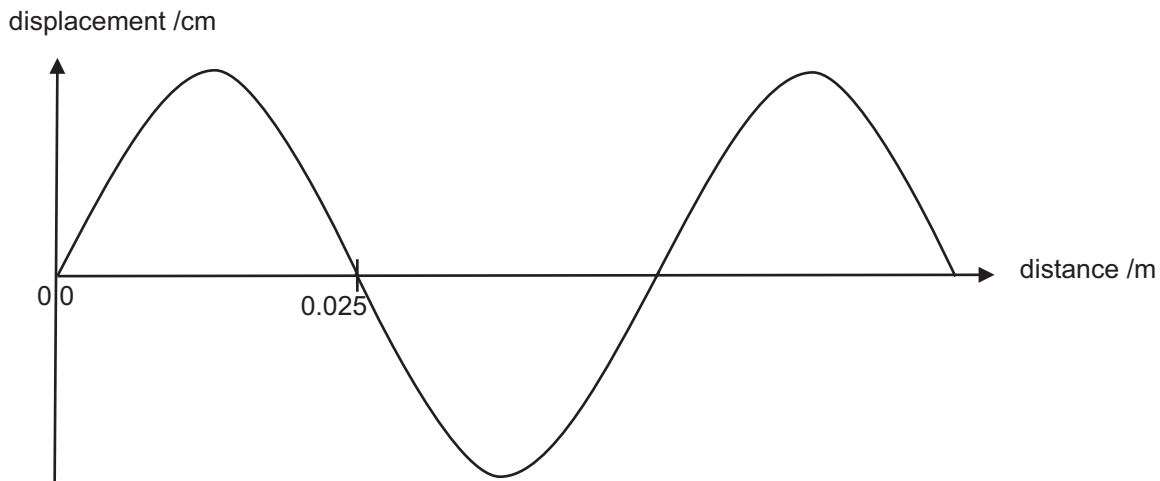
Source: Principal Examiner

[2]

Examiner Only	
Marks	Remark

8 (a) The graphs below provide information regarding the same wave.

Examiner Only	
Marks	Remark



(i) Tick the box which correctly describes the wave.

The wave shown is transverse

The wave shown is longitudinal

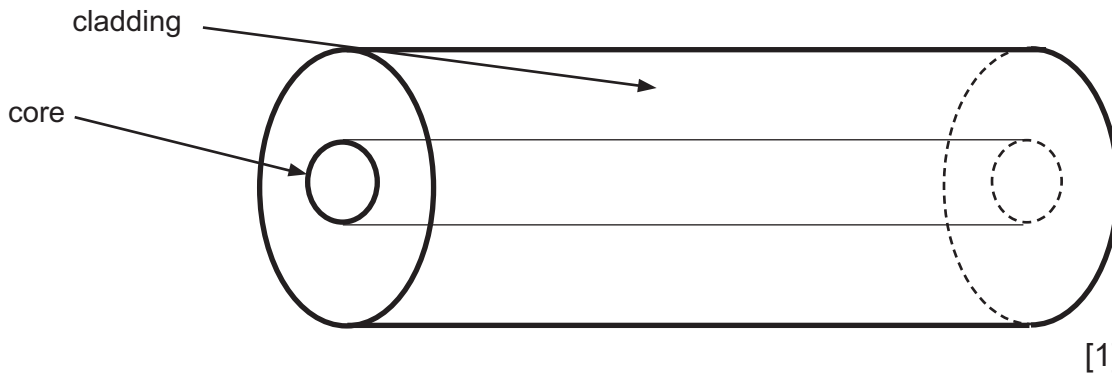
The wave shown could be either transverse or longitudinal

[1]

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(Questions continue overleaf)

(ii) Complete the simplified diagram of a **single mode fibre optic cable** by showing a ray of light travelling along the fibre.



(iii) State an example of when single mode fibre optic cables are more useful than multimode cables.

[1]

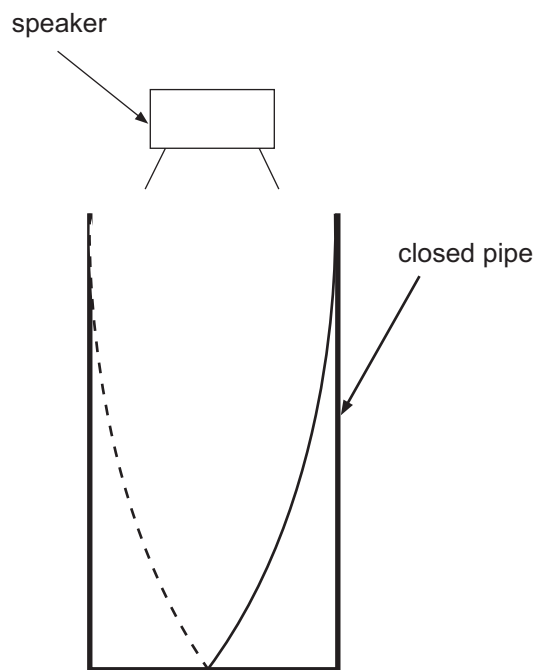
Examiner Only	
Marks	Remark

10 (a) How are standing waves created?

[2]

(b) The diagram below shows a standing wave pattern of a sound wave in a closed pipe of length 28.0 cm.

The standing wave pattern shown is for the first harmonic which occurs at a frequency of 300 Hz.



(i) Mark the positions of all nodes N and antinodes A on the diagram above. [1]

(ii) What is the wavelength of the sound generated by the speaker when the frequency is 300 Hz?

Wavelength = _____ cm [1]

Examiner Only	
Marks	Remark

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