

Other Applications of Light

Question Paper

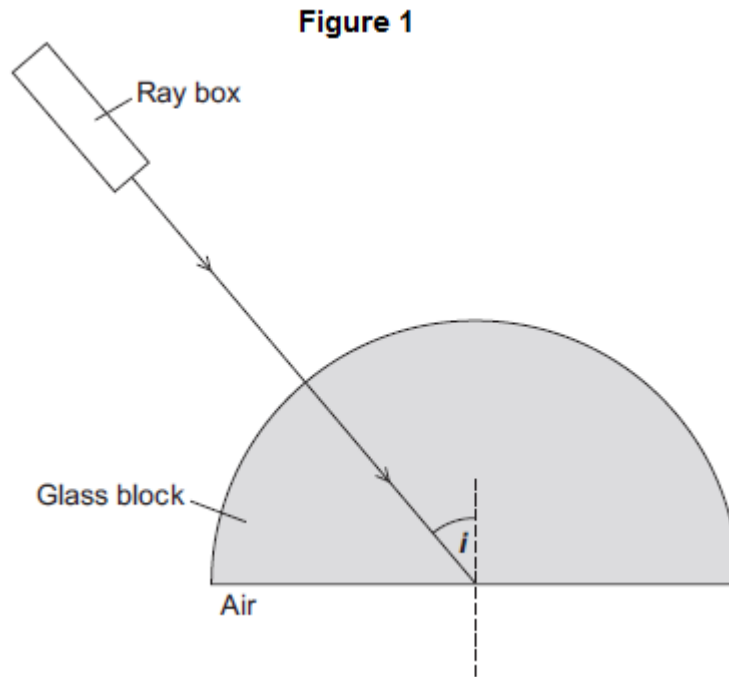
Level	GCSE
Subject	Physics
Exam Board	AQA
Unit	P3
Topic	Other Applications of Light
Difficulty Level	Gold Level
Booklet	Question Paper

Time Allowed: 26 minutes

Score: /26

Percentage: /100

Q1. Figure 1 shows a ray of light travelling through a semicircular glass block. The angle of incidence is labelled i .



- (a) (i) The angle of incidence i equals the critical angle for the glass.

Complete **Figure 1** to show what happens to the ray of light at the glass-to-air boundary.

(1)

- (ii) The critical angle for the glass is 41° .

Calculate the refractive index of the glass.

Use the correct equation from the Physics Equations Sheet.

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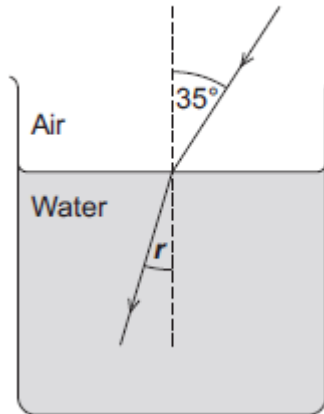
Refractive index =

(2)

- (b) **Figure 2** shows what happens to a ray of light as it meets the boundary between air

and water.

Figure 2



Not to scale

The refractive index of the water is 1.3.

Calculate the angle of refraction r .

Use the correct equation from the Physics Equations Sheet.

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Angle of refraction = degrees

(3)
(Total 6 marks)

Q2.(a) Human eyes and digital cameras both have parts with the same function.

Complete the missing parts in the table below.

Details of part	Part of eye	Part of digital camera
Refracts light to produce an image	Cornea and lens	Lens
Images are focused here	Retina

Variable opening where light enters	Aperture
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(2)

(b) Long sight is a defect of the human eye.

State **two** causes of long sight.

1

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2

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(2)

(c) Long sight can be corrected by wearing spectacles with converging (convex) lenses.

A lens in these spectacles has a power of +3.2 dioptries.

Calculate the focal length of this lens.

Use the correct equation from the Physics Equations Sheet.

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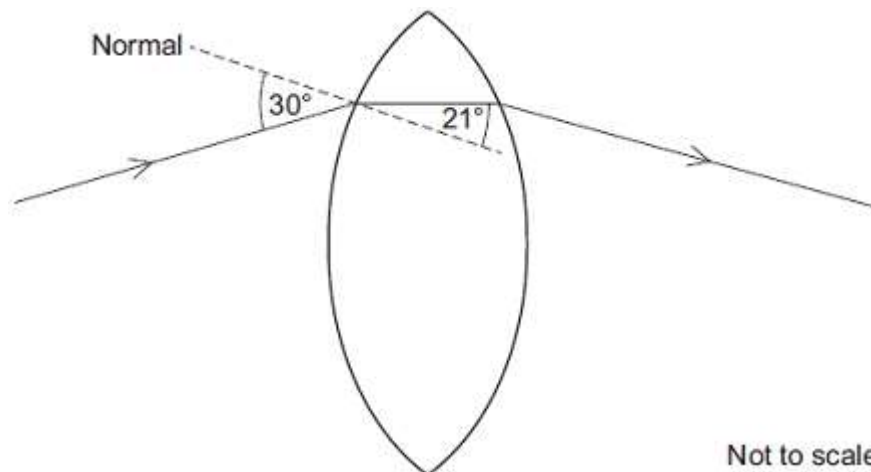
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Focal length = metres

(2)

(d) The figure below shows a ray of light passing through a converging (convex) lens.



- (i) Use the information in the figure above to calculate the refractive index of the glass used to make the lens.

Use the correct equation from the Physics Equations Sheet.

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Refractive index =

(3)

- (ii) Different lenses of the same power can be made using glass of a different refractive index.

State **one** advantage of making spectacles using lenses made from glass of a higher refractive index.

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(1)

(Total 10 marks)

Q3.Figure 1 shows how a ray of light from a laser travels along an optical fibre.

Figure 1



- (a) Why does the ray of light stay within the optical fibre?

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(1)

- (b) The material used to make the optical fibre has a refractive index of 1.50.
Calculate the critical angle of this material.

Use the correct equation from the Physics Equations Sheet.

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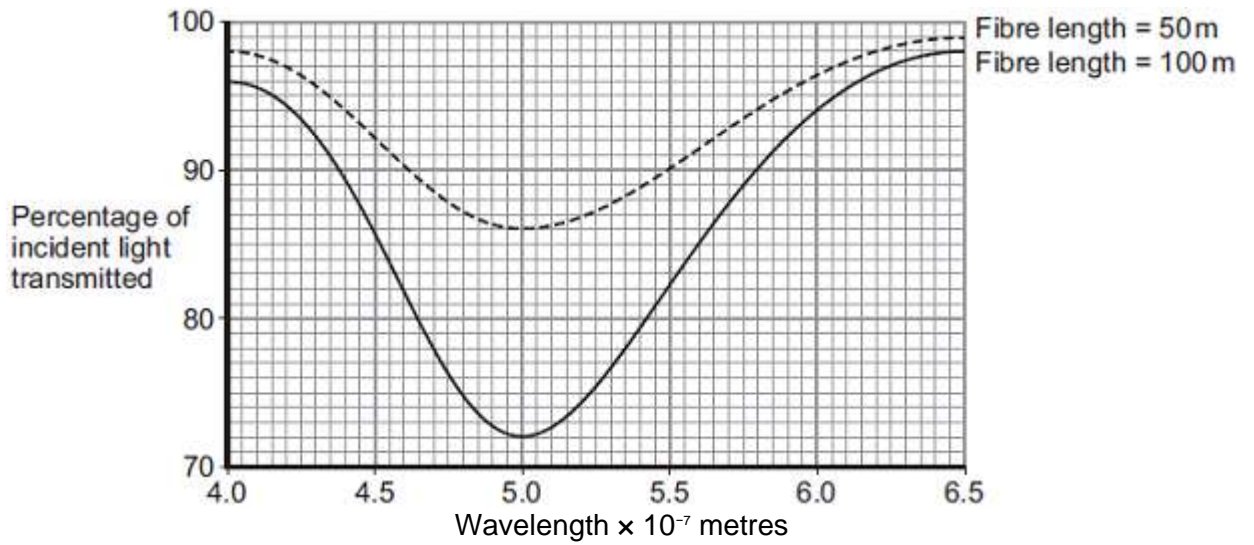
Critical angle = degrees

(2)

- (c) Different wavelengths of light can be used to transmit information along optical fibres.

Figure 2 shows how the percentage of incident light transmitted through a fibre varies with the wavelength of light and the length of the fibre.

Figure 2



Compare the percentages of incident light transmitted through the two different fibres over the range of wavelengths shown.

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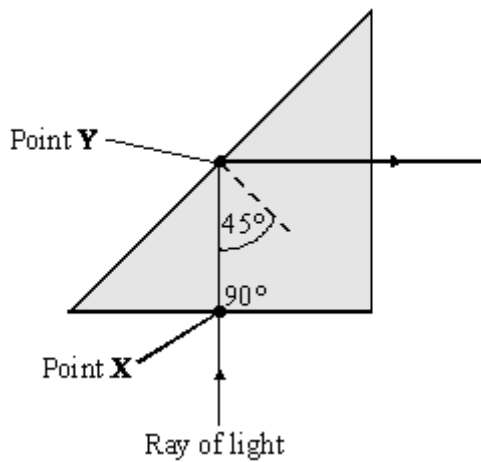
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(3)
(Total 6 marks)

Q4. The diagram shows a glass prism.



(i) Explain why refraction has **not** occurred at point X.

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(1)

(ii) (A) Give the full name for the process which has occurred at point Y.

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(1)

(B) Explain why this process has occurred.

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(2)

(Total 4 marks)