


# Physics

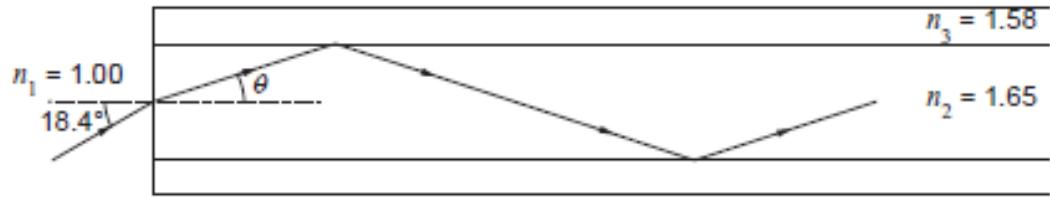
Question	Maximum Mark	Mark Awarded
#1	6	
#2	6	
#3	6	
#4	8	
#5	10	
#6	14	
Total	50	

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 **Question Bank**  
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#1

2. A light ray enters an optical fibre as shown.



(a) Show that the angle  $\theta$  is approximately  $10^\circ$ . [2]

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(b) Deduce whether or not this light will propagate along the length of the optical fibre with total internal reflection as shown. [4]

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Question taken from Eduqas examination paper 842103, June 2018

#2

Explain the advantages of monomode optical fibres over multimode optical fibres when transmitting a rapid sequence of pulses. [6 QER]

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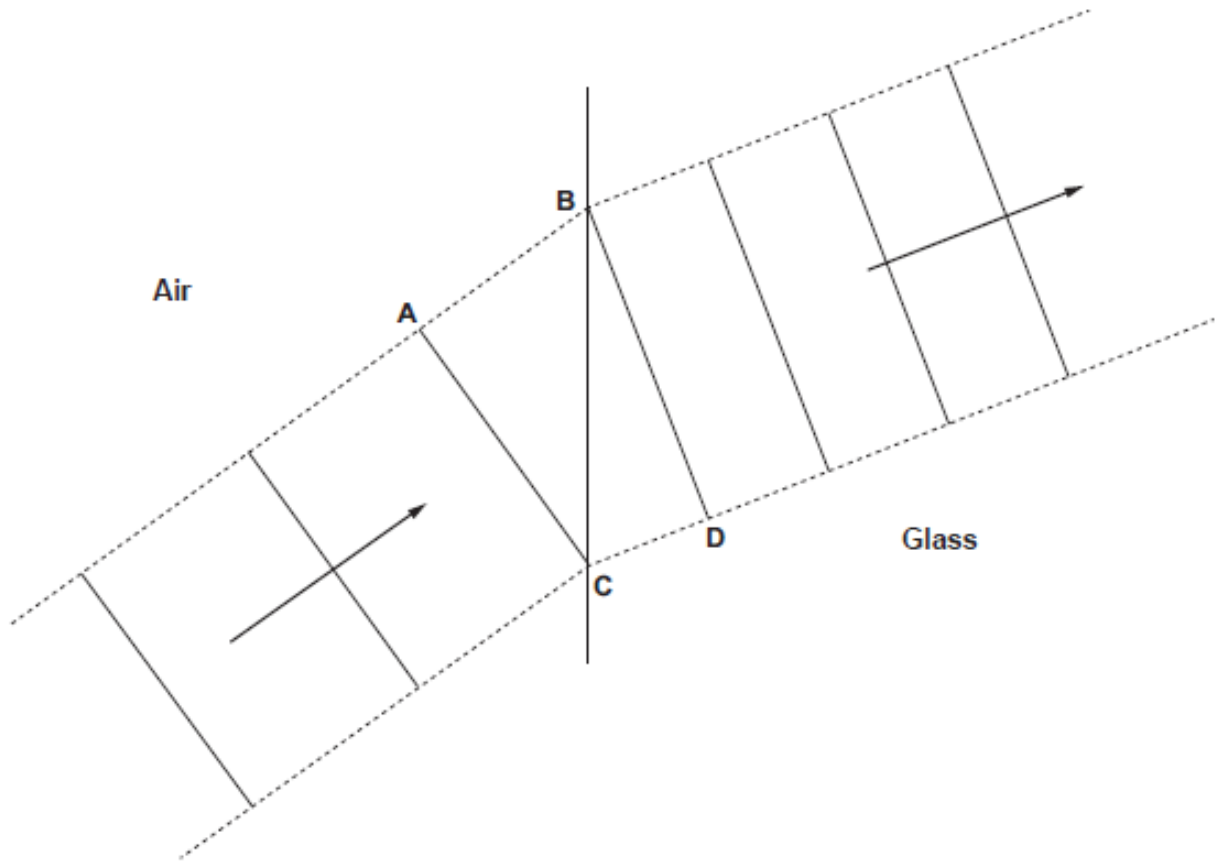
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Question taken from Eduqas examination paper 842103, June 2017

#3

3. A light beam travelling in air hits a boundary with glass. The diagram shows wavefronts on the light beams in the air and in the glass.



- (a) State what is meant by refraction and use the diagram to explain why refraction occurs. [3]

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(b) By measuring appropriate lengths from the diagram calculate the speed of light in the glass. [3]

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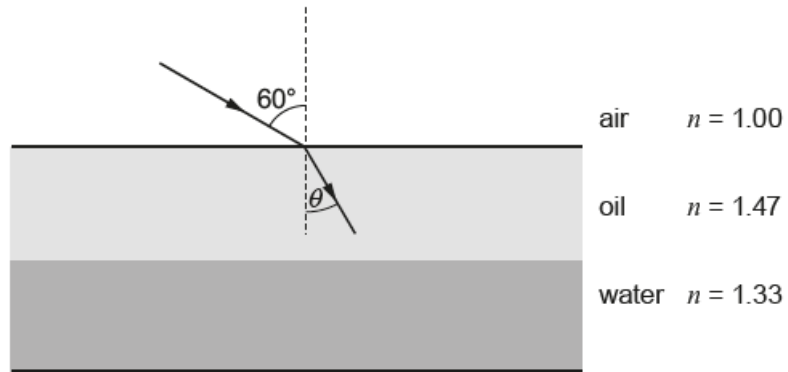
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Question taken from Eduqas examination paper 842002, June 2019

#4

The diagram shows a ray of light incident at an angle of  $60^\circ$  to the surface of a layer of oil that is floating on water.



(a) Calculate the angle of refraction,  $\theta$ . [2]

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(b) (i) Calculate the critical angle for a ray of light travelling from oil to water. [2]

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(ii) State and explain what happens to the ray of light in the diagram above when it reaches the boundary with the water. [2]

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(c) Determine the speed of the light in the oil. [2]

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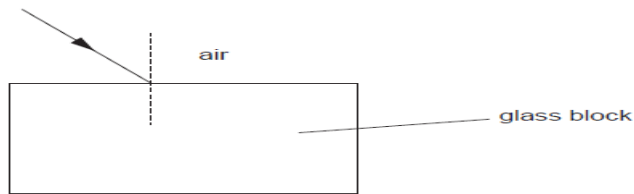
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Question taken from Eduqas examination paper 842002, June 2017

#5

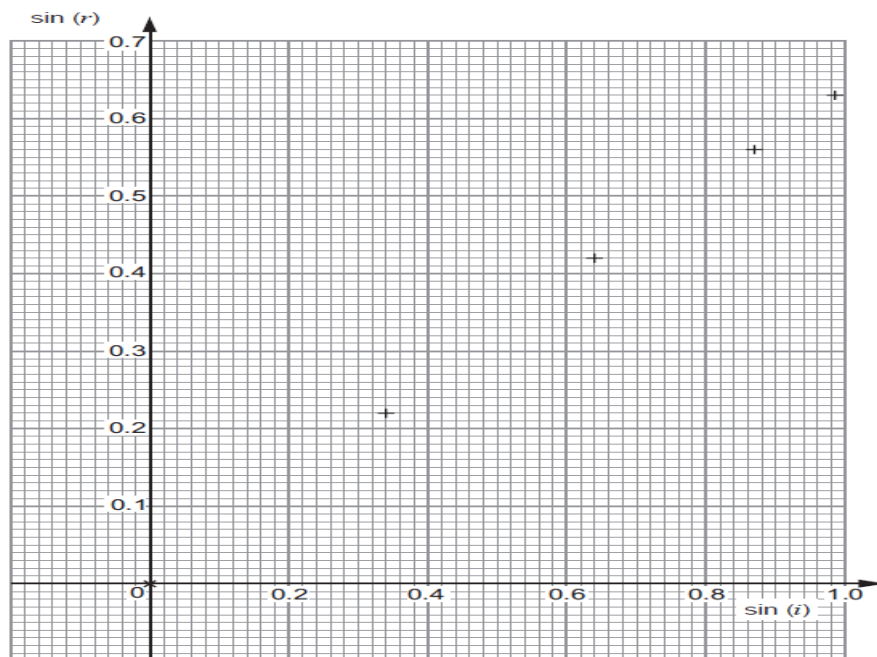
An experiment is carried out to investigate Snell's law. Laser light is passed through a glass block and the angles of incidence and refraction are measured using a protractor.



(a) **Draw** the refracted ray and the ray emerging from the glass block on the above diagram. [2]

(b) The results obtained are collated in the following table and plotted on the grid.

Incident angle ( $i$ ) / degrees $\pm 1^\circ$	Refracted angle ( $r$ ) / degrees $\pm 1^\circ$	$\sin(i)$	$\sin(r)$
0	0	$0.00 \pm 0.02$	$0.00 \pm 0.02$
20	13	$0.34 \pm 0.02$	$0.22 \pm 0.02$
40	25	$0.64 \pm 0.01$	$0.42 \pm 0.02$
60	34	$0.87 \pm 0.01$	$0.56 \pm 0.01$
80	39	$0.985 \pm 0.005$	$0.63 \pm 0.01$



- (i) **Add error bars** to the data points and also draw the lines of maximum gradient and minimum gradient. [4]
- (ii) Determine the refractive index of the block along with a value for its **absolute uncertainty**, quoting your results to an appropriate number of significant figures. [4]

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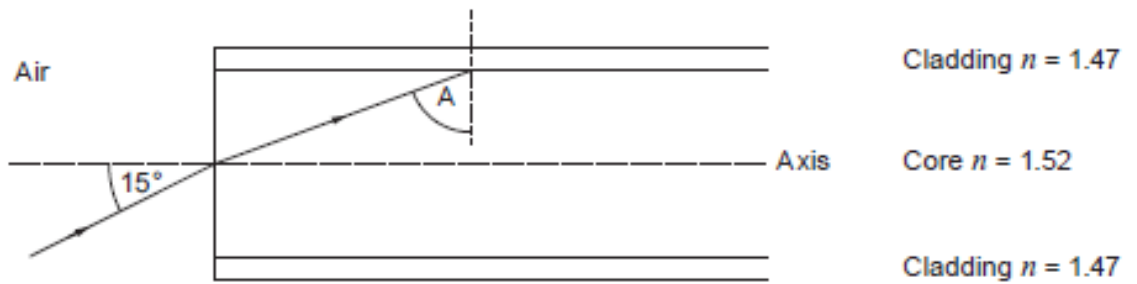
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Question taken from Eduqas examination paper 842103, June 2017

#6

6. (a) A multimode optical fibre has a core made of glass of refractive index 1.52. The cladding is made of a material with refractive index 1.47.



- (i) Calculate the critical angle for the core-cladding boundary. [2]

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- (ii) A beam of light enters the optical fibre from air at an angle of  $15^\circ$  as shown. Calculate angle A. [3]

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- (iii) A technician states that the beam of light entering the fibre from air at an angle of  $15^\circ$  will not travel down the optical fibre. Evaluate whether the technician is correct. [2]

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- (b) Calculate the time taken for the light to travel along the axis of a straight optical fibre of length 15 km. [3]

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- (c) (i) State how the paths of light in monomode and multimode optical fibres differ. [1]

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- (ii) Explain the advantage of monomode optical fibres over multimode optical fibres for communicating a rapid sequence of data encoded as light pulses. [3]

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Question taken from Eduqas examination paper 842002, June 2018