

Question Number	Answer	Mark
16ai	<p>Use of $n_1 \sin \theta_1 = n_2 \sin \theta_2$ (1) with $\sin \theta_2$ as 1 (1) critical angle = 75.1° (1)</p> <p>Or calculates ratio $n_2:n_1$ (1) Use of $\sin C = 1/n$ (1) critical angle = 75.1° (1)</p> <p><u>Example of calculation</u> $n_1 \sin \theta_1 = n_2 \sin \theta_2$ $1.48 \times \sin C = 1.43 \times \sin 90^\circ$ $C = 75.1^\circ$</p>	3
16aii	<p>Angle of incidence measured/stated in range $79\text{-}81^\circ$ (1) This is greater than the critical angle (1) <u>Total internal reflection</u> takes place (1)</p> <p>(MP1 can be awarded for seeing angle correctly marked on diagram) (If no angle of incidence measured, score 0) (MP3 dependent upon awarding MP2) (MP2 and MP3 can be awarded if angle of incidence is measured to be between 76° and 85°)</p> <p>(e.c.f. from (i))</p>	3
16bi	<p>Use of $n = c/v$ with $n = 1.48$ (1) Use of speed = distance / time (1) Time = 3.4×10^{-4} s (1)</p> <p>(Allow MP2 if using speed of light in a vacuum)</p> <p><u>Example of calculation</u> $v = c/n = 3.00 \times 10^8 \text{ ms}^{-1} / 1.48 = 2.03 \times 10^8 \text{ ms}^{-1}$ time = distance / speed = $70,000 \text{ m} / 2.03 \times 10^8 \text{ ms}^{-1} = 3.45 \times 10^{-4} \text{ s}$</p>	3
16bii	<p>(Lower RI leads to) lower critical angle (1)</p> <p>More light (totally internally) reflected Or less light refracted Or more of the incident light will hit the boundary at an angle greater than the critical angle (1)</p> <p>(MP2 dependent on awarding MP1)</p>	2
Total for question 16		11