Mark scheme for Support Worksheet – Topic 4, Worksheet 5

1 The diffraction angle is $\theta_D = 1.22\frac{\lambda}{b} = 1.22\frac{480\times10^{-9}}{3.0\times10^{-3}} \approx 2\times10^{-4}$ rad; since $\theta_A > \theta_D$ the sources will be resolved. [2]

2 Light is polarised if the electric field of the electromagnetic wave oscillates on only one plane. [1]

3 Light can be polarised by reflection; and by passing the light through a polariser. [2]

4 Look at the surface of the lake through the polariser as you rotate the polariser; the orientation at which the polariser looks darkest is when the transmission axis is vertical. [2]

5 The intensity after passing through the first polariser will be $\frac{I_0}{2}$; and after the second it will be $\frac{I_0}{2}\cos^2 60^\circ = \frac{I_0}{8}$ so $\frac{1}{8}$. [2]

6 Realisation that we are dealing with the Brewster angle; and so $n = \tan\phi = \tan 52^\circ = 1.28$ [2]

7 It means that polarised light entering the solution will have its plane of polarisation rotated as the ray moves through the solution. [1]