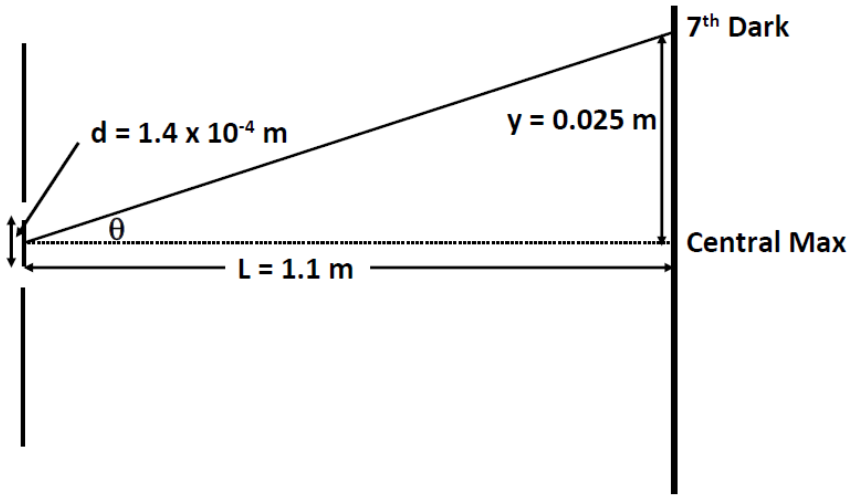
2. In a Young's double-slit experiment, the seventh dark fringe is located 0.025 m to the side of the central bright fringe on a flat screen, which is 1.1 m away from the slits. The separation between the slits is 1.4 x 10^{-4} m. What is the wavelength of the light being used?



Dark Fringes in a double-slit experiment have the defining equation

$$d\sin(\theta) = \left(m + \frac{1}{2}\right)\lambda$$

Solve for λ

$$\lambda = \frac{d\sin(\theta)}{\left(m + \frac{1}{2}\right)}$$

We get θ, by first using tangent

$$\tan(\theta) = \frac{y}{L} = \frac{0.025\ m}{1.1\ m} = 0.022727$$

$$\theta = \tan^{-1}(0.022727) = 1.3°$$

Now we can find λ

$$\lambda = \frac{d\sin(\theta)}{\left(m + \frac{1}{2}\right)} = \frac{(1.4\ x\ 10^{-4}\ m)\sin(1.3°)}{6 + \frac{1}{2}} = 4.887\ x\ 10^{-7}\ m$$

$$\boxed{\lambda = 4.9\ x\ 10^{-7}\ m}$$

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