

p693 17-25 odd

$$\textcircled{17} \sin \theta = \frac{\lambda}{b} = \frac{580 \times 10^{-9} \text{ m}}{0.044 \times 10^{-3} \text{ m}}$$
$$\theta = 0.755^\circ \text{ (from center to first minimum)}$$

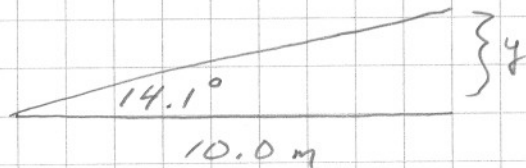
$$\text{Width of maximum} = \underline{1.51^\circ}$$

$$\textcircled{19} \text{ first dark fringe } \sin \theta = \frac{\lambda}{b} = \frac{520 \times 10^{-9} \text{ m}}{3.2 \times 10^{-6} \text{ m}}$$
$$\theta = 9.4^\circ$$

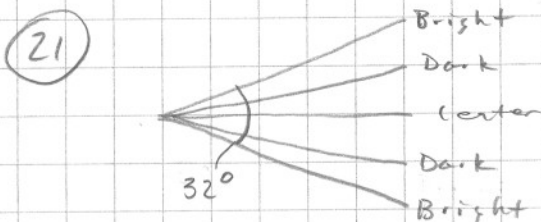
the bright fringe should be halfway between the first and second dark fringe.

the second dark fringe should have 2θ so 18.8°

the first bright fringe is therefore 14.1°



$$\tan 14.1 = \frac{y}{10.0 \text{ m}}$$
$$y = \underline{2.5 \text{ m}}$$



$$\text{center to dark} = \theta$$
$$\text{Dark to bright} = \theta/2$$
$$\text{so center to bright} = \frac{3}{2}\theta$$
$$\text{and bright to bright} = \frac{6\theta}{2} = 3\theta$$

$$3\theta = 32^\circ$$
$$\theta = 10.67^\circ$$

$$\sin \theta = \frac{\lambda}{b}$$

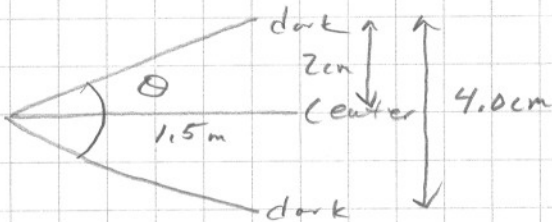
$$b = \frac{\lambda}{\sin \theta} = \frac{653 \times 10^{-9} \text{ m}}{\sin(10.67^\circ)} = \underline{3.53 \times 10^{-6} \text{ m}}$$

(23) dark to dark = $2\theta = 55.0^\circ$
 $\theta = 27.5^\circ$

$$\sin \theta = \frac{\lambda}{b}$$

$$b = \frac{\lambda}{\sin \theta} = \frac{440 \times 10^{-9} \text{ m}}{\sin(27.5^\circ)} = \underline{9.5 \times 10^{-7} \text{ m}}$$

(25)



$$\tan \theta = \frac{.02 \text{ m}}{1.5 \text{ m}}$$

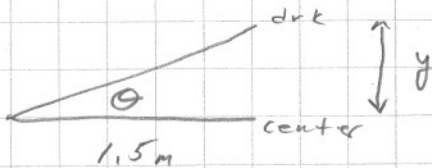
$$\theta = 0.764^\circ$$

$$\sin \theta = \frac{\lambda}{b}$$

$$b = \frac{\lambda}{\sin \theta} = \frac{650 \times 10^{-9} \text{ m}}{\sin(0.764^\circ)} = 4.875 \times 10^{-5} \text{ m}$$

$$\sin \theta = \frac{420 \times 10^{-9} \text{ m}}{4.875 \times 10^{-5} \text{ m}}$$

$$\theta = 0.4936^\circ$$



$$\tan \theta = \frac{y}{1.5 \text{ m}}$$

$$y = 1.5 \text{ m} \tan(0.4936^\circ) = 0.0129 \text{ m}$$

$$\text{dark to dark} = 2y = \underline{0.026 \text{ m}} \text{ or } \underline{2.6 \text{ cm}}$$