

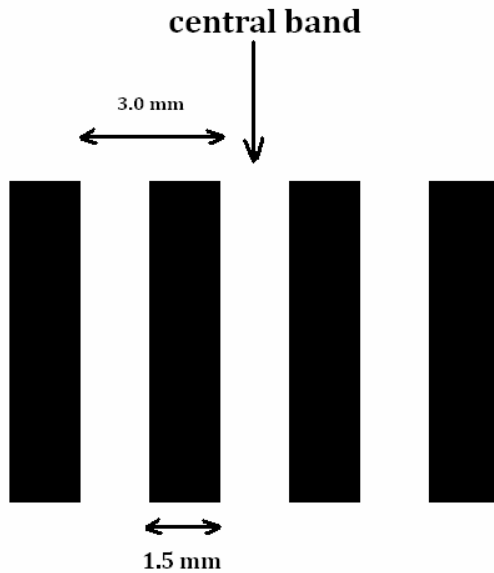
QUESTION:

Monochromatic light is used to illuminate a pair of narrow slits $d=0.3$ mm apart and the interference pattern is observed on a source $l=0.91$ m away. The second dark band appears 3.0 mm from the centre. What is the wavelength in metres?

SOLUTION:

The spacing Δx of the fringes at a distance l from the slits is given by

$$\Delta x = \frac{l\lambda}{d}$$



As it can be seen from a picture above, the spacing between interference fringes is equal to the

$$\frac{3.0}{2} = 1.5 \text{ mm}$$

So

$$\lambda = \frac{\Delta x \cdot d}{l}$$

$$\lambda = \frac{1.5 \cdot 10^{-3} \cdot 0.3 \cdot 10^{-3}}{0.91} = 495 \cdot 10^{-9} \text{ m} = 495 \text{ nm}$$

ANSWER:

$495 \cdot 10^{-9}$ meters