we can write the resultant wave as

\[ y'(x,t) = (2\text{m} \cos \frac{1}{2} \Phi) \sin(kx - wt + \frac{\Phi}{2}) \]

1) The amplitude \( 2\text{m} \cos \frac{1}{2} \Phi \) of the resultant wave is half the total oscillation distance of 6.0 mm, so we have

\[ 2\text{m} \cos \frac{1}{2} \Phi = 3.0 \text{ mm} \]

\[ \text{as} \quad y_m = 4.0 \text{ mm} \]

\[ \Rightarrow \quad \Phi = 2 \cos \frac{30 \text{ mm}}{2(40 \text{ mm})} = 2 \times \text{ rad} \]

2) to find the angular wave number \( k \), two key ideas:

i) \( k = \frac{2\pi}{\lambda} \)

ii) \( \lambda \) can be measured as the distance between repetition of the wave shape.

Let's use the solid curve and pick any point at which it crosses the \( x \) axis. That curve makes an identical crossing 3.0 cm to the right (or left) from the first point. Thus, \( \lambda = 3.0 \text{ cm} \), and:

\[ k = \frac{2\pi}{\lambda} = \frac{2\pi}{0.030 \text{ m}} = 209 \text{ m}^{-1} < 210 \text{ m}^{-1} \]

3) to find \( \omega \), \( \omega = kv \). \( v \) is the ratio of distance of traveled by the resultant wave to the time interval \( t \) required for that travel.

Thus, we have

\[ \omega = kv = k \frac{d}{t} = (209 \text{ m}^{-1}) \frac{0.0620 \text{ m}}{0.0105 \text{ s}} = 8778 \text{ s}^{-1} \approx 8800 \text{ s}^{-1} \]

we can now write for the interfering waves as

\[ y_1(x,t) = (4.0 \text{ mm}) \sin(210x - 8800t) \]

\[ y_2(x,t) = (4.0 \text{ mm}) \sin(210x - 8800t + 2.4 \text{ rad}) \]

\[ y'(x,t) = (3.6 \text{ mm}) \sin(210x - 8800t + 1.2 \text{ rad}) \]

with \( x \) in meters and \( t \) in seconds.