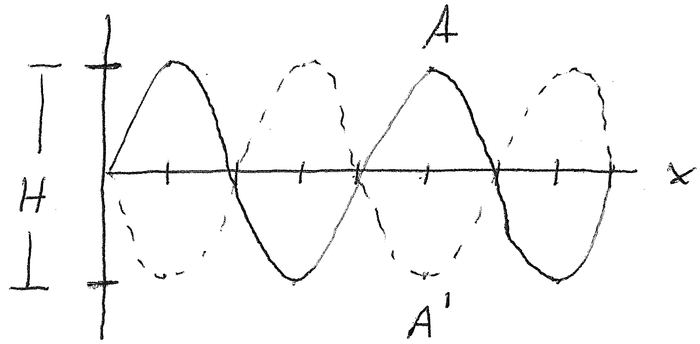

$H = 1.80\,cm$

x-axis scale 10.cm

$\Delta t = 6.0\,ms$
↓
between A and A'

Two waves with the same amplitude and wavelength travel through a string producing the wave pattern shown above. The equation for wave 1 is: $y(x,t) = y_m \sin(kx + \omega t)$. Determine the equation for the second wave.

Solution: A standing wave pattern is set up by the interference of the two waves.

$$\underset{\text{standing wave}}{y(x,t)} = [2 y_m \sin kx] \cos \omega t$$

From Graph

$\lambda = 40.cm$

$\frac{1}{2}H = y(10cm, t) = \underbrace{[2y_m \sin kx]}_{\text{Amplitude}} \cos \omega t = 0.90cm$

Given

$\frac{1}{2}T = 6.0ms$

$T = 12.0ms = 12.0E-3s$

$k = \frac{2\pi}{\lambda} = \frac{2\pi}{40.cm} = 0.1571 cm^{-1}$

$0.90cm = 2y_m \sin(0.1571 cm^{-1} \; 10.cm)$

$\omega = \frac{2\pi}{T} = 524 s^{-1}$

$\frac{0.90cm}{2\sin[0.1571(10)]} = y_m$

$0.45cm = y_m$

$y(x,t) = y_m \sin(kx - \omega t)$ ← opposite the 1st wave

$$\boxed{y(x,t) = 0.45cm \sin(0.16cm^{-1}x - 520s^{-1}t)}$$