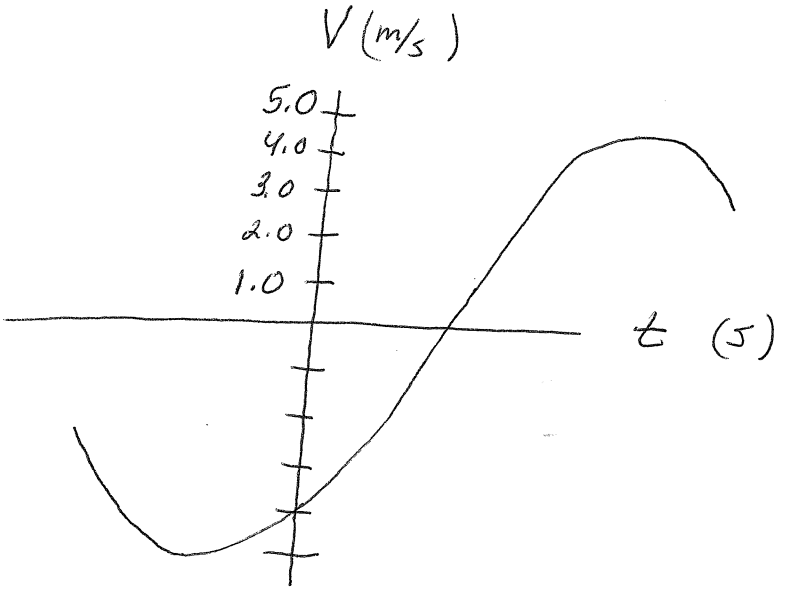
6



Let the plot above represent V vs T for a point oscillating transversely at x=0, as a wave passes through it.

The Wave is described by

$$y(x,t) = y_m \sin(kx - \omega t + \phi)$$

Determine ϕ

$$v(x,t) = -\omega y_m \cos(\cancel{kx}^{\,0} - \omega t + \phi)$$

$x = 0$

From plot $\quad -\omega y_m = 5.0\ m/s \quad$ (maximum)

$$v(0,0) = -4.0\ m/s = -5.0\ m/s \cos(\cancel{-\omega t}^{\,0} + \phi)$$

$$-4.0\ m/s = -5.0\ m/s \cos(\phi)$$

$$\cos\phi = \frac{4.0}{5.0}$$

$$\cos^{-1}\left(\frac{4.0}{5.0}\right) = \pm 0.6435$$

$V(x,t)$ has a positive slope @ $t = 0s$ (from graph)

$$\Rightarrow \frac{dV(0,0)}{dt} > 0$$

$$-\omega^2 y_m \sin(\phi) > 0$$

$$\Rightarrow -\sin\phi > 0$$

Sin is negative in quads 3 & 4

$-0.6435\,\text{rad}\ (-37°)$ is in quadrant 4

$$\boxed{-0.6435\,\text{rad}}$$