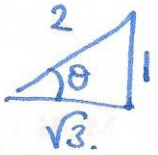
Example find $\cos\left(\sin^{-1}\left(\frac{1}{2}\right)\right)$ $\hookrightarrow$ $\cos\theta$ $\quad \theta = \sin^{-1}\left(\frac{1}{2}\right)$

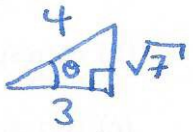
$\sin\theta = \frac{1}{2}$



so $\cos\theta = \frac{\sqrt{3}}{2}$.

find $\cot\left(\cos^{-1}\left(\frac{3}{4}\right)\right)$ $\hookrightarrow$ $\cot(\theta)$ $\quad \theta = \cos^{-1}\left(\frac{3}{4}\right)$.

$\cos\theta = \frac{3}{4}$



$\cot(\theta) = \frac{3}{\sqrt{7}}$.

§5.6 Modelling simple harmonic motion

If something is described by equations of the form

$$y = a\sin(\omega t) \quad \text{or} \quad y = a\cos(\omega t)$$

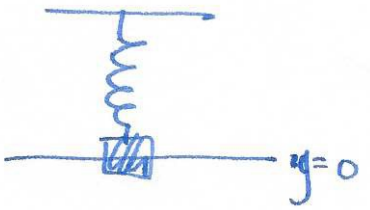
then the object moves according to simple harmonic motion.

amplitude $|a|$ (max distance from center)

period $\frac{2\pi}{\omega}$ (time required to complete one cycle)

frequency $\frac{\omega}{2\pi}$ (number of cycles per unit time).

Example springs



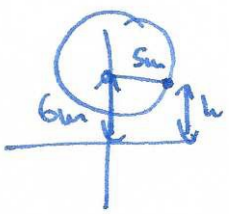
$y = 10\sin(4\pi t)$.

amplitude 10 $\quad$ period $\frac{2\pi}{4\pi} = \frac{1}{2}$ $\quad$ freqency $= 2$.

Sound waves: air pressure $P(t) = 0.2\sin 80\pi t$

amplitude 0.2 $\quad$ period $= \frac{2\pi}{80\pi} = \frac{1}{40}$ $\quad$ frequency $= \frac{80\pi}{2\pi} = 40$ Hz.

Ferris wheel



$h(t) = -5\cos(2\pi f t) + 6$.