

A spring with natural length 0.5 m has a length 50.5 cm with a mass of 2 gm

Suspended from it. The mass is initially displaced 1.5 cm below equilibrium and released with zero velocity. Find its displacement from + > 0

* natural length *
calculations *

$$0.5 \times 100 = 50\text{cm}$$

converting from
meters to centimeters

$$\frac{g}{\Delta L} = \frac{980 \text{ cm/s}^2}{0.5 \text{ cm}} = 1960$$

General Solution for Complex #'s

$$y = A \cos(44.27189t) + B \sin(44.27189t)$$

* Take derivative *

$$y' = -A \sin(44.27189t)(44.27189) + B \cos(44.27189t)(44.27189)$$

$$y(0) = 1.5 = A(\cos(0)) + B(\sin(0))$$

$$A + 0 \quad A = 1.5$$

$$y'(0) = 0 = -44.27189 A \sin(0) + 44.27189 B \cos(0)$$

$$B = 0$$

$$y(t) = 1.5 \cos(44.27189t) \quad \text{for } t > 0$$

length with
mass - natural
length

$$\Delta L = 50.5\text{cm} - 50\text{cm} = 0.5\text{cm}$$

$$g = 980 \frac{\text{cm}}{\text{s}^2}$$

$$y(0) = 1.5\text{cm}$$

* distance *

$$y'(0) = 0$$

* initial *

$$y'' + 1960 y = 0$$

$$r^2 + 1960 = 0$$

$$a \quad c$$

$$= -0 \pm \sqrt{0^2 - 4(1)(1960)}$$

$$2(1)$$

$$r = \pm 14i\sqrt{10}$$

$$14\sqrt{10} = 44.27189$$