

1. A die on a 4 inch string dangles for the mirror of a car. After going around a turn the die swings back and forth. How long is one cycle?

$$4 \text{ in} \times \frac{2.54 \text{ cm}}{1 \text{ in}} \times \frac{1 \text{ m}}{100 \text{ cm}} = 0.1016 \text{ m}$$

$T =$

2. A 50 kg mass is suspended on a  $4.5 \times 10^3 \text{ N/m}$  spring. How far does the mass stretch the spring? If the spring is stretched 5cm downward, how long would the period of the resulting motion be?

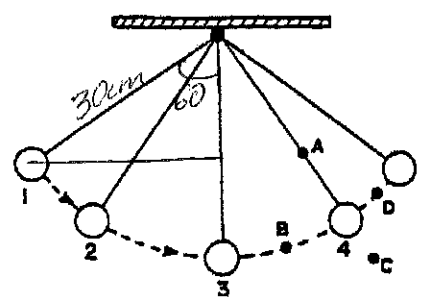
$$mg = kx$$

$$50 \times 9.8 = 4.5 \times 10^3 \times x$$

$$x = 0.108 \text{ m}$$

$T =$

3.



A ball swings on a 30cm string. At point 1 it makes a 60 degree angle with the vertical.

a. Determine the height that point 1 is above point 3.

$$\cos 60 = \frac{h_1}{.3} \quad h_1 = .15 \quad h_1 - h_3 = 15 \text{ cm}$$

$$h_3 = -.3$$

b. Determine the energy that the ball has at point 1.

~~$$mgh = 1.47 \text{ m}$$~~

$$E = mgh = m \times 9.8 \times .15 = 1.47 \text{ m}$$

c. Determine the maximum speed of the ball.

$$1.47 \text{ J} = \frac{1}{2} mv^2 \quad v_{\text{max}} = 1.7146 \text{ m/s}$$

d. Determine how long the ball takes to make one cycle.

$T =$