

**Answer on question #64336, Physics / Mechanics — Relativity**

**Question** the position of a 0.30 kg object attached to a spring is described by  $x=(0.25 \text{ m})\cos(0.4 t)$ . find:

- A.) the amplitude of the motion
- B.) the spring constant
- C.) the position at  $t= 0.30\text{s}$
- D.) the object speed at  $t=0.30\text{s}$

**Solution** So the equation of motion is

$$x(t) = A \cos \omega t = 0.25 \cos(0.4\pi t)$$

A. The amplitude is

$$A = 0.25 \text{ m}$$

B. Spring constant

$$k = m\omega^2 = 0.3 \cdot (0.4\pi)^2 \approx 0.473 \text{ N/m}$$

C. Position at  $t = 0.3$ :

$$x(0.3) = 0.25 \cos(0.4\pi \cdot 0.3) \approx 0.232 \text{ m}$$

D. Speed is

$$v(t) = \dot{x}(t) = -A\omega \sin \omega t = -0.1\pi \sin(0.4\pi t)$$

$$v(0.3) = -0.1\pi \sin(0.4\pi \cdot 0.3) \approx -0.116 \text{ m/s}$$