

Chapter 14 Periodic Motion

Example 1:

Calculate the maximum acceleration if the spring constant is 1000 N/m, the mass is 2 kg and the amplitude is 10 cm for a mass oscillating on the end of a horizontal spring.

Example 2:

If a 250 N force stretches a spring 10 cm, find the period of oscillation when a 1.25 kg mass is attached to the spring.

Example 3:

Find the maximum frequency of oscillation if a penny is to sit on top of an oscillating piston with the amplitude equal to 0.12 m.

Example 4:

If the initial conditions are: $x_0 = -3/4 A$ and the mass is moving to left find the phase constant. (Assume the left end of the spring is fixed.)

Example 5:

If the initial conditions are: $x_0 = 1/2 A$ and the mass is moving to right find the phase constant. (Assume the left end of the spring is fixed.)

Example 6:

If $k = 500 \text{ N/m}$, $m = 0.5 \text{ kg}$ and $A = 20 \text{ cm}$ what is the maximum kinetic energy for a mass oscillating on the end of a horizontal spring?

Example 7:

Find the displacement for a mass oscillating on the end of a horizontal spring when $K = 3 U$.

Example 8:

Calculate the length of a simple pendulum whose period is 1.0 second.

Example 9:

What would be the period of a 2 m long simple pendulum if it were on the Moon? (The acceleration due to gravity on the Moon is $1/6$ of that on Earth.)

Example 10:

Show that the physical pendulum formula can be reduced to the one for a simple pendulum.

Example 11:

A disk pivots about a point half way from its center to its edge. What is the period of the disk's oscillation? The disk has a mass of 1.5 kg and a radius of 0.4 m.

Example 12:

A 1 m long, 2 kg rod pivots about its upper end. If a 1.5 kg sphere with a 20 cm radius is attached to the lower end of the rod what is system's frequency?