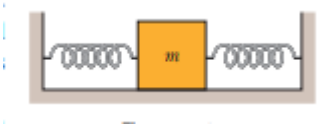
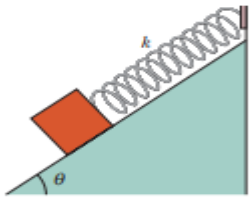
(1) In the following figure two identical springs of Spring Constant are attached to a block of mass 0.245 Kg. What is the frequency of oscillation on the frictionless floor?



Ans: 39.6 Hz

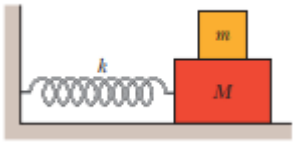
(2) In the following figure a block weighing 14.0 N, which can slide without friction on an incline plane at an angle 0f $\Theta = 40^0$, is connected to the top of the incline by a massless spring of unstressed length 0.450 m and spring constant 120 N/m

(a) How far the top of the incline is the block's equilibrium point?
(b) If the block is pulled slightly down the incline and released, what is the period of the resulting oscillations?



Ans: x = 0.525 m, T = 0.686 s

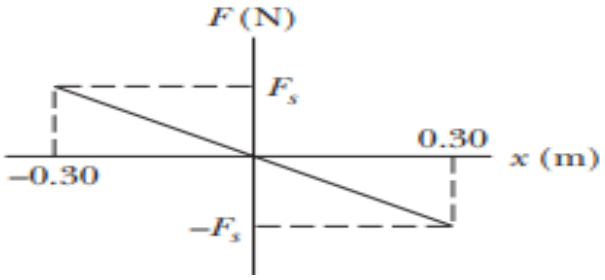
(3)In Fig. two blocks (m = 1.8 kg and M = 10 kg) and a spring (k = 200 N/m) are arranged on a horizontal, frictionless surface. The coefficient of static friction between the two blocks is 0.40. What amplitude of simple harmonic motion of the spring–blocks system puts the smaller block on the verge of slipping over the larger block?



Ans: x_m = 23 cm

(4) A simple harmonic oscillator consists of a 0.50 kg block attached to a spring. The block slides back and forth along a straight line on a frictionless surface with equilibrium point x = 0. At t = 0 the block is at x = 0 and moving in the positive x direction. A graph of the magnitude of the net force on the block

as a function of its position is shown in Fig. The vertical scale is set by Fs = 75.0 N. What are (a) the amplitude and (b) the period of the motion, (c) the magnitude of the maximum acceleration, and (d) the maximum kinetic energy?



Ans: (a) X_m = 0.30 m (b) T = 0.28 s (c) 150 m/s (d) K_m = 11 J

(5) The scale of a spring balance that reads from 0 to 15.0 kg is 12.0 cm long. A package suspended from the balance is found to oscillate vertically with a frequency of 2.00 Hz. (a) What is the spring constant? (b) How much does the package weigh?

Ans: weight (mg) = 76 N

(6) The end point of a spring oscillates with a period of 2.0 s when a block with mass m is attached to it. When this mass is increased by 2.0 kg, the period is found to be 3.0 s. Find m.

Ans: m = 1.6Kg

(7) A flat uniform circular disk has a mass of 3.00 kg and a radius of 70.0 cm. It is suspended in a horizontal plane by a vertical wire attached to its center. If the disk is rotated 2.50 rad about the wire, a torque of 0.0600 N*m is required to maintain that orientation. Calculate (a) the torsion constant (kappa **κ)** , and (b) the angular frequency ω of this torsion pendulum when it is set oscillating. Rotational Inertia I = 0.735 kg. m^2.

Ans: (a) κ = 0.0240 N. m/rad (b) ω = 0.181 rad/sec