PHY C6.2

SHM Work Sheet

1) $X = .500m$, $F = .500N$ $\quad F = kx \quad k = \frac{F}{x} = \frac{.500N}{.500m} = 1 N/m$

$x = \frac{F}{k} = \frac{1.00N}{1.00 N/m} = 1.00m$

2) $x = .0500m$, $F = 40.0N$ $\quad F = -kx \quad k = \frac{F}{x} = \frac{40.0N}{.0500m} = 800. N/m$

$x = \frac{F}{k} = \frac{125N}{800. N/m} = .156m$

3) $F = -kx \quad k = \frac{F}{x} = \frac{2.00N}{.250m} = 8.00 N/m$

4) $Cyc = 12.0$, $\Delta t = 3.00s$ $\quad f = \frac{Cyc}{sec} = \frac{12.0 cyc}{3.00 s} = 4.00 Hz$

$T = \frac{1}{f} = \frac{1}{4.00 Hz} = .250 s$

5) $f = 200. \text{ vib/s} = 200. Hz$

$T = \frac{1}{f} = \frac{1}{200 Hz} = .00500 s$

6) $f = 4.00 Hz \quad T = \frac{1}{f} = \frac{1}{4.00 Hz} = .250 s$

$\Delta t = (2400 Hz)(.250 s) = 600. s$

7) $k = 16 N/m$, $m = 1.00 kg$ $\quad T = 2\pi\sqrt{\frac{m}{k}} = 2\pi\sqrt{\frac{1.00 kg}{16 N/m}} = 1.57 s$

8) $x = .0800 cm \quad F = -kx \quad k = \frac{F}{x} = \frac{.500N}{.0800m} = 6.25 N/m$

$F_1 = .500 N$

$F_g = mg \quad m = \frac{F_g}{g} = \frac{(2.00N + .500N)}{9.80 m/s^2} = .255 kg$

$F_2 = 2.00 N$

$A = 1.20 m \quad F = -kx = (6.25 N/m)(1.20m) = 7.50 N$

9) $w_T = 25.0\,N$ $m = 2.55\,kg$

$f = 60.0\ v.\,6/min = 1\ v.\,6/s$ $T = \frac{1}{f} = \frac{1}{1\,Hz} = 1.00\,s$

$A = 1.50\,m$ $T = 2\pi\sqrt{\frac{m}{k}}$ $k = \frac{m(2\pi)^2}{T^2} = \frac{(2.55\,kg)(2\pi)^2}{(1.00\,s)^2}$

$k = 100.7\,N/m$

$F = -kx = (100.7\,N/m)(1.50\,m)$

$F_R = 151\,N$

10) $T = 2.00\,s$ $T = 2\pi\sqrt{\frac{L}{g}}$ $L = \frac{T^2}{(2\pi)^2}g = \frac{(2.00\,s)^2(9.80\,m/s^2)}{(2\pi)^2}$

$L = .993\,m$

11) $L = 353\,m$

$T = ?$

$g = 9.80\,m/s^2$ $T = 2\pi\sqrt{\frac{L}{g}} = 2\pi\sqrt{\frac{353\,m}{9.80\,m/s^2}} = 37.7\,s$

12) $g_m = \frac{1}{6}(9.80\,m/s^2) = 1.63\,m/s^2$ $T = 2\pi\sqrt{\frac{L}{g}}$ $L_E = \frac{T^2}{(2\pi)^2}g$

$T_E = 2.00\,s$ $L_E = \frac{(2.00\,s)^2\,9.80\,m/s^2}{(2\pi)^2} = .993\,m$

$L_M = ?$

$T_m = 2\pi\sqrt{\frac{.993\,m}{1.63\,m/s^2}} = 4.90\,s$

13) $L_1 = .250\,m$ $T = 2\pi\sqrt{\frac{L}{g}}$ $g = \frac{L(2\pi)^2}{T^2} = \frac{.250\,m(2\pi)^2}{(1.10\,s)^2} = 8.157\,m/s^2$

$T_1 = 1.10\,s$

$L_2 = .160\,m$ $T = 2\pi\sqrt{\frac{L}{g}} = 2\pi\sqrt{\frac{.160\,m}{8.157\,m/s^2}} = .697\,s$

$T_2 = ?$

14) $L = 1.00\,m$ $T = 2\pi\sqrt{\frac{L}{g}}$ $g = \frac{L(2\pi)^2}{T^2} = \frac{1.00\,m(2\pi)^2}{(2.05\,s)^2} = 10.1\,m/s^2$

$T = 2.05\,s$

$g = ?$

$g =$

15) $T = 2.00\,s$ $T = 2\pi\sqrt{\frac{L}{g}}$ $L = \frac{T^2 g}{(2\pi)^2} = \frac{(2.00\,s)^2(9.79609\,m/s^2)}{(2\pi)^2}$

$g = 9.79609\,m/s^2$

$L = ?$

$L = .993\,m$