Ch # 11

H.W. Solution

3. The distance travelled in one period $= 4A$

$= 4 \times .25$

$= 1\ m.$

8

$v = \sqrt{\frac{T}{(m/L)}}$, ~~where $T = Mg$~~

where $T = Mg$,

where M = The mass of the object hunged.

m = the mass of the string

L = the length of the string.

$\therefore \frac{v_1}{v_2} = \sqrt{\frac{T_1}{(m/L)}} \times \sqrt{\frac{(m/L)}{T_2}}$

or $\frac{v_1}{v_2} = \sqrt{\frac{T_1}{T_2}} = \sqrt{\frac{0.6 \times 9.8}{0.38 \times 9.8}}$

or $\frac{v_1}{v_2} = \sqrt{\frac{0.6}{0.38}} = 1.26$

or $v_1 = 1.26\, v_2$

8. cont.

$$v = \lambda f$$

$$\therefore v_1 = \lambda f_1 \;,\quad v_2 = \lambda f_2$$

$$\therefore \text{same } \lambda \Rightarrow \lambda f_1 = 1.26\,\lambda f_2$$

$$\therefore f_2 = \frac{f_1}{1.26} = \frac{3}{1.26} = 2.38\,Hz$$

17. $m = 0.5\,kg$

$$x = 0.45\cos(8.4t)$$

$$x = A\cos(\omega = 2\pi f t)$$

a. $A = 0.45\,m$.

b $8.4 = 2\pi f$

$$f = \frac{8.4}{2\pi} = 1.33\,Hz$$

c. $E = \frac{1}{2}kA^2$

$$T = 2\pi\sqrt{m/k}$$

$$\text{or } f = \frac{1}{2\pi}\sqrt{k/m}$$

$$\text{or } f^2 = \frac{1}{4\pi^2}\cdot k/m$$

$$\therefore k = f^2 \times 4\pi^2 \times m \Rightarrow$$

$\therefore k = 4\pi^2 \times (1.33)^2 \times 0.5$

$= 35.28$

$\therefore E = \frac{1}{2} \times 35.28 \times (.45)^2$

$= 3.5\,J$

d. $U = \frac{1}{2} kx^2$

$= \frac{1}{2} \times 35.28 \times (.3)^2$

$= 1.58\,J$

$KE + U = E$

or $KE = E - U$

$KE = 3.50 - 1.58$

$= 1.91\,J$

#44

a. $\frac{I_1}{I_2} = \frac{r_2^2}{r_1^2}$

$\frac{I_1}{I_2} = \left(\frac{20}{10}\right)^2 = 4$

b. ~~$\frac{A_1}{A_2} = \frac{r_1}{r_2} = \frac{10}{20} = \frac{1}{2}$~~

b. $\frac{A_1}{A_2} = \frac{r_2}{r_1} = \frac{20}{10} = 2.$

#51

$f_n = n f_1$

$f_2 = 2 \times 440$
$= 880\ Hz$

$f_3 = 3 \times 440$
$= 1320\ Hz$

$f_4 = 4 \times 440$
$= 1760\ Hz$

$f_5 = 5 \times 440$
$= 2200\ Hz$