Section 14.1 Practice Problems (p.378, #1-5)

#1

$K = 95\ N/m$

$x = .25\ m$

$F_{sp} = \_\_\_\_\ N$

$F_{sp} = -Kx$

$= -(95\ N/m)(.25m)$

$\boxed{F_{sp} = -24\ N}$

#2

$K = 56\ N/m$

$F_g = -18N$

$(F_{sp} = 18N)$

$x = \_\_\_\_\ m$

$F_{sp} = -Kx$

$x = \dfrac{F_{sp}}{-K}$

$x = \dfrac{18\ N}{-(56\ N/m)}$

$\boxed{x = -.32\ m}$

#3

$F_g = -24N$

$(F_{sp} = 24N)$

$x = -12cm$

$(-.12\ m)$

$K = \_\_\_\_\ N/m$

$F_{sp} = -Kx$

$\therefore K = \dfrac{F_{sp}}{-x}$

$K = \dfrac{(24N)}{-(-.12\ m)}$

$K = 200\ N/m$

$\boxed{K = 2.0 \times 10^2\ N/m}$

#4

$K = 144\ N/m$

$x = 16.5\ cm$
$(.165\ m)$

$PE_{E\ (sp)} = \_\_\_\_\ J$

$$PE_{sp} = \frac{1}{2}kx^2$$

$$= \frac{1}{2}(144\ N/m)(.165\ m)^2$$

$$\boxed{PE_{sp} = 1.96\ J}$$

#5

$K = 256\ N/m$

$PE_{sp} = 48\ J$

$x = \_\_\_\_\ m$

$$2 * PE_{sp} = \frac{1}{2}kx^2 * 2$$

$$\frac{2\,PE_{sp}}{K} = \frac{Kx^2}{K}$$

$$\sqrt{\frac{2\,PE_{sp}}{K}} = \sqrt{x^2}$$

$$x = \sqrt{\frac{2(48\ J)}{256\ N/m}} = \boxed{0.61\ m}$$

p. 379 $\left(T = 2\pi\sqrt{\frac{l}{g}}\right)$

#6

$T = \_\_ s$

$g = 9.8 \frac{m}{s^2}$

$l = 1.0 m$

$T = 2\pi\sqrt{\frac{1.0m}{9.8\frac{m}{s^2}}}$

$T = 2.0s$

#7

$l = \_\_ m$

$T = 2.0s$

$g_{moon} = 1.6 \frac{m}{s^2}$

$T = 2\pi\sqrt{\frac{l}{g}}$

$\frac{T}{2\pi} \quad 2\pi\sqrt{\frac{l}{g}}$

$\left(\frac{T}{2\pi}\right)^2 = \left(\sqrt{\frac{l}{g}}\right)^2$

$g * \left(\frac{T}{2\pi}\right)^2 = \frac{l}{g} * g$

$l = g\left(\frac{T}{2\pi}\right)^2$

$l = .16 m$

#8

$g = \_\_ \frac{m}{s^2}$

$\left(\frac{T}{2\pi}\right)^2 = \frac{l}{g}$

$g = \frac{l}{\left(\frac{T}{2\pi}\right)^2}$

$g = 9.1 \frac{m}{s^2}$