Show your work!!! If I can read it, I will give you partial credit!!! Correct answers without work will NOT get full credit.

**Concept (3 points)**

1. Label the following plot for:
   - Period $\tau$
   - Amplitude $A$
   - axes (both)

Give the value for the period, amplitude, frequency, and phase offset of the oscillation.

From the plot, one can see that two full cycles occur just after 6, or $\approx 6.2$, or actually $2\pi$. This means that $\tau = \pi$.

Also, from the plot, one can see that the amplitude is $A = 4$ units.

Since $f = \frac{1}{\tau}$, then $f = \frac{1}{\pi}$ rad/sec.

Using the convention set by the textbook, the displacement is given with a $\cos$ function. Since $\cos 0 = 1$, and this plot begins with a displacement of 0 at $t=0$, then there must be a constant phase shift of $\pi/2$. 

![Plot of displacement vs time]
The total energy of a system, $E$, is generally the sum of the kinetic and potential energies. Here, for this oscillatory system, when the block is at a turning point, the kinetic energy is zero since the velocity is zero, and the potential energy is at a maximum. This is equivalent to stating that the total energy is purely potential.

Let $A = 2.4\text{cm}$ and $k = 1.5\text{N/cm}$

$$E = K + P$$

$$= \frac{1}{2}mv^2 + \frac{1}{2}kx^2$$

$$= \frac{1}{2}m(0)^2 + \frac{1}{2}k(A)^2$$

$$= \frac{1}{2}kA^2$$

$$= \frac{1}{2}(1.5\text{N/cm})(2.4\text{cm})^2$$

$$= 4.32\text{ N \cdot cm}$$

or

$$E = 0.0432\text{ N \cdot m} = 0.0432\text{J}$$