Simple Harmonic Motion

1. On Mars, a pendulum of length 90 cm makes 10 cycles in 26.1 sec. How much longer should the pendulum be if it is to only make 5 cycles in 26.1 sec?

2. A horizontal spring system has k = 250 N/m and a 5 kg mass attached. The mass is moving 4 m/s when it is 20 cm to the right of the equilibrium position. Find
    a. Total energy
    b. v_{max}
    c. amplitude
    d. period
    e. acceleration (magnitude and direction) when x = -.3 m
    f. PE when x = .15 m

3. A 10 kg mass is attached to a spring and it stretches 40 cm. Then it is pulled down an additional 20 cm and released. Find
    a. k
    b. Time to get to highest point
    c. Speed when 10 cm above equilibrium

4. An 800 g mass is placed on a spring. It is then stretched 40 cm to the right and released. 0.80 sec later it returns to the point of release. Find
    a. k
    b. v_{max}
    c. acceleration when x = 0.25m
    d. max acceleration
    e. v when x = 30 cm

5. A spring (k = 100 N/m) is used to propel a 0.2 kg mass up a hill.
    a. If the spring is pulled back 25 cm, how high will the mass go?
    b. If the mass needs to make it 10 m up the hill, how far back must the spring be pulled?

Pull back   h

m