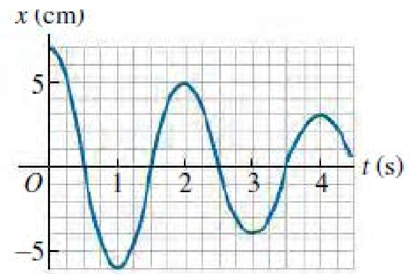
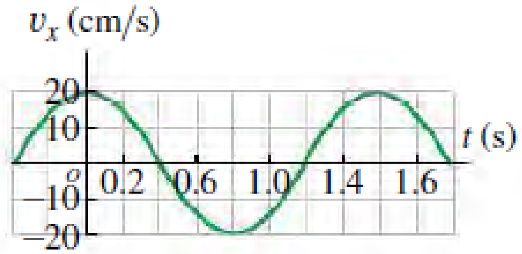
PHYSICS 3 HOMEWORK ASSIGNMENT #1 RETURN:14.10.2022 at 09.00

1. An object is undergoing SHM with period 0.300 s and amplitude 6.00 cm. At t = 0 the object is instantaneously at rest at x = 6.00 cm. Calculate the time it takes the object to go from x = 6.00 cm to x = -1.50 cm. (Üniversite Fiziği Young and Freedman 14.baskı 14.64)
2. A mass is vibrating at the end of a spring of force constant 225 N/m. Figure shows a graph of its position x as a function of time t. (a) At what times is the mass not moving? (b) How much energy did this system originally contain? (c) How much energy did the system lose between t = 1.0 s and t = 4.0 s? Where did this energy go? (Üniversite Fiziği Young and Freedman 14.baskı 14.62)



3. A 0.0200-kg bolt moves with SHM that has an amplitude of 0.240 m and a period of 1.500 s. The displacement of the bolt is +0.240 m when $t = 0$. Compute (a) the displacement of the bolt when $t = 0.500$ s; (b) the magnitude and direction of the force acting on the bolt when $t = 0.500$ s; (c) the minimum time required for the bolt to move from its initial position to the point where $x = -0.180$ m; (d) the speed of the bolt when $x = -0.180$ m. (Üniversite Fiziği Young and Freedman 14.baskı 14.78)

4. A mass m is attached to a spring of force constant 75 N/m and allowed to oscillate. Figure P14.89 shows a graph of its velocity component vx as a function of time t. Find (a) the period, (b) the frequency, and (c) the angular frequency of this motion. (d) What is the amplitude (in cm), and at what times does the mass reach this position? (e) Find the maximum acceleration magnitude of the mass and the times at which it occurs. (f) What is the value of m? (Üniversite Fiziği Young and Freedman 14.baskı 14.89)



5. A 1.35-kg object is attached to a horizontal spring of force constant 2.5 N>cm. The object is started oscillating by pulling it 6.0 cm from its equilibrium position and releasing it so that it is free to oscillate on a frictionless horizontal air track. You observe that after eight cycles its maximum displacement from equilibrium is only 3.5 cm. (a) How much energy has this system lost to damping during these eight cycles? (b) Where did the "lost" energy go? Explain physically how the system could have lost energy. (Üniversite Fiziği Young and Freedman 14.baskı 14.59)
6. A sinusoidally varying driving force is applied to a damped harmonic oscillator of force constant *k* and mass *m*. If the damping constant has a value *b*1, the amplitude is *A*1 when the driving angular frequency equals 2*k*>*m*. In terms of *A*1, what is the amplitude for the same driving frequency and the same driving force amplitude *F*max, if the damping constant is (a) 3*b*1 and (b) *b1*/2? (Üniversite Fiziği Young and Freedman 14.baskı 14.63)

7. A simple pendulum is 0.30 m long. At $t = 0$ it is released from rest starting at an angle of 13°. Ignoring friction, what will be the angular position of the pendulum at (*a*) $t = 0.35$ s, (*b*) $t = 3.45$ s, and (*c*) $t = 6.00$ s? (Giancoli 4.baskı 14.43)
8. An 1150 kg automobile has springs with $k = 16{,}000$ N/m. One of the tires is not properly balanced; it has a little extra mass on one side compared to the other, causing the car to shake at certain speeds. If the tire radius is 42 cm, at what speed will the wheel shake most? (Giancoli 4.baskı 14.65)

9. A "seconds" pendulum has a period of exactly 2.000 s. That is, each one-way swing takes 1.000 s. What is the length of a seconds pendulum in Austin, Texas, where $g = 9.793 \text{ m/s}^2$? If the pendulum is moved to Paris, where $g = 9.809 \text{ m/s}^2$, by how many millimeters must we lengthen the pendulum? What is the length of a seconds pendulum on the Moon, where $g = 1.62 \text{ m/s}^2$? (Giancoli 4.baskı 14.77)

10. What is the period of a simple pendulum 53 cm long (*a*) on the Earth, and (*b*) when it is in a freely falling elevator? (Giancoli 4.baskı 14.44)