

PHYS-2010: General Physics 1
Dr. Luttermoser's Classes
Sample Problems for Exam 2

1. A block of mass 10.2 kg is connected to a spring and is free to slide on a frictionless horizontal surface. It is pulled out a distance of 37.2 cm from the equilibrium position and released from rest. When it passes the equilibrium position, it is traveling at a speed of 3.22 m/s.
(a) What is the total energy of this system? (b) What is the spring constant?

2. A 29.2 gram golf club head travels at 32.2 m/s when it hits a 1.68 gram golf ball at rest. The impact takes 0.0324 s to complete. Just after impact, the golf club travels at 26.4 m/s. The golf ball accelerates at $13.6\ g$ just after impact. (a) What is the velocity of the ball just after impact? (b) What is the average force of the impact? (c) What is the impulse of the collision?

3. A 1.22 kg rock is connected to a rope and starts to move in a circular, horizontal path from rest. The radius of the circular path is 64.2 cm. At 6.24 s, the rock has a tangential speed of 18.2 m/s. (a) What is the angular speed at this time? (b) What is the angular acceleration during this time interval? (c) How many revolutions does the rock complete during this time?

4. An asteroid has an orbital period of 4.12 years and is at 2.32 A.U. when it is at its closest point to the Sun. (a) What is the semimajor axis of this asteroid's orbit? (b) What is its orbital eccentricity? (c) What is the aphelion distance of this asteroid?