CHAPTER 4 PRACTICE QUESTIONS

Directions: Complete the following problems as specified by each question, and then check your work using the solutions that follow. For extended, step-by-step solutions, access your Student Tools online.

1. A projectile is fired at an initial speed of v_0 = 20 m/s at a launch angle of θ = 35° along a flat surface. What is the time of flight for the projectile? What is the range of the projectile?

2. If you throw a ball at 15 m/s at an angle of 30° from the ground, what is the maximum height the ball will reach?

3. A stunt driver is trying to jump from a cliff, across a river, and land safely on the opposite bank. If the cliff is 20 m above the opposite bank of the river, and the river is 60 m wide, how fast does the stunt driver have to go to safely traverse the gap?

4. A projectile is launched at an initial speed of v_0 = 25 m/s at an angle of 40°. After 1.5 s of flight, what will its horizontal speed be?

5. A projectile is launched from the ground at an initial speed of v_0 = 30 m/s at an angle of 50°. After 2 s, what is the height of the projectile?

6. A bug is on the outer rim of a disk that has a radius of 10 cm. The bug walks toward the center of the disk as it rotates at a rate of 10 rad/s. If the bug moves at 1 cm/s, how many revolutions does the disk make before the bug reaches the center? Ignore any effects the bug has on the motion of the disk.

7. A tetherball is hit such that its tether makes an angle of 30° with its pole, and has a rotational speed of 20 rpm. What is the centripetal acceleration on the tetherball if its tether is 2 m long?

8. Satellites can exist in orbits that are **geosynchronous**, meaning they are above the same point on the ground at all times. What tangential speed is needed to maintain a geosynchronous orbit? The height above the Earth for geosynchronous satellites is 36,000 km.