

Two Dimensional Motion Problems

1. A baseball player throws a baseball horizontally. How fast must he throw it in order for the ball to fall a distance of 0.80 meter by the time it reaches the batter, 20 meters away?
2. A car with a crash test dummy is driven off a cliff with a crash test dummy. The cliff is 100 meters high and the car lands 600 meters away. How fast was the car going when it went off the cliff?
3. A bullet is shot horizontally at a speed of 650 m/s from a height of 1.8 meters in a perfectly flat desert. How far away will the bullet land? [Neglect air resistance]
4. An arrow aimed directly at a target is fired horizontally at a speed of 120 m/s. The target is 50 meters away. How far below the target will the arrow strike? [Neglect air resistance]

5. A cannon shoots a cannonball with a speed of 70 m/s at an angle of 25° with the ground.
[Neglect air resistance]
- Find the horizontal and vertical components of the velocity.
 - How high does the cannonball go?
 - For how long is the cannonball in the air?
 - How far away does the cannonball land?
6. A racecar driver drives around a circular path of radius 500 meters in 50 seconds. What acceleration does she experience?
7. How fast must a space station of radius 1000 meters spin so that an acceleration of $g = 9.8 \text{ m/s}^2$ is achieved on its circumference?