

Free Fall Problem Set

In each of these problems, ignore the possibility of air resistance. Assume that acceleration due to gravity is downward and equal to g .

1. A cannon sitting atop of a 200m cliff shoots a projectile at a velocity of 50 m/s and at an angle of 30° above the horizontal. A building 50m tall sits 300m from the base of the cliff. Does the projectile strike the building? (Ignore the width of the building).

2. A lacrosse player 80m. from an open goal throws a ball at an angle of 25° above the horizontal with a velocity of 20 m/s. Does the ball enter the goal in the air? Assume that the ball leaves the stick 3 m above the ground and that a lacrosse goal is 2 m high.

3. An F-18 is flying at 200 m/s at an altitude of 1500m and at an angle of 5° below the horizontal when it drops a bomb. There is a 300 m building 3000 m from the point below the F-18 when it drops its bomb. Does the bomb hit the building? (Ignore the width of the building).

4. In Fenway Park, the Green Monster is a wall approximately 11.3 m tall and 94 m from home plate along third base line. A ball was hit at an angle of 30° along the third base line and barely cleared the Green Monster. At what velocity did the ball leave the bat? Assume that batter hit the ball 1 m above the ground.

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