AP Physics 1
Projectile Motion Practice Problems

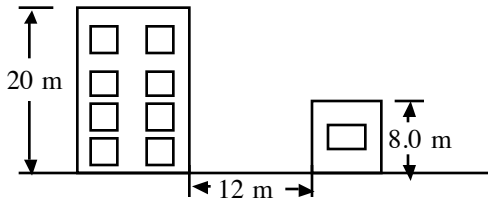
1.) A stone is thrown horizontally at 12.0 m/s from a cliff 65.0 m high.

a.) How much time does it take the stone to reach the ground?

b.) How far from the base of the cliff does the stone strike the ground?

c.) What is the velocity (magnitude and direction) of the stone when it strikes the ground?

2.) Rat wants to move from the roof of one building to that of a neighboring structure as shown in the figure to the right.



a.) If her maximum horizontal speed is 4.0 m/s, will she land on top of the adjacent building? (She is not jumping at an angle.)

b.) What initial velocity is required to reach the other building?

3.) A projectile is launched horizontally from a building that is 50.0 m tall. It strikes the ground a horizontal distance of 850 m from the base of the building.

a.) How long does the projectile remain in the air?

b.) What is the initial velocity of the projectile?

c.) Find the following just before the projectile hits the ground.

v_x = _____ v_y = _____ v = _____ θ = _____

4.) A cannonball is launched with a speed of 240 m/s from ground level at an angle of 53.13°.

a.) What is the velocity (magnitude and direction) of the cannonball at its maximum height?

b.) How many seconds does it take for the cannonball to reach its maximum height?

c.) What is the maximum height of the cannonball?

d.) Find the following just before the cannonball hits the ground.

v_x = _____ v_y = _____ v = _____ θ = _____

e.) How far does the cannonball travel before hitting the ground?

5.) A stone is thrown at an angle of 36.87° above the horizontal at 20.0 m/s from a building 45 m high.

a.) What is the maximum height (with respect to the ground) that the stone reaches?

b.) Find the following just before the stone hits the ground.

v_x = _____ v_y = _____ v = _____ θ = _____

c.) How many seconds does it take for the stone to reach the ground?

d.) How far from the base of the building does the stone strike the ground?

6.) A golfer tees off from the top of an elevated tee, giving the golf ball an initial velocity of 40.0 m/s at an angle of 36.87° above the horizontal. The ball strikes the fairway a horizontal distance of 176 m from the tee. Assume the fairway is level.

a.) How long is the ball in the air? b.) What is the initial height of the ball?

7.) A baseball is hit at ground level. The ball is observed to reach its maximum height above ground level 4.0 s after being hit. 3.0 s after reaching this maximum height, the ball is observed to barely clear a fence that is 154 m from where it was hit. What was the initial velocity (magnitude and direction) of the ball?

8.) A rock is thrown from a building 30.0 m tall and strikes the ground 5.0 s later a horizontal distance of 60.0 m from the base of the building. What was the initial velocity (magnitude and direction) of the rock? (The rock is not thrown horizontally.)

9.) A place-kicker must kick a football from a point 36.0 m from a goalpost crossbar that is 3.05 m high. When kicked, the ball leaves the ground with a speed of 20.0 m/s at an angle of 53.13° to the horizontal.

a.) By how much does the ball clear or fall short of clearing the crossbar?

b.) Does the ball approach the crossbar while still rising or while falling?

10.) A rock is thrown from ground level and travels a horizontal distance of 12.0 m when it reaches a maximum height of 10.0 m.

a.) How many seconds does it take to reach for the rock to reach its maximum height?

b.) What is the magnitude and direction of the rock's initial velocity?

c.) The rock strikes the side of a building which is 18.0 m away from the point from which the rock was thrown. At what height does the rock strike the building?