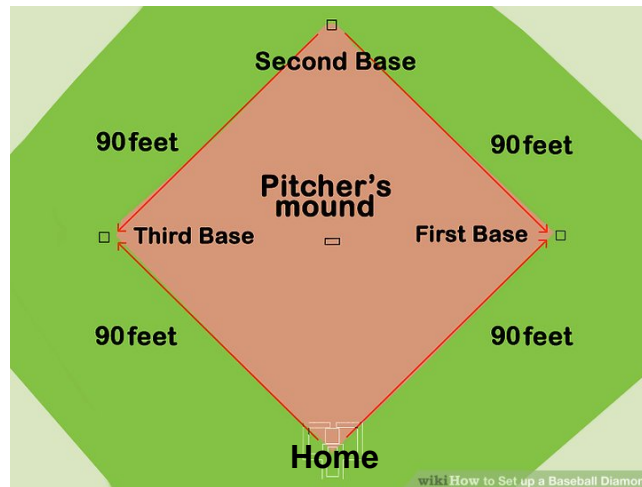


PHY151H1F – Practice Problem Set 1



1. Above is a sketch of a baseball diamond. There is a player at Second Base, and he wants to “steal” third base. That means that he will start running towards Third Base at the same moment the pitcher throws the ball toward Home. Assume he starts from rest at Second Base at the moment the ball leaves the pitcher’s hand. The pitcher throws from the Pitcher’s mound which is 61 feet away from Home. The catcher at Home catches the ball, and then throws it toward Third Base. It takes 0.45 s of delay time between the catcher catching the ball and then throwing it again. Assume the horizontal component of the ball’s velocity is constant during a throw, and its magnitude is always 20 m/s. What is the maximum amount of time the runner can take to run from Second Base to Third Base in order to get there before the ball? Do you think he’s going to make it?

[**Note:** 12 inches = 1 feet, and 2.54 cm = 1 inch. Both of these are definitions, so there are an infinite number of significant figures in each unit conversion.]

2. Sketch the following vector, and label an angle that specifies the vector’s direction. Also find its magnitude.

$$\vec{v} = (-10 \hat{i} + 60 \hat{j}) \text{ m/s}$$

3. • Mary needs to row her boat across a 100-m-wide river that is flowing to the east at a speed of 1.0 m/s. Mary can row with a speed of 2.0 m/s.
 - a. If Mary points her boat due north, how far from her intended landing spot will she be when she reaches the opposite shore?
 - b. What is her speed with respect to the shore?