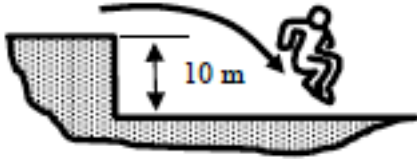


1. A freshman runs off the bleachers and onto the football field as shown in the figure at right. The freshman's horizontal velocity is 8 m/s. Assume gravity is  $-10$  m/s per second. Show work.



(a.) \_\_\_\_\_ What is the formula for vertical height you would use for this problem?

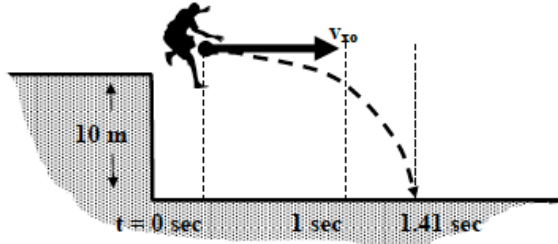
(b.) \_\_\_\_\_ *In how many seconds* would the freshman land on the ground?

(c.) \_\_\_\_\_ *How far* (in m) would the freshman have moved horizontally in the time you found in Problem. (b).

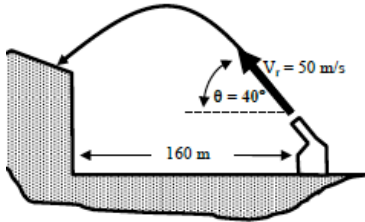
(d.) \_\_\_\_\_ What is the formula for *vertical velocity* (in m/s) you would use for this problem?

(e.) \_\_\_\_\_ What would be the freshman's final *vertical velocity* (in m/s) right before he lands on the ground?

(f.) **Draw** and **label** the freshman's velocity vectors at the points indicated. Make sure you draw them to scale. The first one has been done for you. You should draw both  $V_x$ , the horizontal components,  $V_y$ , the vertical components, and  $V_r$ , the resultant. You will be drawing a total of six arrows that are missing below. Also, label the angles that the resultant vectors make with the horizontal.



2. At the Huron vs. Pioneer football game, the cheerleading squad launches a River Rat t-shirt with the t-shirt shooter into the bleachers from the football field with an initial velocity of 50 m/s at an angle of  $40^\circ$ . Assume gravity is  $-10 \text{ m/s}^2$ . Show work.



- (a.) \_\_\_\_\_ What is the *initial horizontal velocity* ( $V_{ox}$ ) of the t-shirt (in m/s)?
- (b.) \_\_\_\_\_ What is the *initial vertical velocity* ( $V_{oy}$ ) of the t-shirt (in m/s)?
- (c.) \_\_\_\_\_ *In how many seconds* will the t-shirt reach its maximum height?
- (d.) \_\_\_\_\_ What is the *maximum height* (in m) the t-shirt will go?
- (e.) \_\_\_\_\_ *How far* (in m) horizontally will the t-shirt have gone when it is at maximum height?
- (f.) \_\_\_\_\_ *After how many seconds* will the t-shirt land in the stands 160 m away?

Answers

1 (a)  $y = y_0 - 1/2 gt^2$  (b) 1.14 s (c) 11.31s (d)  $V_y = -gt$  (e) 14.14 m/s (f) yourself 2

2 (a) 38.30 m/s (b) 32.14 m/s (c) 3.21 s (d) 51.65 m (e) 123.10 (f) 4.18 s