Projectiles

Intro to Cannon Problems with a Bomber Review

Practice Bomber Problem

The Goodyear blimp is trying to drop some Doritos into a jar of salsa on the 50 yard line at the Super Bowl. If the blimp is flying at 10.0 m/s and is 1250 m above the field, then:

1. How far from the jar of salsa should the blimp drop the chips in order to hit the salsa jar?

$$d = \frac{1}{2}at^2$$

$$1250 = \frac{1}{2}(9.8)t^2$$

$$1250 = 4.9\,t^2$$

$$t^2 = \frac{1250}{4.9} = 255.1$$

$$t = \sqrt{255.1} = 15.97 \text{ sec}$$

$$\boxed{d = V \cdot t = 10(15.97) = 159.7 \text{ m}}$$

	x	y
V_i	10	0
V_f	10	
d	0	1250
a	0	9.8
t	15.97	15.97

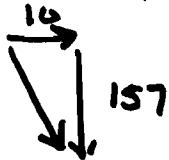2. How fast will the chips be moving when they hit the salsa in the:

   a. x-direction?

   10 m/s

   b. y-direction?

   $$V_f = V_i + at = 0 + 9.8(15.97) = 157 \text{ m/s}$$

   c. The actual (resultant) velocity (include magnitude and direction)

   $$V^2 = 10^2 + 157^2 = 24749$$

   $$V = 157.3 \text{ m/s}$$

   $$\measuredangle = \tan^{-1}\left(\frac{157}{10}\right) = 86° \text{ Below Horizontal}$$

3. A ball is tossed into the air with a vertical velocity of 7.5 m/s.

   $V_i = 7.5$
   $V_f = 0$
   $d =$
   $a = -9.8$
   t

   a. How long is the ball in the air?

   $$V_f = V_i + at$$
   $$0 = 7.5 - 9.8t$$
   $$t = \frac{7.5}{9.8} = 0.77 \text{ sec}$$
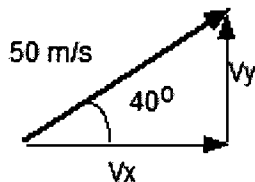 $$2t = 0.77(2) = 1.53 \text{ s}$$

   b. What is the ball's maximum height?

   $$d = \frac{1}{2}at^2 = \frac{1}{2}(9.8)(.77)^2 = 2.87 \text{ m}$$

   c. What is the velocity of the ball just before it strikes the ground?

4. Vector review / Cannon intro

Determine the horizontal velocity Vx __38.3 m/s__

$$V_x = 50 \cos(40)$$

Determine the vertical velocity Vy __32.1 m/s__

$$V_y = 50 \sin(40)$$

Determine the horizontal velocity Vx __8.19 m/s__

$$V_x = 10 \cos 35)$$

Determine the vertical velocity Vy __5.73 m/s__

$$V_y = 10 \sin(35)$$