

1. At the Mallard's game on Friday, a guy came out shooting t-shirts from his t-shirt launcher. If he launches them from a height of 4 feet and with a velocity of 72ft per second.

a. Write an equation to model the situation.

$$h(t) = -16t^2 + 72t + 4$$

b. What is the maximum height of the t-shirt?

$$t = \frac{-72}{2(-16)} = 2.25$$

$$h(2.25) = 85$$

max ht. is 85 ft.

2. You and a bunch of your friends are going to the movies this weekend. You and your best friend are responsible for buying tickets ahead of time. You are buying 10 tickets; your total is \$95. Your best friend is buying 7 tickets; their total is \$67.55.

a. Write an equation to model the situation.

$$(10, 95) \quad (7, 67.55)$$

$$m = \frac{67.55 - 90}{7 - 10} = \frac{-22.45}{-3} = 9.15$$

b. Is there a convenience fee? If so, how much is it?

yes, 3.50 dollars

$$y = 9.15x + b$$

$$95 = 9.15(10) + b$$

$$b = 3.5$$

c. How many tickets could you purchase if you had \$45?

$$45 = 9.15x + 3.5$$

$$41.5 = 9.15x$$

$$x = 4.536$$

buy 4 tickets

$$\boxed{y = 9.15x + 3.5}$$

3. A goalie kicked the soccer ball from the grass from one goal line, into the air and tried to clear it to the other side of the field. If she kicked it with a velocity of 60 feet per second.

a. Write an equation to model the situation.

$$h(t) = -16t^2 + 60t$$

b. How long does it take the ball to hit the ground?

$$0 = -16t^2 + 60t$$

$$0 = -4t(4t - 15)$$

$$t = 0 \quad t = 15/4$$

3.75 seconds

4. A bacteria culture triples in size every hour. Three hours from now, the culture has 8,000 bacteria.

a. Write an equation to model the situation.

$$y = a(b)^x \quad 8000 = a(3)^3 \quad 8000 = 27a$$

b. Approximately how many bacteria are there after ten hours?

$$y = 296(3)^{10} = \boxed{17478504} \quad a \approx 296 \quad y = 296(3)^x$$

5. Steph and Tommy broke up. Upset, Steph climbed to the top of the 50 foot bridge and threw Tommy's class ring into the river with an initial velocity of 20 feet per second.

a. Write an equation to model the situation.

$$h(t) = -16t^2 + 20t + 50$$

b. How long did it take for the ring to hit the water?

$$\boxed{2.5 \text{ seconds}}$$

$$0 = -16t^2 + 20t + 50$$

$$t = \frac{-20 \pm \sqrt{20^2 - 4(-16)(50)}}{2(-16)} = \frac{-20 \pm \sqrt{3600}}{-32}$$

$$t = -1.25 \text{ \& } 2.5$$

6. Monica feeds her dog 2 cups of dog food each day from a very large bag. On the 3rd day, she has 44 cups left in the bag.

a. Write an equation to model the situation.

$$y = -2x + b$$

b. How many cups are there after the 20th day?

$$y = -2(20) + 50$$

$$y = 10$$

$$\boxed{10 \text{ cups}}$$

$$(3, 44)$$

$$44 = -2(3) + b$$

$$b = 50$$

$$\boxed{y = -2x + 50}$$

7. The world population in 2000 was approximately 6.08 billion. The annual rate of increase was about 1.26%.

a. Write an equation to model the situation.

$$y = 6.08(1.0126)^x$$

b. Estimate the world's population in year 2014.

$$y = 6.08(1.0126)^{14} = \boxed{7.24 \text{ billion people}}$$