

Key

For each situation, identify the variables, write an equation, and solve for the situation.

1. **Fund-Raising:** the sophomore class holds a car wash to raise money. A local merchant donates all of the supplies. A wash costs \$5 per car and \$6.50 per van or truck. Write an equation to relate the number of cars and vans or trucks the students must wash to at least \$800. How many cars must you wash if 2 vans come to the car wash?

$$5C + 6.50T \geq 800$$

$$5C + 6.50(2) \geq 800$$

$$5C + 13 \geq 800$$

$$5C \geq 787$$

$$C \geq 157.4$$

158 cars

2. **Trip:** A car enters an interstate highway 15 miles north of a city. The car travels due north at an average speed of 62.5 mi/hr. Write an equation to model the car's distance d from the city after traveling for h hours. How long will it take the car to be 100 miles away from the city?

$$y = mx + b$$

slope

starting pt

($x = \text{time}$)
($y = \text{dist}$)

$$y = 62.5x + 15$$

$$100 = 62.5x + 15$$

$$85 = 62.5x \quad x = 1.36$$

3. **Party:** You are sent to the store to buy sliced meat for a party. You are told to get roast beef and turkey, and you are given \$30. Roast beef is \$4.29/lb and turkey is \$3.99/lb. How much turkey can you get if you bought 3 lbs of roast beef?

$$4.29R + 3.99T = 30$$

$$4.29(3) + 3.99T = 30$$

$$T = 4.29 \text{ lbs}$$

4. **Cab Ride:** A 2-mile cab ride costs \$5.25. A 5-mile cab ride costs \$10.50. How much does a 3.8-mile cab ride cost?

$$(2, 5.25) \quad (5, 10.50)$$

$$\frac{10.50 - 5.25}{5 - 2} = \frac{5.25}{3} = 1.75$$

slope

$$y - y_1 = m(x - x_1)$$

$$y - 5.25 = 1.75(x - 2)$$

$$y - 5.25 = 1.75(x - 2)$$

$$y = 8.40$$

5. **Transportation:** Jacksonville, Florida has an elevation of 12 feet above sea level. A hot-air balloon is taking off from Jacksonville rises 50 ft/min. Write an equation to model the balloon's elevation as a function of time. How high is the balloon after 1 hour?

$$y = 50x + 12$$

$$y = 50(60) + 12$$

$$y = 3012 \text{ ft}$$

6. **Balloon:** Suppose a balloon begins descending at a rate of 20 ft/min from an elevation of 1350 feet. When does the balloon hit the ground?

Slope = -20

height = 0

$$y = -20x + 1350$$

$$0 = -20x + 1350$$

$$x = 67.5 \text{ min}$$

7. **Water Jug:** An empty 5-gal water jug weighs 0.75 lb. With 3 cups of water inside, the jug weighs 2.25 lb. Predict the weight of the jug with 5 cups of water inside

(0, .75) (3, 2.25)

$$\frac{.75 - 2.25}{0 - 3} = .5$$

$$y - .75 = .5(x - 0)$$

$$y - .75 = .5(5 - 0)$$

$$y = 3.25 \text{ lbs}$$

8. **Car Dealer:** A tire dealer sells Supreme tires for \$48 and Prestige tires for \$56 each. The dealer hopes the sales during the month of October will be at least \$2000. How many Prestige tires must the company sell to reach their goal if they have sold 9 Supreme tires?

$$48S + 56P \geq 2000$$

$$48(9) + 56P \geq 2000$$

$$P \geq 28 \text{ tires}$$

9. **Pool:** You have a 55,000-gallon pool. It is being emptied at a rate of 45 gallons per hour. How long will it take to empty the pool?

$$y = -45x + 55,000$$

$$y = 1,222.22 \text{ hrs}$$

10. **Science:** A candle is 6 in. tall after burning for 1 hour. After 3 hours it is 5 1/2 in tall. Write a linear equation to model the height y of the candle after burning x hours. When does the candle burn out?

height = 0

(1, 6) (3, 5.5)

m = -1/4

$$y - 6 = -1/4(x - 1)$$

$$0 - 6 = -1/4(x - 1)$$

$$24 = x - 1$$

$$x = 25 \text{ hrs}$$

- Suppose after 3 hours it was 4.5 inches tall, write a linear equation to model the height y of the candle burning x hours. When does the candle burn out now?

(1, 6) (3, 4.5)

$$\frac{4.5 - 6}{3 - 1} = -.75$$

$$y - 6 = -.75(x - 1)$$

$$0 - 6 = -.75(x - 1)$$

$$x = 9 \text{ hrs}$$