

# Linear Equation Word Problems

Name KEY

## Example Problems:

Ex 1: An airplane 30,000 feet above the ground begins descending at the rate of 2,000 feet per minute. Assume the plane continues at the same rate of descent. The plane's height and minutes above the ground are related to each other.

Step 1) Identify the variables in this situation

$h = \text{height above ground}$   
 $m = \# \text{ minutes}$

Step 2) Write an equation to model the situation.

$$h = 30,000 - 2,000m$$

Step 3) Use your equation to find the altitude of the plane after 5 minutes.

$$h = 30,000 - 2,000(5) = 20,000 \text{ ft}$$

Ex 2: Suppose you receive \$100 for a graduation present, and you deposit it in a savings account. Then each week thereafter, you add \$5 to the account but no interest is earned. The amount in the account is a function of the number of weeks that have passed.

Step 1) Identify the variables in this situation

$M = \text{money in account}$   
 $W = \# \text{ weeks}$

Step 2) Write an equation to model the situation.

$$M = 5W + 100$$

Step 3) Use your equation to find when you will have \$310 in the account.

$$310 = 5W + 100$$

$$210 = 5W$$

$$W = 42$$

weeks

Ex 3: A machine salesperson earns a base salary of \$40,000 plus a commission of \$300 for every machine he sells. Write an equation that shows the total amount of income the salesperson earns, if he sells  $x$  machines in a year.

Step 1) Identify the variables in this situation

$y = \text{income}$ ,  $x = \# \text{ machines sold}$

Step 2) Write an equation to model the situation.

$$y = 40,000 + 300x$$

Step 3) Use your equation to find how much the salesperson's income would be if he/she sold 150 machines?

$$y = 40,000 + 300(150) = \$85,000$$

Step 4) How many machines would the salesperson need to sell to earn a \$100,000 income?

$$100,000 = 40,000 + 300x$$

$$60,000 = 300x$$

$$x = 200$$

machines

### Practice Problems:

1. The cost of a school banquet is \$95 plus \$15 for each person attending. Write an equation that gives total cost as a function of the number of people attending. What is the cost for 77 people?

$$y = 95 + 15x$$

$$y = 95 + 15(77) = 1250$$

2. In 1980 the average price of a home in Brainerd County was \$97,000. By 1986 the average price of a home was \$109,000. Write a linear model for the price of a home,  $P$ , in Brainerd County as a function of the year,  $t$ . Let  $t = 0$  correspond to 1980.

$$\frac{109,000 - 97,000}{1986 - 1980} = \frac{12,000}{6} = 2,000$$

$$P(t) = 2,000t + 97,000$$

3. Roman paid \$150 to join a handball club. He pays an additional \$15 every time he uses one of the club's handball courts. Write an equation that describes Roman's total cost for playing handball as a function of the number of times he plays. Let  $C$  = the total cost and  $n$  = the number of times he plays.

$$C(n) = 150 + 15n$$

4. A sunflower in Julia Rosario's garden was 12 centimeters tall when it was first planted. Since then, it has grown approximately 0.6 centimeters per day. Write an equation expressing the sunflower's height,  $H$ , in terms of the number of days,  $d$ , since it was planted.

$$H(d) = 0.6d + 12$$

5. Billy plans to paint baskets. The paint costs \$14.50. The baskets cost \$7.25 each. Write an equation that gives the total cost as a function of the number of baskets made. Determine the cost of four baskets.

$$C = \text{cost}$$

$$C = 7.25b + 14.50$$

$$b = \# \text{ baskets}$$

$$C = 7.25(4) + 14.50 = \$43.50$$

6. A real estate sales agent receives a salary of \$250 per week plus a commission of 2% of sales. Write an equation that gives the weekly income  $y$  in terms of sales  $x$ .

$$y = 250 + 0.02x$$

7. Nick is given \$50 to spend on a vacation. He decides to spend \$5 a day. The amount Nick has left and the number of days are related.

a) Identify the variables in this situation:

$$y = \text{amount of \$ left}$$

$$x = \# \text{ days}$$

b) Write an equation relating  $x$  and  $y$ .

$$y = 50 - 5x$$

c) Use your equation to find out when Nick will have \$15 left.

$$15 = 50 - 5x$$

$$-35 = -5x$$

$$\boxed{x=7}$$

$$\boxed{7 \text{ days}}$$