

# LINEAR EQUATIONS - SUPPLEMENT

## Homework

Do all work on a separate sheet of notebook paper.

**1. HOUSE APPRECIATION**

A house was purchased for \$89,000. Six years later it was appraised at \$125,000. Assume that the value  $V$  of the house after its purchase is a linear relationship of time  $t$  (in years owning the home).

- a. Express  $V$  in terms of  $t$ .
- b. How many years after the purchase date was the house worth \$103,000?

**2. TEMPERATURE**

The freezing point of water is  $0^{\circ}\text{C}$  or  $32^{\circ}\text{F}$ , and the boiling point is  $100^{\circ}\text{C}$  or  $212^{\circ}\text{F}$ . Express  $F^{\circ}$  in terms of  $C^{\circ}$ . (Express any decimals as fractions.)

**3. NUTRITION**

There are approximately 126 calories in a 2-ounce serving of lean hamburger and approximately 189 calories in a 3-ounce serving.

- a. Write a linear equation for the number of calories in lean hamburger in terms of the size of the serving.
- b. Use this equation to estimate the number of calories in a 5-ounce serving of lean hamburger.

**4. AUTOMOTIVE TECHNOLOGY**

The gas tank of a certain car contains 16 gallons when the driver of the car begins a trip. Each mile driven by the driver decreases the amount of gas in the tank by 0.032 gallons.

- a. Write a linear equation for the number of gallons of gas in the tank in terms of the number of miles driven.
- b. Use your equation to find the number of gallons in the tank after driving 150 miles.
- c. How far can you drive till you run out of gas?

**5. AIR TEMPERATURE**

The relationship between the air temperature  $T$  (in  $^{\circ}\text{F}$ ) and the altitude  $h$  (in feet above sea level) is approximately linear for  $0 \leq h \leq 20,000$ . If the temperature at sea level is  $60^{\circ}$ , an increase of 5000 feet in altitude lowers the air temperature about  $18^{\circ}$ .

- a. Write the linear equation that expresses  $T$  (y-value) in terms of  $h$  (x-value).
- b. Use the above equation to approximate the air temperature at an altitude of 15,000 feet.
- c. Approximate the altitude at which the temperature is  $0^{\circ}$ . Round to the nearest foot.

**6. RECORDS**

In 1930, the record for the 400-meter run was 48.6 seconds. In 1970, it was 43.8 seconds. Let  $R$  represent the record in the 400-meter run and  $t$  the number of years since 1930.

- a. Write a linear equation that relates  $R$  in terms of  $t$ .
- b. When did the record become 40.08 seconds?

**7. FLYING LESSONS**

Flying lessons cost \$645 for an 8 hour course and \$1425 for a 20 hour course. Both prices include a fixed insurance fee.

- a. Express cost,  $C$ , in terms of the length of time,  $t$ , of the course.
- b. What is the hourly rate of the instruction?  
What is the fixed insurance fee?

**8. SALES**

A vendor has learned that, by pricing caramel apples at \$1.25, sales reach 133 caramel apples per day. Raising the price to \$2.25 will cause the sales to fall to 81 apples per day. Let  $y$  be the number of caramel apples the vendor sells at  $x$  dollars each. Write a linear equation that models the number of caramel apples sold per day when the price is  $x$  dollars each.

**9. TELECOMMUNICATIONS**

A cellular phone company offers several different options for using a cellular telephone. One option, for people who plan on using the phone only emergencies, cost the user \$4.95 per month plus \$.59 per minute for each minute the phone is used.

- a. Write a linear equation for the monthly cost of the phone in terms of the number of minutes the phone is used.
- b. Use your equation to find the monthly cost of using the cellular phone for 13 minutes in one month.

**10. CELL PHONE RATES**

Suppose you have a cellular phone with a rate plan that cost \$20 per month, with no additional charge for the first 30 minutes of use, and the \$.40 for each minute or fraction of a minute after the first 30 minutes.

- a. Write an equation that gives the monthly cost  $C$  to talk for  $x$  minutes, if  $x$  is less than or equal to 30 minutes.
- b. Write an equation that gives the monthly cost  $C$  to talk for  $x$  minutes, if  $x$  is greater than 30 minutes.