

Exercises 41–49, (a) write the variation and (b) determine the quantity indicated.

Property Tax The property tax, t , on a home is directly proportional to the assessed value, v , of the home. If the property tax on a home with an assessed value of \$140,000 is \$2100, what is the property tax on a home with an assessed value of \$180,000?

Resistance The resistance, R , of a wire varies directly as its length, L . If the resistance of a 30 ft length of wire is 0.24 ohm, determine the resistance of a 40 ft length of wire.

$$R = kL$$

$$.24 = k \cdot 30$$

$$k = .008$$

$$R = .008(40)$$

$$R = .32$$

Speaker Loudness The loudness of a stereo speaker, l , measured in decibels (dB), is inversely proportional to the square of the distance, d , of the listener from the speaker. If the loudness is 20 dB when the listener is 6 ft from the speaker, what is the loudness when the listener is 3 ft from the speaker?

$$l = \frac{k}{d^2}$$

$$20 = \frac{k}{6^2}$$

$$k = 720$$

$$l = \frac{720}{3^2}$$

$$l = 80$$

Melting an Ice Cube The time, t , for an ice cube to melt is inversely proportional to the temperature, T , of the water in which the ice cube is placed. If it takes an ice cube 2 minutes to melt in 75°F water, how long will it take an ice cube of the same size to melt in 80°F water?

45. **Video Rentals** The number of weekly videotape rentals, R , at Busterblock Video varies directly with the advertising budget, A , and inversely with the daily rental price, P . When the video store's advertising budget is \$600 and the rental price is \$3 per day, it rents 4800 tapes per week. How many tapes would it rent per week if the store increased its advertising budget to \$700 and raised its rental price to \$3.50?

$$R = \frac{kA}{P}$$

$$4800 = \frac{k(600)}{3}$$

$$k = 24$$

$$R = \frac{24 \cdot 700}{3.50}$$

$$R = 4800$$

46. **Stopping Distance of a Car** The stopping distance, d , of a car after the brakes are applied varies directly as the square of the speed, s , of the car. If a car traveling at a speed of 40 mph can stop in 80 ft, what is the stopping distance of a car traveling at 65 mph?

$$d = ks^2$$

$$80 = k(40)^2$$

$$.05 = k$$

$$d = .05(65)^2$$

$$d = 211.25$$

47. *Guitar Strings* The number of vibrations per second, v , of a guitar string varies directly as the square root of the tension, t , and inversely as the length of the string, l . If the number of vibrations per second is 5 when the tension is 225 kg and the length of the string is 0.60 m, determine the number of vibrations per second when the tension is 196 kg and the length of the string is 0.70 m.

48. *Electrical Resistance* The electrical resistance of a wire, R , varies directly as its length, L , and inversely as its cross-sectional area, A . If the resistance of a wire is 0.2 ohm when the length is 200 ft and its cross-sectional area is 0.05 in.^2 , what is the resistance of a wire whose length is 5000 ft with a cross-sectional area of 0.01 in.^2 ?

$$R = \frac{kL}{A}$$

$$.2 = \frac{k \cdot 200}{.05}$$

$$\frac{.01}{200} = \frac{k \cdot 200}{.01}$$

$$k = .00005 \times 10^{-5}$$

$$k \cdot 00005$$

$$R = \frac{.00005(5000)}{.01}$$

$$R = 25$$