

Key

LINEAR EQUATION WORD PROBLEMS

> **SLOPE-INTERCEPT:** Use when given a rate of change (m) and a starting point (b)

1. You and your friends plan to attend the county fair this weekend. The admission to the fair is \$5 and the cost per ride is 50¢. If your parents gave you \$20, write and solve a linear equation to find how many rides you can go on.

$$y = 0.5x + 5$$

$$20 = 0.5x + 5$$

$$\begin{array}{r} 20 = 0.5x + 5 \\ -5 -5 \\ \hline 15 = 0.5x \end{array}$$

$$\frac{15}{0.5} = \frac{0.5x}{0.5} \quad x = 30 \text{ rides}$$

2. While your family is visiting Deep Creek Lake, you and your mother decide to go boating. The rangers charge \$6.50 per hour in addition to a \$25.00 deposit to rent a canoe. If you wish to rent the canoe from 12:30 to 3:30 PM, write and solve a linear equation to find the total cost to rent the canoe.

$$y = 6.50x + 25$$

$$y = 6.50(3) + 25$$

$$y = \$44.50$$

3. Your parents have decided to buy a new Toyota 4Runner for \$25,635. According to the dealer, the car will depreciate in value approximately \$3,000 per year. Write and solve a linear equation to find how many years until the car is worth \$3,135?

$$y = 3000x + 3135$$

$$25635 = 3000x + 3135$$

$$\begin{array}{r} 25635 = 3000x + 3135 \\ -3135 -3135 \\ \hline 22500 = 3000x \end{array}$$

$$\frac{22500}{3000} = \frac{3000x}{3000} \quad x = 7.5 \text{ years}$$

4. If you buy a car wash at the gas station for \$5.00, the cost per gallon is \$3.10. If you have \$40, write and solve a linear equation to find the number of gallons of gas you can afford.

$$y = 3.10x + 5.00$$

$$40 = 3.10x + 5.00$$

$$\begin{array}{r} 40 = 3.10x + 5.00 \\ -5 -5 \\ \hline 35 = 3.10x \end{array}$$

$$\frac{35}{3.10} = \frac{3.10x}{3.10} \quad x = 10.3 \text{ gal}$$

> **STANDARD FORM:** Use when the problem relates two different objects

5. Sam ordered 2 tacos and 3 enchiladas for lunch at the restaurant. His bill came to \$7.80. If enchiladas were \$2 each, write and solve a linear equation to find the cost of each taco.

$$2x + 3y = 7.80$$

$$2x + 3(2) = 7.80$$

$$2x + 6 = 7.80$$

$$\begin{array}{r} 2x + 6 = 7.80 \\ -6 -6 \\ \hline 2x = 1.80 \end{array}$$

$$\frac{2x}{2} = \frac{1.80}{2}$$

$$x = \$0.90$$

6. Tickets at a school play cost \$4 in advance or \$5 at the door. Total ticket sales for an evening production were \$440. If no tickets were sold in advance, write and solve a linear equation to find the how many were sold at the door.

$$4x + 5y = 440$$

$$5y = 440$$

$$y = 88 \text{ tickets}$$

7. Karen's piggy bank has all dimes and quarters. The total value of the money in her piggy bank is \$11.40. If Karen has 36 quarters, write and solve a linear equation to find the number of dimes she has.

$$0.10x + 0.25y = 11.40$$

$$0.10x + 0.25(36) = 11.40$$

$$0.10x + 9 = 11.40$$

$$\begin{array}{r} 0.10x = 2.40 \\ \hline 0.10 \quad 0.10 \end{array}$$

$$x = 24 \text{ dimes}$$

8. The Madison High School Marching Band sold gift wrap to earn money for a band trip. Solid color gift wrap sells for \$4 per roll and printed gift wrap sells for \$6 per roll. The band needs to earn \$2340 for an upcoming competition. If the band sells 340 rolls of printed paper, write and solve a linear equation to find the number of solid paper they must sell.

$$4x + 6y = 2340$$

$$4x + 6(340) = 2340$$

$$4x + 2040 = 2340$$

$$\begin{array}{r} 4x = 300 \\ \hline 4 \quad 4 \end{array}$$

$$x = 75 \text{ solid paper}$$

> **POINT-SLOPE:** Use when the problem gives a sample point (x, y) and a rate of change (m)

9. At Eagle Bay, it costs \$10 per hour to rent a canoe. Nick and his friends rented a canoe for 3 hours and paid \$45. Write and solve a linear equation to find the cost to rent the canoe for 8 hours.

$$y - 45 = 10(x - 3)$$

$$y - 45 = 10x - 30$$

$$\begin{array}{r} y - 45 = 10x - 30 \\ +45 \quad +45 \\ \hline y = 10x + 15 \end{array}$$

$$y = 10(8) + 15$$

$$y = \$95$$

10. A construction company charges \$15 per hour for debris removal, plus a one-time fee for the use of the trash dumpster. The total fee for 9 hours of service was \$195. Write and solve a linear equation to find the one-time fee for the trash dumpster.

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

$$y - 195 = 15(x - 9)$$

$$y - 195 = 15x - 135$$

$$\begin{array}{r} y - 195 = 15x - 135 \\ +195 \quad +195 \\ \hline y = 15x + 60 \end{array}$$

$$\text{\$60}$$

11. A company offers premium cable for \$39.95 per month plus a one-time setup fee. The total cost for setup and 6 months of service was \$264.70. Write and solve a linear equation to find the total cost for 2 years of service.

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

$$y - 264.70 = 39.95(x - 6)$$

$$y - 264.70 = 39.95x - 239.7$$

$$\begin{array}{r} y - 264.70 \\ + 264.70 \end{array} \qquad \begin{array}{r} - 239.7 \\ + 264.70 \end{array}$$

$$y = 39.95x + 25$$

$$y = 39.95(2) + 25$$

$$y = \$104.90$$

12. A home security company provides security systems for \$5 per week, plus an installation fee. The total fee for 12 weeks of service is \$210. Write and solve a linear equation to find the cost of the installation fee.

$$y - 210 = 5(x - 12)$$

$$y - 210 = 5x - 60$$

$$\begin{array}{r} y - 210 \\ + 210 \end{array} \qquad \begin{array}{r} - 60 \\ + 210 \end{array}$$

$$y = 5x + 150$$

$$\$150 \text{ installation fee}$$

> TWO POINTS:

The problem gives two sample points (x_1, y_1) and (x_2, y_2)

13. To surf the internet for 25 minutes at an Internet Café, it costs \$7.25. For 40 minutes, it costs \$9.80. Write and solve a linear equation to find the cost for surfing the web for one hour.

$$\frac{9.80 - 7.25}{40 - 25} = \frac{2.55}{15} = \$0.17$$

$$\$13.20$$

$$y - 7.25 = 0.17(x - 25)$$

$$y - 7.25 = 0.17x - 4.25$$

$$\begin{array}{r} y - 7.25 \\ + 7.25 \end{array} \qquad \begin{array}{r} - 4.25 \\ + 7.25 \end{array}$$

$$y = 0.17x + 3$$

$$y = 0.17(60) + 3$$

14. Water boils at 100° Celsius or 212° Fahrenheit. Water freezes at 0° Celsius or 32° Fahrenheit. If the weather forecaster says it will be 25° Celsius today, write and solve a linear equation to find what Fahrenheit temperature this is.

$$\frac{212 - 32}{100 - 0} = \frac{180}{100} = 1.8$$

$$y - 212 = 1.8(x - 100)$$

$$y - 212 = 1.8x - 180$$

$$\begin{array}{r} y - 212 \\ + 212 \end{array} \qquad \begin{array}{r} - 180 \\ + 212 \end{array}$$

$$y = 1.8x + 32$$

$$y = 1.8(25) + 32$$

$$y = 77^\circ \text{F}$$

15. The value of a car decreases at a constant rate. After 3 years, the value of the car is \$15,000. After 2 more years, the value of the car is \$11,000. Write and solve a linear equation to find the value of the car after 8 years.

$$\frac{15000 - 11000}{3 - 5} = \frac{4000}{-2} = -2000$$

$$y - 15000 = -2000(x - 3)$$

$$y - 15000 = -2000x + 6000$$

$$\begin{array}{r} y - 15000 \\ + 15000 \end{array} \qquad \begin{array}{r} + 6000 \\ + 15000 \end{array}$$

$$y = -2000x + 21000$$

$$y = -2000(8) + 21000 \qquad 3 \quad 15000$$

$$y = -16000 + 21000 \qquad 5 \quad 11000$$

$$y = \$5000$$

16. Customers of a satellite dish company must pay for installation of the dish, and a monthly fee for service. After 6 months, Jack had paid \$594. After 11 months, he had paid \$989. Write and solve a linear equation to find the cost for installation.

$$\frac{989 - 594}{11 - 6} = \frac{395}{5} = 79$$

$$\begin{aligned} y - 594 &= 79(x - 6) \\ y - 594 &= 79x - 474 \\ +594 & \quad +594 \\ \hline y &= 79x + 120 \end{aligned}$$

\$120 installation



now... YOU determine which type!

17. You are buying \$48 worth of two types of lawn seed. Ryegrass lawn seed sells for \$0.70 per pound and Fescue lawn seed sells for \$1.15 per pound. If you bought 25 pounds of Fescue lawn seed, write and solve a linear equation to find the amount of Ryegrass lawn seed purchased.

$$\begin{aligned} 0.70x + 1.15y &= 48 \\ 0.70x + 1.15(25) &= 48 \\ 0.70x + 28.75 &= 48 \\ -28.75 & \quad -28.75 \\ \hline 0.70x &= 16.25 \\ \frac{0.70x}{0.70} & \quad \frac{16.25}{0.70} \end{aligned}$$

$$x = 11.375 \text{ lbs}$$

18. Jeff is keeping track of his weight over several weeks. After 2 weeks, he weighs 194 pounds. After 6 weeks, he weighs 186 pounds. Write and solve a linear equation to find Jeff's weight after 12 weeks.

$$\frac{186 - 194}{6 - 2} = \frac{-8}{4} = -2$$

$$\begin{aligned} y - 194 &= -2(x - 2) \\ y - 194 &= -2x + 4 \\ +194 & \quad +194 \end{aligned}$$

$$\begin{aligned} y &= -2x + 198 \\ y &= -2(12) + 198 \\ y &= -24 + 198 \end{aligned}$$

174 lbs

19. A landscape supply business charges \$30 to deliver mulch. The cost of the mulch is \$23 per cubic yard. Write and solve a linear equation to find the cost of having 8 cubic yards of mulch delivered to a site.

$$y = 23x + 30$$

$$y = 23(8) + 30$$

$$y = 184 + 30$$

$$y = 214$$

20. Karen used a birthday check her mother gave her to start a savings account. She plans to save \$25 per month as well. After 8 months, Karen has \$250. Write and solve a linear equation to find the original check amount from Karen's mother.

$$\begin{aligned} y - 250 &= 25(x - 8) \\ y - 250 &= 25x - 200 \\ +250 & \quad +250 \\ \hline y &= 25x + 50 \end{aligned}$$

\$50