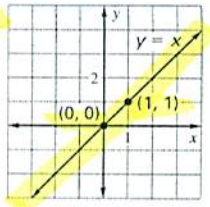
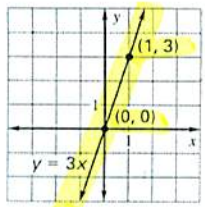
7. No, it is not reasonable to use a direct variation model since the ratios $\frac{c}{s}$ would not be the same for the first 5 songs as it would for later purchases.

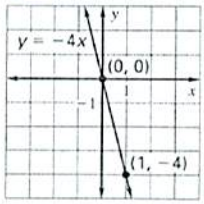
4.6 Exercises (pp. 256–259)

Skill Practice

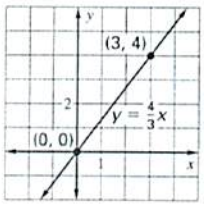
1. Two variables x and y show *direct variation* provided $y = ax$ and $a \neq 0$.
2. The line is not a direct variation equation, because it has a y-intercept of 4. Direct variation equations pass through the origin and therefore have a y-intercept of zero.
3. Yes the equation $y = x$ represents direct variation because it is in the form $y = ax$. The constant of variation is 1.
4. No, the equation $y = 5x - 1$ does not represent direct variation because it cannot be rewritten in the form of $y = ax$.
5. $2x + y = 3$
   $y = -2x + 3$
   No, the equation $2x + y = 3$ does not represent direct variation because it cannot be rewritten in the form $y = ax$.
6. $x - 3y = 0$
   $-3y = -x$
   $y = \frac{1}{3}x$
   Yes, $x - 3y = 0$ represents direct variation, because it can be rewritten in the form $y = ax$. The constant of variation is $\frac{1}{3}$.
7. $8x + 2y = 0$
   $2y = -8x$
   $y = -4x$
   Yes, the equation $8x + 2y = 0$ does represent direct variation because it can be rewritten in the form $y = ax$. The constant of variation is -4.
8. $2.4x + 6 = 1.2y$
   $-1.2y = -2.4x - 6$
   $y = 2x + 5$
   No, the equation $2.4x + 6 = 1.2y$ does not represent direct variation because it cannot be written in the form of $y = ax$.
9. C; $3x - 7y = 0$
   $3x - 7y = 0$
   $-7y = -3x$
   $y = \frac{3}{7}x$
10. The equation must be in the form $y = ax$ to find the constant of variation.
    $-5x + 3y = 0$
    $3y = 5x$
    $y = \frac{5}{3}x$
    The constant of variation is $\frac{5}{3}$.

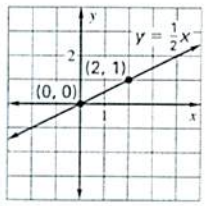
11. 

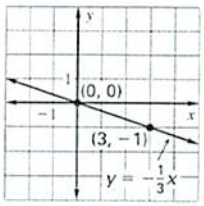
12. 

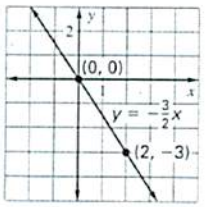
13. 

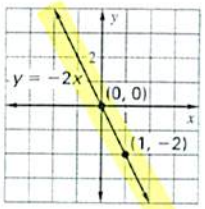
14. 

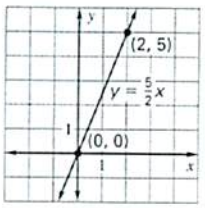
15. 

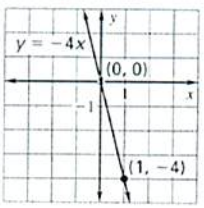
16. 

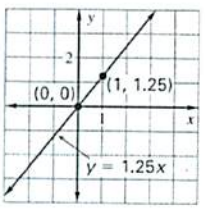
17. 

18. 

19. $12y = -24x$
    $y = -2x$
    

20. $10y = 25x$
    $y = \frac{5}{2}x$
    

21. $4x + y = 0$
    $y = -4x$
    

22. $y - 1.25x = 0$
    $y = 1.25x$
    

23. $y = ax$
    $2 = a(-2)$
    $-1 = a$
    $y = -x$
    $y = -8$

24. $y = ax$

$5 = a(4)$

$\frac{5}{4} = a$

$y = \frac{5}{4}x$

$y = \frac{5}{4}(8)$

$y = 10$

25. $y = ax$

$-3 = a(4)$

$-\frac{3}{4} = a$

$y = -\frac{3}{4}x$

$y = -\frac{3}{4}(8)$

$y = -6$

26. Yes, the table represents direct variation. $y = 5x$

27. No, the table does not represent direct variation.

28. For the table to model direct variation, each point must work in the equation $y = ax$ with the same constant of variation.

The first 3 terms fit the equation $y = \frac{1}{2}x$, but the third term does not, $6 \neq \frac{1}{2}(16)$.

29. $x = 3, y = 9$

$y = ax$

$9 = a(3)$

$3 = a$

$y = 3x$

30. $x = 2, y = 26$

$y = ax$

$26 = a(2)$

$13 = a$

$y = 13x$

31. $x = 14, y = 7$

$y = ax$

$7 = a(14)$

$\frac{1}{2} = a$

$y = \frac{1}{2}x$

32. $x = 15, y = -5$

$y = ax$

$-5 = a(15)$

$-\frac{1}{3} = a$

$y = -\frac{1}{3}x$

33. $x = -2, y = -2$

$y = ax$

$-2 = a(-2)$

$1 = a$

$y = x$

34. $x = -18, y = -4$

$y = ax$

$-4 = a(-18)$

$\frac{2}{9} = a$

$y = \frac{2}{9}x$

35. $x = \frac{1}{4}, y = 1$

$y = ax$

$1 = a\left(\frac{1}{4}\right)$

$4 = a$

$y = 4x$

36. $x = -6, y = 15$

$y = ax$

$15 = a(-6)$

$-\frac{5}{2} = a$

$y = -\frac{5}{2}x$

37. $x = -5.2, y \approx 1.4$

$y = ax$

$1.4 = a(-5.2)$

$-\frac{7}{26} = a$

$y = -\frac{7}{26}x$

38. If y varies directly with x, then x varies directly with y. The constants of variation are reciprocals of each other. For example, if a is a constant,

$y = ax$

$\frac{y}{a} = x$

$\frac{1}{a}y = x.$

39. $m = \frac{y_2 - y_1}{x_2 - x_1} = -\frac{1}{3} = \frac{2 - y_1}{-6 - x_1}$

$-1(-6 - x_1) = 3(2 - y_1)$

$6 + x_1 = 6 - 3y_1$

$x_1 = -3y_1$

$-\frac{1}{3}x_1 = y_1$

$y = -\frac{1}{3}x$

Yes, the equation of the line represents direct variation.

Problem Solving

40. a. $d = 2r$

b. $d = 2(1500) = 3000$

You travel 3000 meters in 1500 tire revolutions.

41. a. $v = \frac{3}{2}t$

b. $v = \frac{3}{2}(8) = 12$

An employee earns 12 hours of vacation in 8 weeks.

42. $s = \frac{10}{2}d$

$s = 5d$

$s = 5(3) = 15$

15 bags are needed to spread a layer that is 3 inches deep.

43. a. f varies directly with w because each value for w multiplied by $\frac{1}{4}$ gives you the corresponding value of f.

b. $f = \frac{1}{4}w$; the rate of change, $\frac{1}{4}$, represents the change in cost (in dollars) per pound of weight, or \$.25 per pound

$f = \frac{1}{4}(18) = 4.5$

$f = \frac{1}{4}(10) = 2.5$

$4.5 + 2.5 = 7$

The total fee would be \$7.