

1. Write the equation of the line through the points (1,4) and (5,-12).

$$m = \frac{-12-4}{5-1} = \frac{-16}{4} = -4$$

$$y-4 = -4(x-1)$$

$$y+12 = -4(x-5)$$

$$y = -4x + 8$$

2. Write the equation of the line parallel to the line in #1, through the point (2,-6)

$$m = -4$$

$$y+6 = -4(x-2)$$

$$y = -4x + 2$$

3. Write the equation of the line through the points (2,6) and (8,-12).

$$m = \frac{-12-6}{8-2} = \frac{-18}{6} = -3$$

$$y-6 = -3(x-2)$$

$$y+12 = -3(x-8)$$

$$y = -3x + 12$$

4. Write the equation of the line perpendicular to the line in #3, through the point (3,8).

$$m_{\perp} = \frac{1}{3}$$

$$y-8 = \frac{1}{3}(x-3)$$

$$y = \frac{1}{3}x + 7$$

5. Is horizontal and contains (3,7).

$$y = 7$$

6. Has an x-intercept 2 and y-intercept -5.

$$\begin{matrix} (2,0) \\ (0,-5) \end{matrix} m = \frac{-5}{-2} = \frac{5}{2}$$

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

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

7. Given  $f(x) = x^2 + 5$  and  $g(x) = 2x - 3$ , find:

$$f(-3) = (-3)^2 + 5$$

$$= 14$$

$$f(g(x)) = (2x-3)^2 + 5$$

$$4x^2 - 12x + 9 + 5$$

$$4x^2 - 12x + 14$$

$$y-0 = \frac{5}{2}(x-2)$$

8. If  $f(x) = x^2 + 6$ , find  $f^{-1}(x)$  algebraically.

$$y = x^2 + 6$$

$$x = \sqrt{y-6}$$

$$x-6 = y^2$$

$$y = \pm\sqrt{x-6}$$

$$f^{-1}(x) = \pm\sqrt{x-6}$$

9. Solve the inequality:  $|2x-7|+8 \leq 11$

$$|2x-7| \leq 3$$

$$-3 \leq 2x-7 \leq 3$$

$$4 \leq 2x \leq 10$$

$$2 \leq x \leq 5$$

10. **Milk Problem** The Dairy Dugout sells one-gallon (4 qt) cartons of milk for \$3.09 and half-gallon cartons for \$1.65. Assume the number of cents you pay for a carton of milk varies linearly with the number of quarts the carton holds. Write a linear equation to model the situation. How much would a 3-gallon carton cost? Suppose a carton was \$3.45. How much did the carton hold?

$$\begin{matrix} (4, 3.09) \\ (2, 1.65) \end{matrix}$$

$$m = \frac{3.09 - 1.65}{4 - 2} = .72$$

$$\begin{aligned} y - 3.09 &= .72(x - 4) \\ y &= .72x + .21 \end{aligned}$$

$$\$3.45 = .72x + .21$$

$$\begin{aligned} 3.24 &= .72x \\ 4.50 &= x \end{aligned}$$

$$3 \text{ gallon} = \$8.85$$

11. **Reading Problem** Phoebe Small has 35 pages of history to be read after she has been reading for 10 minutes, and 5 pages left after she has been reading for 50 minutes. Assume that the number of pages left varies linearly with the number of minutes she has been reading. Write the particular equation expressing pages in terms of minutes.

$$\begin{matrix} (10, 35) \\ (50, 5) \end{matrix}$$

$$y - 35 = \frac{-3}{4}(x - 10)$$

or

$$m = \frac{35 - 5}{10 - 50} = \frac{+30}{-40} = \frac{-3}{4}$$

$$y = \frac{-3}{4}x + 42.5$$

(a) How many total pages will Phoebe have to read for this assignment?

$$y - 35 = \frac{-3}{4}(0 - 10)$$

$$y = 42.5 \text{ pages}$$

12. **Donuts Problem** The price you pay for a box of donuts varies linearly with the number of donuts in the box. For 5 donuts the price is \$1.15, and for 11 donuts it is \$2.35

(a) Write the equation, in slope-intercept form, expressing price in terms of donuts.

$$\begin{matrix} (5, 1.15) \\ (11, 2.35) \end{matrix}$$

$$\begin{aligned} y - 1.15 &= .2(x - 5) \\ y &= .2x + .15 \end{aligned}$$

$$m = \frac{2.35 - 1.15}{11 - 5} = .20$$

(b) Using your equation from part (a), predict the price of a box containing 3 donuts.

$$y = .2(3) + .15$$

$$= \boxed{\$.75}$$

(c) If a box costs \$3.15, how many donuts would you expect it to contain?

$$3.15 = .2x + .15$$

$$3 = .2x$$

$$\boxed{15 \text{ donuts} = x}$$

(d) Sketch the graph of this linear function.

