Example 2 Find an equation of each line described.
   a. The line through (1, 2) and parallel to the line $y = 3x - 7$
   b. The line through (1, 2) and perpendicular to the line $y = 3x - 7$
   c. The line through the points $(-3, 0)$ and (1, 8)

Solution
   a. If the line is parallel to the line $y = 3x - 7$, its slope must be 3.
   Substituting in $y - y_1 = m(x - x_1)$ gives $y - 2 = 3(x - 1)$,
   or $y = 3x - 1$.

   b. The required line has slope $-\dfrac{1}{3}$. (Why?) Thus an equation in point-slope
   form is $y - 2 = -\dfrac{1}{3}(x - 1)$, or $y = -\dfrac{1}{3}x + \dfrac{7}{3}$, or $x + 3y = 7$.

   c. First find the slope: $m = \dfrac{8 - 0}{1 - (-3)} = 2$
   Then use the point-slope form with *either* given point.
   Using $(-3, 0)$, the equation is $y - 0 = 2[x - (-3)]$, or $y = 2x + 6$.
   Using (1, 8), the equation is $y - 8 = 2(x - 1)$, or $y = 2x + 6$.

Classroom Exercises

Give an equation of each line described.

1. Slope $= -\dfrac{1}{2}$; y-intercept $= 5$

2. Slope $= \dfrac{3}{7}$; y-intercept $= 8$

3. x-intercept $= 2$; y-intercept $= 4$

4. x-intercept $= 2$; y-intercept $= -6$

5. The x-axis

6. The y-axis

7. y-intercept $= -3$; parallel to $y = -\dfrac{4}{5}x + 2$

8. y-intercept $= 0$; perpendicular to $y = -\dfrac{7}{4}x + 9$

9. Slope $= \dfrac{5}{8}$; passes through (3, 4)

10. Slope $= -2$; passes through (8, 6)

State the slope of the line and name two points on the line.

11. $y = -(x + 7)$

12. $y + 2 = \dfrac{1}{2}(x - 5)$

13. $y - c = \dfrac{a}{b}(x - d)$

14. Line l is tangent to $\odot O$ at point $P(3, 4)$.
   a. Find the radius of the circle.
   b. Give an equation of the circle.
   c. Find the slope of line l.
   d. Give an equation of line l.