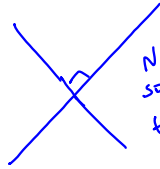


3.7 Perpendicular Lines in a Coordinate plane

What is perpendicular



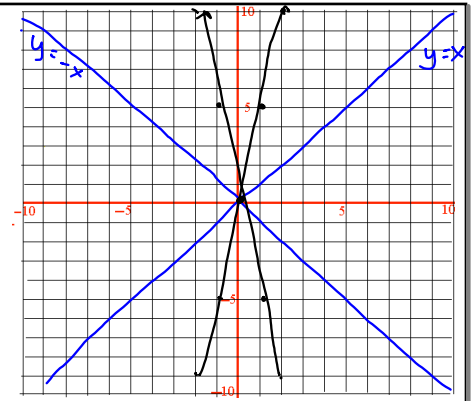
Need to know
something about
the slope to
determine

$$y = -x$$

$$y = x$$

$$y = 5x$$

$$y = -5x$$



We say slopes are
 \perp if they are
opposite reciprocals

$$m_1 \cdot m_2 = -1$$

opposite - change sign
reciprocal - flip the number

If $m_1 =$

$$\frac{2}{3}$$

$$-\frac{1}{5}$$

$$-2\frac{2}{3}$$

then $m_2 =$

$$-\frac{3}{2}$$

$$5$$

$$\frac{3}{8}$$

$$l_1 (0, 3) (-4, -3) \quad \frac{3}{2} \cdot \left(-\frac{2}{3}\right) = -1$$

$$l_2 (0, 3) (3, 1)$$

$$m_1 = \frac{3 - (-3)}{0 - (-4)} = \frac{6}{4} = \frac{3}{2}$$

$$m_2 = \frac{3 - 1}{0 - 3} = -\frac{2}{3} = -\frac{2}{3}$$

Writing Equations

given m, b

$$y = mx + b$$

$$m = \frac{2}{3} \quad b = 7$$

$$y = \frac{2}{3}x + 7$$

$$\begin{aligned} & (2, 3) \quad (6, -1) \\ m &= \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 3}{6 - 2} = \frac{-4}{4} = -1 \\ y &= 3 \quad x = 2 \quad m = -1 \quad b = ? \\ 3 &= -1(2) + b \\ 3 &= -2 + b \\ +2 & \quad +2 \\ 5 &= b \quad y = -x + 5 \end{aligned}$$

through a point $(4, 0)$
 perpendicular to the
 line $y = -2x + 1$
 $m_1 = -2$ $m = \frac{1}{2}$
 $0 = \frac{1}{2}(4) + b$
 $0 = 2 + b$
 $-2 = b$ $y = \frac{1}{2}x - 2$

through a point $(-2, 0)$
 perpendicular to $y = \frac{3}{2}x + 3$
 $m_1 = \frac{3}{2}$ $m = -\frac{2}{3}$
 $0 = -\frac{2}{3}(-2) + b$
 $0 = \frac{4}{3} + b$ $y = -\frac{2}{3}x - \frac{4}{3}$
 $-\frac{4}{3} = b$

P 175-177
 2-50 even