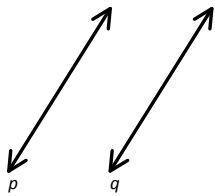


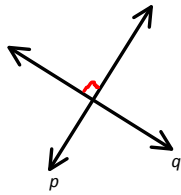
## Parallel and Perpendicular Lines

### Parallel Lines



$$p \parallel q$$
$$m_p = m_q$$

### Perpendicular Lines



$$p \perp q$$

$$m_p = \frac{3}{2}$$

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

$$m_p = -\frac{2}{1}$$

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

$$m_p = \frac{1}{1}$$

$$m_q = -1$$

$$m_p = 0$$

$$m_q = \text{undefined}$$

1. Find the slope of a line that is parallel and perpendicular to the given line.

a)  $2x + 5y = 10$

$-2x$     $-2x$

$$y = mx + b$$

↓  
slope

$$\frac{5}{5}y = \frac{-2x}{5} + \frac{10}{5}$$

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

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

$$m_{\parallel} = -\frac{2}{5}$$
$$m_{\perp} = \frac{5}{2}$$

b)  $-\frac{1}{6}x - 3y = 7$

$$\frac{-1x}{6} - \frac{3y}{1} = \frac{7 \cdot 6}{1 \cdot 6}$$

LCD = 6

$$\frac{-1x}{6} - \frac{18y}{6} = \frac{42}{6}$$

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$$y = -\frac{1}{18}x + \frac{42}{-18}$$

$$\frac{42 \div 6}{-18 \div 6} = \frac{7}{-3}$$

$$y = -\frac{1}{18}x - \frac{7}{3}$$

$$m = -\frac{1}{18}$$

$$m_{\perp} = -\frac{1}{m}$$

$$m_{\perp} = 18$$

c)  $y = 4$

horizontal line

$$m = 0$$

$$m_{\perp} = 0$$

vertical line - undefined slope

$$m_{\perp} = \text{undefined}$$

2. Write the equation of the line in slope-intercept form that passes through the point (2,3) and is parallel to  $3y = -6x + 12$ .

$$* y - y_1 = m(x - x_1) \quad (x_1, y_1) = (2, 3)$$

$$m = -2$$

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

$$y - 3 = -2x + 4$$

$$+3 \quad +3$$

$$y = -2x + 7$$

$$\frac{3y}{3} = \frac{-6x}{3} + \frac{12}{3}$$

$$y = -2x + 4$$

$$m = -2$$

3. Write the equation of the line in slope-intercept form that passes through the point  $(-2, 4)$  and is perpendicular to  $5x + 2y = -10$ .

$$y - y_1 = m(x - x_1) \quad (x_1, y_1) = (-2, 4)$$

$$m = \frac{2}{5}$$

$$5x + 2y = -10$$

$$-5x \quad -5x$$

$$\frac{2y}{2} = \frac{-5x - 10}{2}$$

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

$$y - 4 = \frac{2}{5}(x - -2)$$

$$y - 4 = \frac{2}{5}(x + 2)$$

$$\frac{2}{5} \cdot \frac{2}{1} = \frac{4}{5}$$

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

$$y - 4 = \frac{2}{5}x + \frac{4}{5}$$

$$+4 \quad +4$$

$$\frac{4}{5} + \frac{4 \cdot 5}{1 \cdot 5} = \frac{4}{5} + \frac{20}{5} = \frac{24}{5}$$

$$LCD = 5$$

$$m_{\perp} = \frac{2}{5}$$

$$y = \frac{2}{5}x + \frac{24}{5}$$