

## Day 3 – Parallel & Perpendicular Lines – Practice

A. Determine whether the lines are parallel, perpendicular, or neither given the equations.

1)  $y = -2x + 5$ ;  $y = 2x - 3$

neither

2.  $3x - 8y = -16$ ;

$$\frac{-8y}{-8} = \frac{-3x-16}{-8}$$

$$y = \frac{3}{8}x + 2$$

$32x + 12y = -18$

$$\frac{12y}{12} = \frac{-32x-18}{12}$$

$$y = -\frac{8}{3}x - \frac{3}{2}$$

Perpendicular (neg reciprocals)

B. Determine whether the lines through the pairs of points are parallel, perpendicular, or neither. (Hint—find the slope!)

2. (2, 5) and (-2, 7); (0, 4) and (1, 6)

$$\frac{7-5}{-2-2} = \frac{2}{-4} = -\frac{1}{2} \quad \frac{6-4}{1-0} = 2$$

Perpendicular (neg. reciprocals)

3. (1, 2) and (5, 4); (0, 3) and (2, 4)

$$\frac{4-2}{5-1} = \frac{2}{4} = \frac{1}{2} \quad \frac{4-3}{2-0} = \frac{1}{2}$$

Parallel (same slopes)

C. Write the equation in slope intercept form of the line parallel and line perpendicular to given line through given point.

4.  $y = 4x + 7$  through (-2, -9)  
x y

Parallel  
 $m = 4$

$$\begin{aligned} -9 &= 4(-2) + b \\ -9 &= -8 + b \\ -1 &= b \end{aligned}$$

$$y = 4x - 1$$

Perpendicular  
 $m = -1/4$

$$\begin{aligned} -9 &= -1/4(-2) + b \\ -9 &= 1/2 + b \\ -9.5 &= b \end{aligned}$$

$$y = -1/4x - 9.5$$

5.  $y = \frac{2}{5}x - 2$  through (5, -7)  
x y

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

$$\begin{aligned} -7 &= \frac{2}{5}(5) + b \\ -7 &= 2 + b \\ -9 &= b \end{aligned}$$

$$y = \frac{2}{5}x - 9$$

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

$$\begin{aligned} -7 &= -5/2(5) + b \\ -7 &= -12.5 + b \\ 5.5 &= b \end{aligned}$$

$$y = -5/2x + 5.5$$

6.  $3x + 4y = 16$  through (12, -5)  
x y

$$\frac{4y}{4} = \frac{-3x+16}{4}$$

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

$m = -3/4$

$$\begin{aligned} -5 &= -\frac{3}{4}(12) + b \\ -5 &= -9 + b \\ 4 &= b \end{aligned}$$

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

$m = 4/3$

$$\begin{aligned} -5 &= \frac{4}{3}(12) + b \\ -5 &= 16 + b \\ -21 &= b \end{aligned}$$

$$y = 4/3x - 21$$

7. For what value of m are the lines  $3x + 9y = 6$  and  $mx + 6y = 6$  perpendicular?

$$3x + 9y = 6$$

$$9y = -3x + 6$$

$$y = -1/3x + 2/3$$

$$mx + 6y = 6$$

$$6y = -mx + 6$$

$$y = -\frac{m}{6}x + 1$$

So, I need a slope of 3.

$$-\frac{m}{6} = 3$$

$$-m = 18$$

$$m = -18$$