

# Lines: Lesson 7

answers!

## Parallel and Perpendicular Lines: Notes

Name: \_\_\_\_\_

MATH 4 ALL

### Parallel Lines:

same slopes

different y-intercepts

### Perpendicular Lines:

Slopes: opposite reciprocals

change sign and flip it

Examples:

Slope 3  $\rightarrow$   $\perp$  Slope:  $-\frac{1}{3}$

Slope  $\frac{-7}{5}$   $\rightarrow$   $\perp$  Slope:  $\frac{5}{7}$

To determine if lines are parallel, perpendicular, or neither:

- Turn each equation into  $y=mx+b$
- Compare their slopes
  - same = parallel
  - opposite reciprocals = perpendicular
  - none of the above = neither

Are these lines parallel, perpendicular, or neither?

$$\frac{3}{3}y = \frac{x}{3} + \frac{21}{3}$$

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

and

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

$$y = -3x - 2$$

Slopes:  $\frac{1}{3}$  and  $-3$

The lines are perpendicular

Are these lines parallel, perpendicular, or neither?

$y = 2x - 10$  and  $y = \frac{1}{2}x - 10$

Slopes: 2 and  $\frac{1}{2}$

These lines are neither

Find the equation of the line parallel to  $4x - y = 3$  and through  $(-2, 1)$ :

1. Turn into  $y = mx + b$
2. Get slope:  $m = \underline{4}$
3. Put into Point-Slope form  $y - y_1 = m(x - x_1)$
4. Make it pretty!

$y - 1 = 4(x + 2)$   
 $y - 1 = 4x + 8$   
 $y = 4x + 9$

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

Find the equation of the line perpendicular to the line through  $(-4, 3)$  and  $(-3, 1)$  that goes through  $(2, 5)$ :

1. Find slope:  $m = \underline{-2}$
2. Get the slope we need:  $\perp$  Slope:  $\frac{1}{2}$
3. Put  $m$ ,  $x$ , and  $y$  into  $y = mx + b$  and solve for  $b$ .
4. Make it pretty!

$m = \frac{1 - 3}{-3 - (-4)} = \frac{-2}{1} = 2$

$5 = \frac{1}{2}(2) + b$   
 $5 = 1 + b$   
 $b = 4$

$y = \frac{1}{2}x + 4$