Warm Up   2/26/19

1. A sequence is as follows:
   -12, -8, -4, 0... $a_1 = -12$ $d = 4$

   A. Write the rule for the sequence

   $$a_n = d(n-1) + a_1$$

   B. Find $a_{11} - a_6$ $a_n = 4(n-1) - 12$

   $4(11) - 16 = 28$ $= 4n - 4 - 12$

   $4(6) - 16 = 8$ $\boxed{a_n = 4n - 16}$

   $28 - 8 = \boxed{20}$

2. Solve: $9m - 3(m + 6) = 2(m + 1)$

   $\underbrace{9m} \underbrace{-3m} - 18 = 2m + 2$

   $6m - 18 = \dfrac{2m + 2}{-2m}$

   $\underline{-2m}$

   $4m - 18 = 2$

   $\underline{+18 \quad +18}$ $\boxed{m = 5}$

   $\dfrac{4m}{4} = \dfrac{20}{4}$
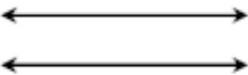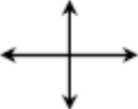
3. Write in slope-intercept form:

   $3x - 4y = 24$

   $\underline{-3x \qquad -3x}$

   $\dfrac{-4y}{-4} = \dfrac{-3x}{-4} + \dfrac{24}{-4}$

   $\boxed{y = \dfrac{3}{4}x - 6}$

Parallel
&
Perpendicular
Lines

Main Ideas/Questions	Notes/Examples
Parallel Lines ⟷ ⟷	Definition: <u>lines that never intersect</u> Algebraically, how do we know if two lines are parallel? SAME SLOPE
Perpendicular Lines ⊥	Definition: <u>lines that intersect at 90°</u> (right angle) Algebraically, how do we know if two lines are perpendicular? Slopes are OPPOSITE RECIPROCALS

Opposite Reciprocals

Def: "FLIP IT and SWITCH IT"

Some examples:

1) $\frac{3}{4}$ & $-\frac{4}{3}$ 2) 2 & $-\frac{1}{2}$ 3) $-\frac{7}{8}$ & $\frac{8}{7}$ 4) 1 & -1 5) 0 & ϕ

Given Ordered Pairs

Determine if segments AB and CD are parallel, perpendicular, or neither:

1. $\overline{AB}$ formed by (-2, 3) and (2, 6) $\overline{CD}$ formed by (-1, 0) and (3, 3)	**2.** $\overline{AB}$ formed by (0, 2) and (5, 4) $\overline{CD}$ formed by (1, 8) and (3, 3)
AB $\dfrac{6-3}{2+2} = \dfrac{3}{4}$ CD $\dfrac{3-0}{3+1} = \dfrac{3}{4}$ Parallel //	AB $\dfrac{4-2}{5-0} = \dfrac{2}{5}$ $\overline{CD}$ $\dfrac{3-8}{3-1} = \dfrac{-5}{2}$ $\perp$ Perp.
3. $\overline{AB}$ formed by (-1, 8) and (2, 6) $\overline{CD}$ formed by (-1, 2) and (3, 3)	**4.** $\overline{AB}$ formed by (2, 3) and (-1, 4) $\overline{CD}$ formed by (-5, 3) and (-4, 6)
AB $\dfrac{6-8}{2+1} = \dfrac{-2}{3}$ CD $\dfrac{3-2}{3+1} = \dfrac{1}{4}$ Neither	AB $\dfrac{4-3}{-1-2} = \dfrac{-1}{3}$ CD $\dfrac{6-3}{-4+5} = \dfrac{3}{1} = 3$ $\perp$

5. $\overline{AB}$ formed by (0, -2) and (0, 7)
   $\overline{CD}$ formed by (3, -5) and (6, -5)

6. $\overline{AB}$ formed by (-4, 7) and (-2, 6)
   $\overline{CD}$ formed by (2, -2) and (-8, 3)

7. $\overline{AB}$ formed by (3, 1) and (3, -4)
   $\overline{CD}$ formed by (-4, 1) and (-4, 5)

8. $\overline{AB}$ formed by (-3, 8) and (3, 2)
   $\overline{CD}$ formed by (7, 1) and (5, -1)

Given Equations	**9.** $y = 7x + 2$ and $y = 7x - 1$	**10.** $y = \frac{4}{5}x - 8$ and $y = -\frac{5}{4}x + 3$
	$m = 7 \qquad m = 7$ //	$m = \frac{4}{5} \qquad m = \frac{-5}{4}$ $\perp$
	11. $y = -\frac{1}{3}x + 2$ and $y = \frac{1}{3}x$	**12.** $x + 6y = 30$ and $3y = 18x - 6$
	$m = -\frac{1}{3} \qquad m = \frac{1}{3}$ Neither	$\begin{array}{c} -x \quad -x \\ \frac{6y}{6} = \frac{-x}{6} + \frac{30}{6} \\ y = -\frac{1}{6}x + 5 \end{array}$ $\frac{3y}{3} = \frac{18x}{3} - \frac{6}{3}$ $y = 6x - 2$ $\perp$

13. $5x - y = 4$ and $y = -\dfrac{1}{5}x + 7$

$\dfrac{-5x \quad -5x}{}$

$\dfrac{-y = -5x + 4}{-1 \quad -1 \quad -1}$

$y = 5x - 4$

14. $3x - y = 2$ and $12x - 4y = 4$

$-y = -3x + 2 \qquad -4y = -12x + 4$

$y = 3x - 2 \qquad\qquad y = 3x - 1$

$m = 3 \qquad\qquad\qquad m = 3$

$//$

15. $y = x + 3$ and $y = -x - 5$

$m = 1 \qquad m = -1$

$\perp$
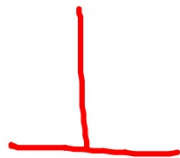
16. $y = 6$ and $x = -1$
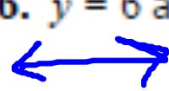
$x = 5$

$y = -3$

$\perp$

WRITING Parallel & Perpendicular **EQUATIONS**	• **What are we doing?** Given a linear equation and a certain point, you can create ANOTHER equation that passes through this point and is either parallel or perpendicular to the given line. • **Keep in mind the following points:** ➤ Parallel lines have **SAME** slopes. ➤ Perpendicular lines have **OPPOSITE RECIP.** slopes.
PARALLEL EXAMPLES $y - y_1 = m(x - x_1)$	1. Write the equation of the line that passes through the point (-2, 7) and is **PARALLEL** to the line $y = -4x + 1$. $m = -4$ $y - 7 = -4(x + 2)$ $(-2, 7)$ $y - 7 = -4x - 8$ $+7 \quad +7$ $\boxed{y = -4x - 1}$ 2. Write the equation of the line that passes through the point $\boxed{(3, -1)}$ and is **PARALLEL** to the line $x - 3y = 9$. $m = 1/3$ $x - 3y = 9$ $-x \qquad -x$ $\dfrac{-3y}{-3} = \dfrac{-x}{-3} + \dfrac{9}{3}$ $y = \frac{1}{3}x - 3$ $y + 1 = \frac{1}{3}(x - 3)$ $y + 1 = \frac{1}{3}x - 1$ $-1 \qquad -1$ $\boxed{y = \frac{1}{3}x - 2}$

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3. Write the equation of the line that passes through the point **(4, 3)** and is **PERPENDICULAR** to the line $y = 2x - 4$.

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

$$(4, 3)$$

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

$$y - 3 = -\frac{1}{2}x + 2$$
$$+3 \qquad\qquad +3$$

$$\boxed{y = -\frac{1}{2}x + 5}$$

4. Write the equation of the line that passes through the point **(-5, 1)** and is **PERPENDICULAR** to the line $5x + 3y = -21$.

$$5x + 3y = -21$$
$$-5x \qquad\quad -5x$$
$$\overline{\frac{3y}{3} = \frac{-5x}{3} - \frac{21}{3}}$$

$$y = \boxed{-\frac{5}{3}}x - 7$$

$$m = \frac{3}{5}$$

$$y - 1 = \frac{3}{5}(x + 5)$$

$$y - 1 = \frac{3}{5}x + 3$$
$$+1 \qquad\qquad +1$$

$$\boxed{y = \frac{3}{5}x + 4}$$