Name: Key* _____ Grade: _____ Date: _____

Parallel and Perpendicular Lines

Q 1 : Find the slope of the line passing through the pairs of points and describe the line as rising, falling, horizontal or vertical.

a. $(2, 1), (4, 5)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$= \frac{4}{2}$

$= 2$

rising

b. $(-1, 0), (3, -5)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-5-0}{3-(-1)}$

$= \frac{-5}{4}$

falling

c. $(2, 1), (-3, 1)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$= \frac{0}{-5}$

$= 0$

horizontal

d. $(-1, 2), (-1, -5)$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-5-2}{-1-(-1)}$

$= \frac{-7}{0}$

= undefined

vertical

Note: This worksheet is supported by a flash presentation, under Mausmi's Math Movies.

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Q2: Determine whether the graphs of each pair of equations are ***parallel***, ***perpendicular*** or ***neither***.

1. $y = 3x + 4$

   $y = 3x + 7$

   ★ same slope
   parallel

2. $y = -4x + 1$

   $\frac{4y}{4} = \frac{x + 3}{4}$ $y = m\frac{1}{4}x + \frac{3}{4}$

   $m_1 = -4$ $m_2 = \frac{1}{4}$

   ★ perpendicular.

3. $y = 2x - 5$

   $y = 5x - 5$

   neither

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

   $y = 3x - 5$

   $m_1 = 3$ $m_2 = -\frac{1}{3}$

   ★ perpendicular.

5. $y = 3/5x - 3$

   $\frac{5y}{5} = \frac{3x - 10}{5}$

   ★ parallel.
   same slope

6. $y = 4$

   $\frac{4y}{4} = \frac{6}{4}$

   ~~neither~~

   parallel
   ★ both horizontal lines

7. $y = 7x + 2$

   $x + 7y = 8$

   $-x$ $-x$

   $\frac{7y}{7} = \frac{-x + 8}{7}$

   $y = -\frac{1}{7}x + \frac{8}{7}$

   $m_1 = 7$ $m_2 = -\frac{1}{7}$

   ★ perpendicular

8. $y = 5/6x - 6$ $m_1 = \frac{5}{6}$

   $x + 5y = 4$

   $-x$ $-x$

   $\frac{5y}{5} = \frac{-x + 4}{5}$ $m_2 = -\frac{1}{5}$

   ★ neither

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Q3: Write the equation in slope-intercept form of the line that is ***parallel*** to the graph of each equation and passes through the given point.

1. $y = 3x + 6$; (4, 7)

$m = 3$

$(4, 7)$

$y - 7 = 3(x - 4)$

$y - 7 = 3x - 12$

$+7 \quad +7$

$y = 3x - 5$

2. $y = x - 4$; (-2, 3)

$y - 3 = 1(x + 2)$

$y - 3 = x + 2$

$+3 \quad +3$

$y = x + 5$

3. $y = \frac{1}{2}x + 5$; (4, -5)

$y + 5 = \frac{1}{2}(x - 4)$

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

$-5 \quad -5$

$y = \frac{1}{2}x - 7$

4. $y + 2x = 4$; (-1, 2)

$-2x \quad -2x$

$y = -2x + 4$

$y - 2 = -2(x + 1)$

$y - 2 = -2x - 2$

$+2 \quad +2$

$y = -2x$

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Q4: Write the equation in slope-intercept form of the line that is ***perpendicular*** to the graph of each equation and passes through the given point.

1. $y = -5x + 1$; $(2, -1)$

$m = \frac{1}{5}$

$(2, -1)$

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

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

$-1 \quad\quad -1$

$y = \frac{1}{5}x - \frac{7}{5}$

2. $y = 2x - 3$; $(-5, 3)$

$y - 3 = -\frac{1}{2}(x + 5)$

$y - 3 = -\frac{1}{2}x - \frac{5}{2}$

$+3 \quad\quad +3$

$y = -\frac{1}{2}x - \frac{11}{2}$

3. $y = -4x - 2$; $(4, -4)$

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

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

$-4 \quad\quad -4$

$y = \frac{1}{4}x - 5$

4. $7y + 4x = 3$; $(-4, -7)$

$-4x \quad -4x$

$\frac{7y}{7} = \frac{-4x + 3}{7}$

$y = -\frac{4}{7}x + \frac{3}{7}$

$y + 7 = -\frac{4}{7}(x + 4)$

$y + 7 = -\frac{4}{7}x - \frac{16}{7} - \frac{49}{7}$

$-7 \quad\quad -7$

$y = -\frac{4}{7}x - 65$

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Q 5: Are the lines L1 and L2 passing through the given pairs of points ***parallel, perpendicular*** or ***neither parallel nor perpendicular***?

a. L1: (1 , 2) , (3 , 1) and L2: (0 , -1) , (2 , 0)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

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

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{0-(-1)}{2-0}$

$= \frac{1}{2}$

★ neither

b. L1: (0 , 3) , (3 , 1) and L2: (-1 , 4) , (-7 , -5)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

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

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-5-4}{-7+1}$

$= \frac{-9}{-6}$

$= \frac{3}{2}$

★ perpendicular

c. L1: (2 , -1) , (5 , -7) and L2: (0 , 0) , (-1 , 2)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-7+1}{5-2}$

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

$= -2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$= -2$

★ parallel

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d. L1: (1 , 0) , (2 , 0) and L2: (5 , -5) , (-10 , -5)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

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

$= \frac{0}{1}$

$= 0$

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{-5+5}{-10-5}$

$= \frac{0}{-15}$

$= 0$

*parallel (both horizontal)

e. L1: (-2 , 5) , (-2 , 7) and L2: (5 , 1) , (5 , 13)

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{7-5}{-2+2}$

$= \frac{2}{0}$

= undefined

$m = \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{13-1}{5-5}$

$= \frac{12}{0}$

= undefined

*parallel (vertical)

Q6: Is it possible for two lines with negative slopes to be perpendicular?

*no, because perpendicular lines will always have one slope of a line that's positive and the other slope is negative.

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