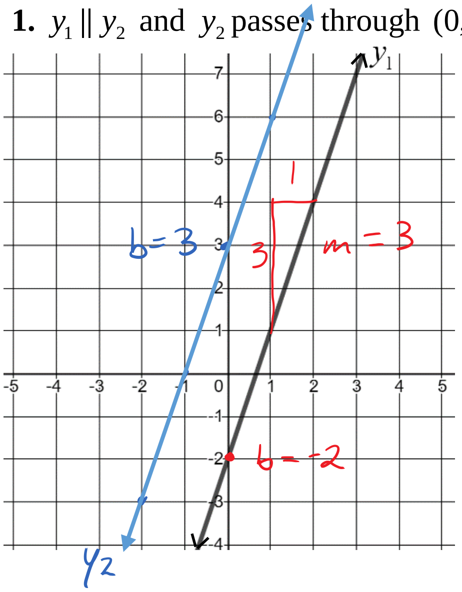
Name: Key Date: ______ Period: ______

Geometry 2.4 Parallel and Perpendicular Lines

For 1-2, graph the line y_2 so that it meets the given requirements. Then write the equations for y_1 and y_2.

1. $y_1 \parallel y_2$ and y_2 passes through $(0,3)$



$y = mx + b$

$y_1 = 3x - 2$

Equation for y_1 $y_1 = 3x - 2$

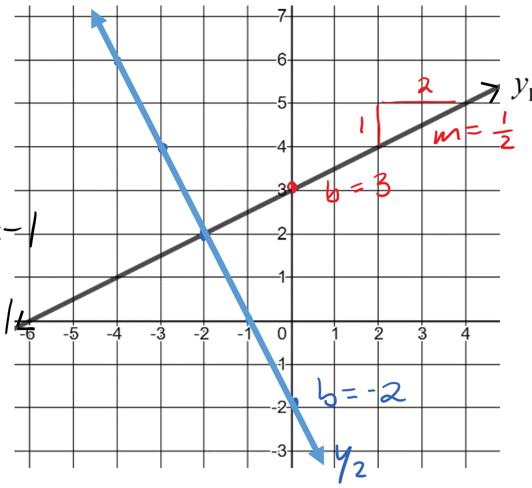
Equation for y_2 $y_2 = 3x + 3$

2. $y_1 \perp y_2$ and y_2 passes through $(-2, 2)$

$(m_{y_2})(m_{y_1}) = -1$

$(m_{y_2})(\frac{1}{2}) = -1$

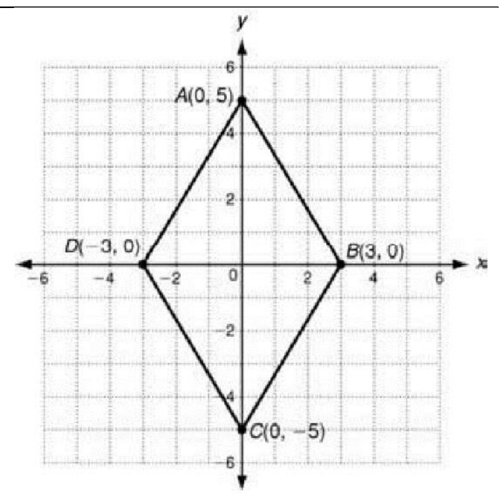
$(m_{y_2}) = -2$



Equation for y_1 $y_1 = \frac{1}{2}x + 3$

Equation for y_2 $y_2 = -2x - 2$

3. A parallelogram is a quadrilateral with opposite sides parallel to each other. Prove the figure to the right is a parallelogram by algebraically showing its opposite sides are parallel to each other.



Show $\overline{AD} \parallel \overline{BC}$:

$m_{\overline{AD}} = \frac{5-0}{0--3} = \frac{5}{3}$ $m_{\overline{BC}} = \frac{0--5}{3-0} = \frac{5}{3}$

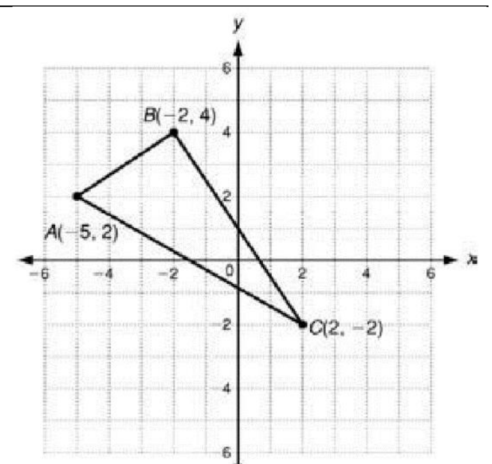
$\boxed{\therefore \overline{AD} \parallel \overline{BC} \text{ since } m_{\overline{AB}} = m_{\overline{BC}}}$

Show $\overline{DC} \parallel \overline{AB}$:

$m_{\overline{DC}} = \frac{-5-0}{0--3} = \frac{-5}{3}$ $m_{\overline{AB}} = \frac{0-5}{3-0} = \frac{-5}{3}$

$\boxed{\therefore \overline{DC} \parallel \overline{AB} \text{ since } m_{\overline{DC}} = m_{\overline{AB}}}$

4. A right triangle is a triangle that has a right angle. Prove that the triangle below is a right triangle by algebraically showing it has a right angle.



Seems like $\angle B$ is a right angle.

Need to show $\overline{AB} \perp \overline{BC}$.

$m_{\overline{AB}} = \frac{4-2}{-2--5} = \frac{2}{3}$

$m_{\overline{BC}} = \frac{-2-4}{2--2} = \frac{-6}{4} = \frac{-3}{2}$

$\boxed{\therefore \overline{AB} \perp \overline{BC} \ (\angle B \text{ is a rt. } \angle) \text{ since } (m_{\overline{AB}})(m_{\overline{BC}}) = -1}$

Name: ____ Date: __________ Period: _____

For 5-6, determine if the lines $y = f(x)$ and $y = g(x)$ are parallel using the table of values.

5.

x	f(x)	g(x)
0	20	22
1	35	37
2	50	52
3	65	67

+1 +15 +15

The slope of f(x) is 15

The slope of g(x) is 15

Since the slopes are the same, f(x) || g(x).

6.

x	f(x)	g(x)
0	5	10
1	7	15
2	9	20
3	11	25

+1 +2 +5

The slope of f(x) is 2

The slope of g(x) is 5

Since the slopes are different, f(x) and g(x) aren't parallel.

For 7-10, write the equation of the line that passes through the point and is parallel or perpendicular.

7. Through (-2, -5) and parallel to $y = x + 3$

$m = 1$

$y - y_1 = m(x - x_1)$

$\boxed{\therefore y + 5 = x + 2}$

$y = mx + b$

$-5 = (1)(-2) + b$

$-5 = -2 + b$

$b = -3$

$\boxed{\therefore y = x - 3}$

8. Through (1, -3) and perpendicular to $y = -x$

$\perp$ slope $= 1$

$y - y_1 = m(x - x_1)$

$\boxed{\therefore y + 3 = x - 1}$

$y = mx + b$

$-3 = (1)(1) + b$

$-3 = 1 + b$

$b = -4$

$\boxed{\therefore y = x - 4}$

9. Through (4, 5) and parallel to $y = \frac{1}{4}x - 4$

$m = \frac{1}{4}$

$y - y_1 = m(x - x_1)$

$\boxed{\therefore y - 5 = \frac{1}{4}(x - 4)}$

$y = mx + b$

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

$5 = 1 + b$

$b = 4$

$\boxed{\therefore y = \frac{1}{4}x + 4}$

10. Through (0, -4) and perpendicular to $y = -\frac{3}{2}x + 1$

$\perp$ slope $= \frac{2}{3}$

$y - y_1 = m(x - x_1)$

$\boxed{\therefore y + 4 = \frac{2}{3}x}$

$y = mx + b$

$-4 = \left(\frac{2}{3}\right)(0) + b$

$b = -4$

$\boxed{\therefore y = \frac{2}{3}x - 4}$

11. Line *m* contains (6, 8) and (−1, 2). Line *n* contains (−1, 5) and (5, *y*). What is the value of *y* if line *m* is perpendicular to line *n*?

Strategy: find slope of line m, then determine what slope line n must have to be $\perp$. Then write & solve equation.

slope of line m:

$\frac{8-2}{6--1} = \frac{6}{7}$

(slope m)(slope n) = −1

$\left(\frac{6}{7}\right)$(slope n) = −1

$\therefore$ slope of n $= \frac{-7}{6}$

$\frac{y-5}{5--1} = \frac{-7}{6}$

$y - 5 = -7$

$\boxed{y = -2}$

$\therefore$ y must have a value of −2.