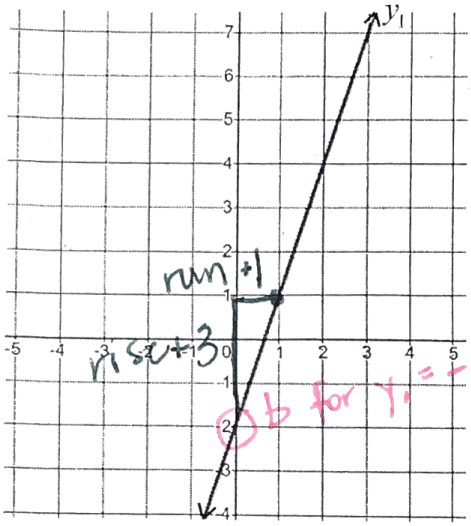
Name: KEY Date: Period:

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 $(0,3)$



b for y_2

$\frac{\text{rise}}{\text{run}} = \frac{3}{1}$

b for $y_1 = -2$

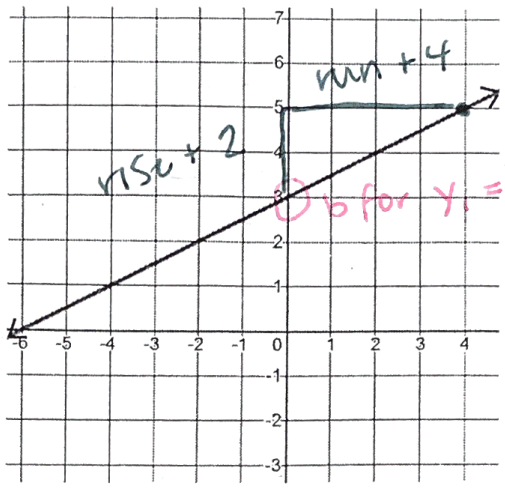
Use slope-intercept form: $y = mx + b$

Equation for y_1 $y = 3x - 2$

Equation for y_2 $y = 3x + 3$

parallel, so same slope!!

2. $y_1 \perp y_2$ and y_2 passes through $(-2,2)$ (x_1, y_1)



$\frac{\text{rise}}{\text{run}} = \frac{2}{4} = \frac{1}{2}$

b for $y_1 = 3$

slope $\perp$ $\frac{1}{2} \rightarrow -2$

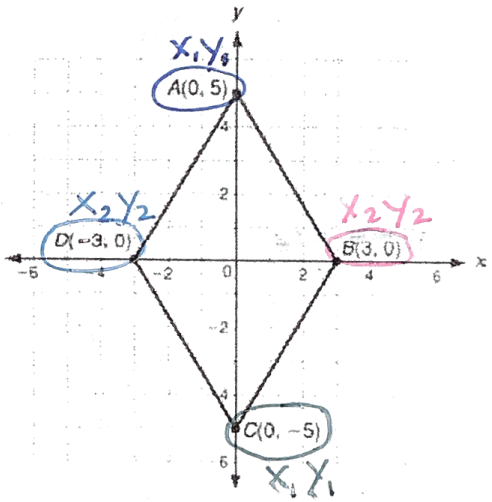
Use slope-intercept form: $y = mx + b$

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

Use point-slope form!

Equation for y_2 $y - y_1 = m(x - x_1) \rightarrow y - 2 = -2(x + 2)$

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 the slope (m) of each line. $m = \frac{y_1 - y_2}{x_1 - x_2}$

Slope of AB = $-\frac{5}{3}$

Slope of DC = $-\frac{5}{3}$

Slope of AD = $\frac{5}{3}$

Slope of BC = $\frac{5}{3}$

$AB = \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{5-0}{0-3} \rightarrow \frac{5}{-3}$ → AB ∥ DC

$DC = \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{-5-0}{0-3} \rightarrow \frac{-5}{+3} \rightarrow \frac{-5}{3}$

$BC = \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{-5-0}{0-3} \rightarrow \frac{-5}{-3} \rightarrow \frac{5}{3}$ → BC ∥ AD

$AD = \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{5-0}{0-3} \rightarrow \frac{5}{+3} \rightarrow \frac{5}{3}$

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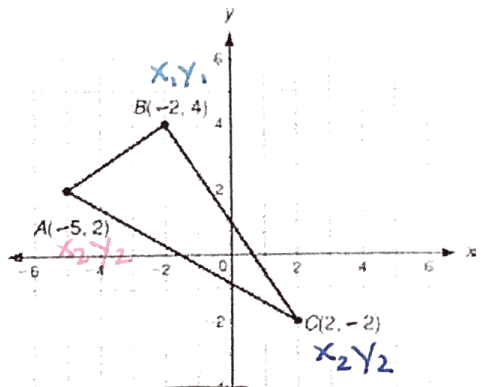
4. A right triangle is a triangle that has a right angle. Prove that the triangle below is a right triangle by algebraically showing it has a right angle. **Show that AB is perpendicular to BC by showing that their slopes are perpendicular.**



$m_{AB} \rightarrow \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{4-2}{-2--5} \rightarrow \frac{2}{3}$

$m_{BC} \rightarrow \frac{y_1 - y_2}{x_1 - x_2} \rightarrow \frac{4--2}{-2-2} \rightarrow \frac{6}{-4} \rightarrow -\frac{3}{2}$

∴ AB ⊥ BC because their slopes are opposite reciprocals

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	
	+15	+15	
1	35	37	
	+15	+15	
2	50	52	
	+15	+15	
3	65	67	

change in f(x) = change in g(x)

∴ slopes are same, so lines are ||

6.

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

change in f(x) ≠ change in g(x)

∴ slopes are different, so lines are NOT ||

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 $y = x + 3$

Use point-slope form: $y - y_1 = m(x - x_1)$

$m = 1$

$y - -5 = 1(x - -2)$

$y + 5 = x + 2$

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

Use point-slope form: $y - y_1 = m(x - x_1)$

$m = -1$ → $\perp = 1$

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

$y + 3 = x - 1$

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

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

Use point-slope form $y - y_1 = m(x - x_1)$

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

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

Use point-slope form $y - y_1 = m(x - x_1)$

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

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

$y - -4 = \frac{2}{3}(x - 0)$

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