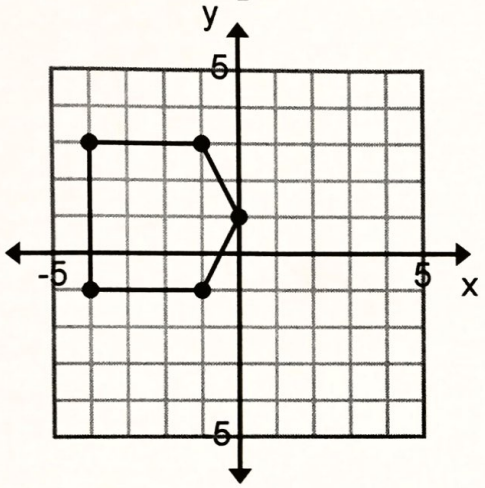
Notes 5-4

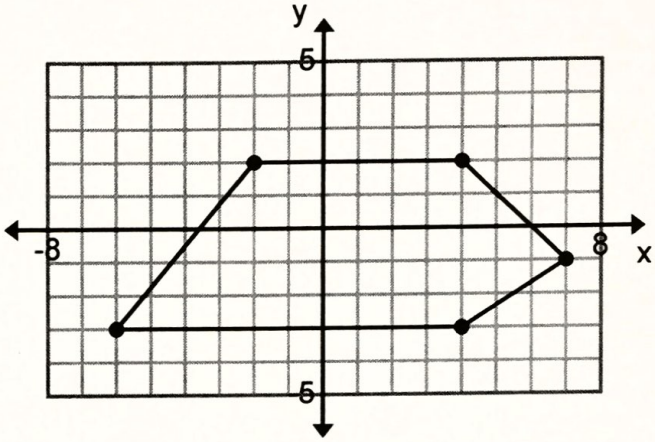
Sec 1 H **Parallel and Perpendicular Lines** **Unit 5**

Warm-up:

1. Find the perimeter.



2. Find the area.



Parallel: Two lines that go forever & never intersect

$\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$

Slope = EXACTLY the Same #

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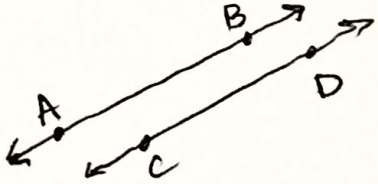


Reciprocal:

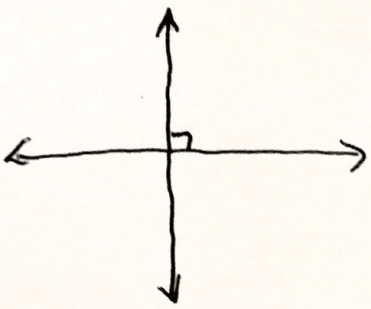
flip a fraction

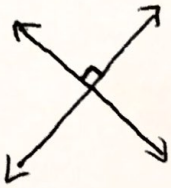
$\frac{3}{2} \rightarrow \frac{2}{3}$ $-\frac{1}{5} \rightarrow -5$ $3 \rightarrow \frac{1}{3}$

Perpendicular: Two lines that intersect to form a 90° angle

$\perp$

Slope = opposite reciprocal (sign)





Notes 5-4

Sec 1 H **Parallel and Perpendicular Lines** **Unit 5**

Ex. 1:

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

a) Graph the line $y=\frac{1}{2}x+3$ on the graph below.

b) Graph another line that is **parallel** to that one, but passes through the point (3, -2).

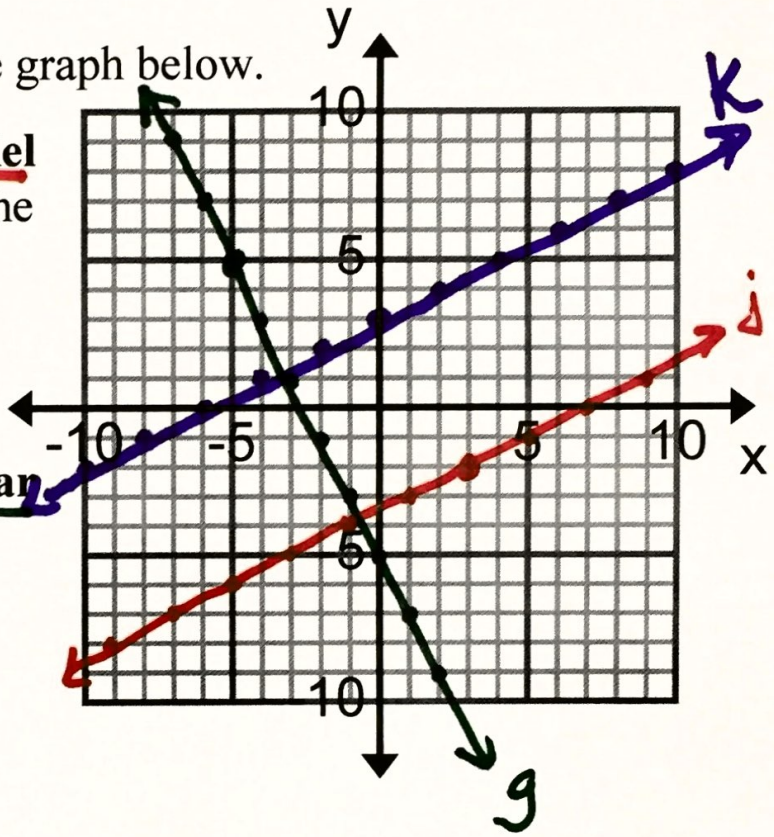
j

$m_{\parallel}=\frac{1}{2}$

c) Pick any point to start with and graph a line that is **perpendicular** to the first two lines.

g

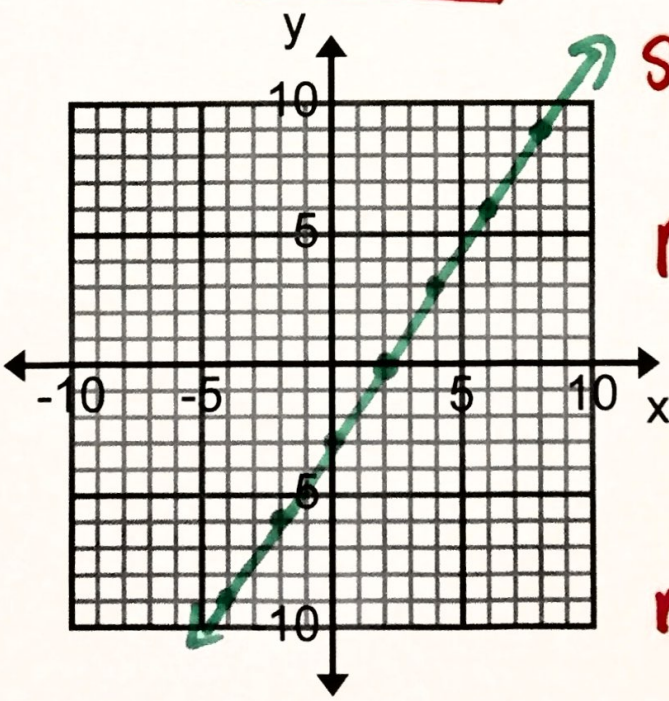
$m_{\perp}=-\frac{2}{1}$



Graph the line that satisfies each condition.

Ex. 2: Passes through A(2, 0), perpendicular to $\overleftrightarrow{XY}$ with X(-1, 6) and Y(8, 0).

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



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

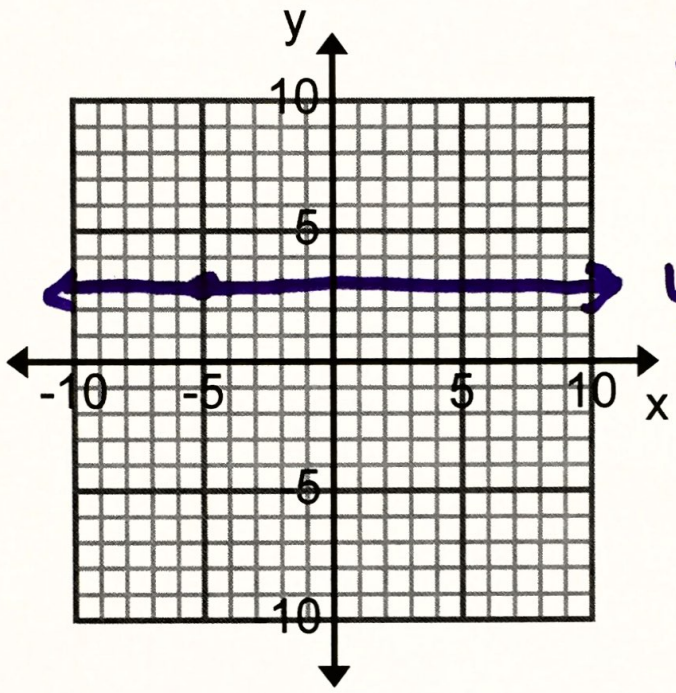
$m_{\overleftrightarrow{XY}}=\frac{6-0}{-1-8}$

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

$m_{\overleftrightarrow{XY}}=-\frac{2}{3}$

Ex. 3: Passes through D(-5, 3), parallel to y = - 4.

y=# horizontal
x=# vertical



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

Ex. 4: $y = 3x + 7$
$y = 2x + 7$

neither

Slopes aren't the same & aren't opp. rec.

Ex. 5: $y = -x + 5$ $m = -1$
$2x + 2y = 4$
$-2x \quad -2x$
$\frac{2y}{2} = \frac{-2x}{2} + \frac{4}{2}$
$y = -1x + 2$ $m = -1$

//

Ex. 6: $y = \frac{3}{2}x + 7$
$y = \frac{2}{3}x + 5$

neither

Ex. 7: $2x + 4y = 16$ $\frac{4y}{4} = \frac{-2x}{4} + \frac{16}{4}$
$y = -\frac{1}{2}x + 4$ $m = -\frac{1}{2}$

$8x - 4y = 4$
$\frac{-4y}{-4} = \frac{-8x}{-4} + \frac{4}{-4}$
$y = 2x - 1$ $m = 2$

⊥

Ex. 8: Write an equation in slope-intercept for the line parallel to $y = 4x - 5$ containing (-1, 5).

OLD LINE $M = 4$

(-1, 5) → NEW LINE $M_{\parallel} = 4$

$y = mx + b$

$5 = (4)(-1) + b$

$5 = -4 + b$

$+4 \quad +4$

$9 = b$

$y = 4x + 9$

Ex. 9: Write an equation in slope-intercept for the line perpendicular to $y = -2x + 6$ containing (8, -3).

OLD LINE $M = -2$

NEW $m_{\perp} = \frac{1}{2}$

$y = mx + b$

$-3 = \left(\frac{1}{2}\right)(8) + b$

$-3 = 4 + b$

$-4 \quad -4$

$b = -7$

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

Ex. 10: Write an equation that contains the point (-10, 2) that is perpendicular to the line containing the points (0, -8) and (5, 17).

(-10, 2) → NEW

(0, -8) and (5, 17) → OLD

OLD

$$m = \frac{-8 - 17}{0 - 5} = \frac{-25}{-5} = 5$$

$$m_{\perp} = -\frac{1}{5}$$