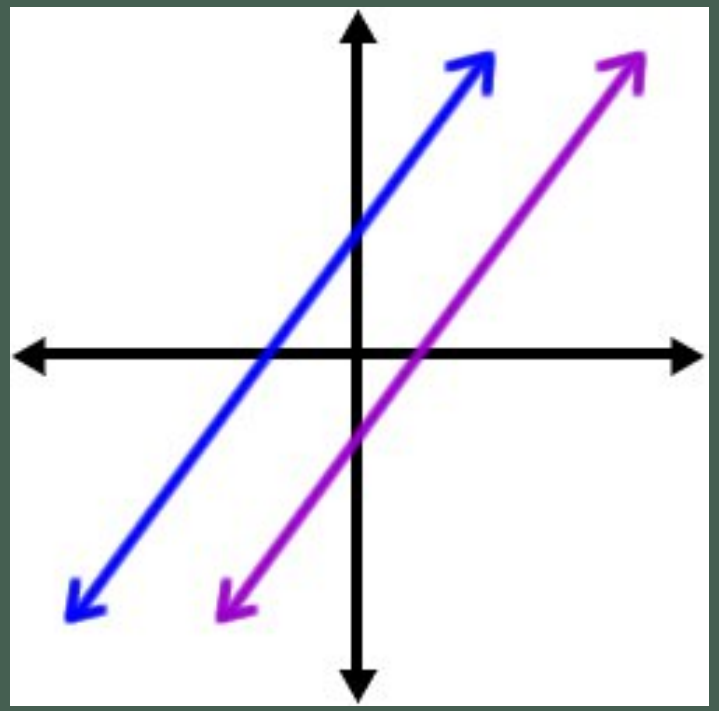
PARALLEL & PERPENDICULAR LINES

Wolff Algebra 1H

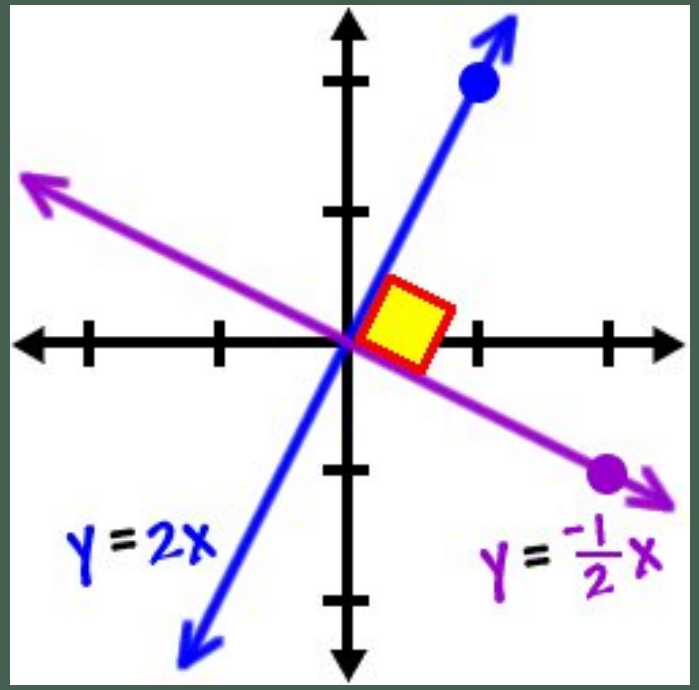
Parallel lines ||

- Never intersect
- Same slope
- Different y-intercepts



Perpendicular Lines ⊥

- Intersect at right angles
- Opposite reciprocal slopes
  - Exception: vertical/horizontal lines that have slope of zero/undefined



Model 1

- Write an equation in point-slope form for the line that passes through (4,-1) and is parallel to the graph of $y = \frac{1}{4}x + 7$

Same slope

x & y coordinates on the parallel line

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

Model 4

- Write an equation in slope-intercept form for the line that passes through (4,7) and is perpendicular to the graph of y = 2/3 x - 1

- $y - 7 = -\frac{3}{2}(x - 4)$

Enter in the point you know and the opposite reciprocal slope

$y - 7 = -\frac{3}{2}x + 6$

$+ 7 \qquad + 7$

$y = -\frac{3}{2}x + 13$

Practice with a partner

- Write an equation in slope-intercept form for the line that passes through (4,-2) and is parallel to the graph of $y = \frac{1}{2}x - 7$

Test yourself individually

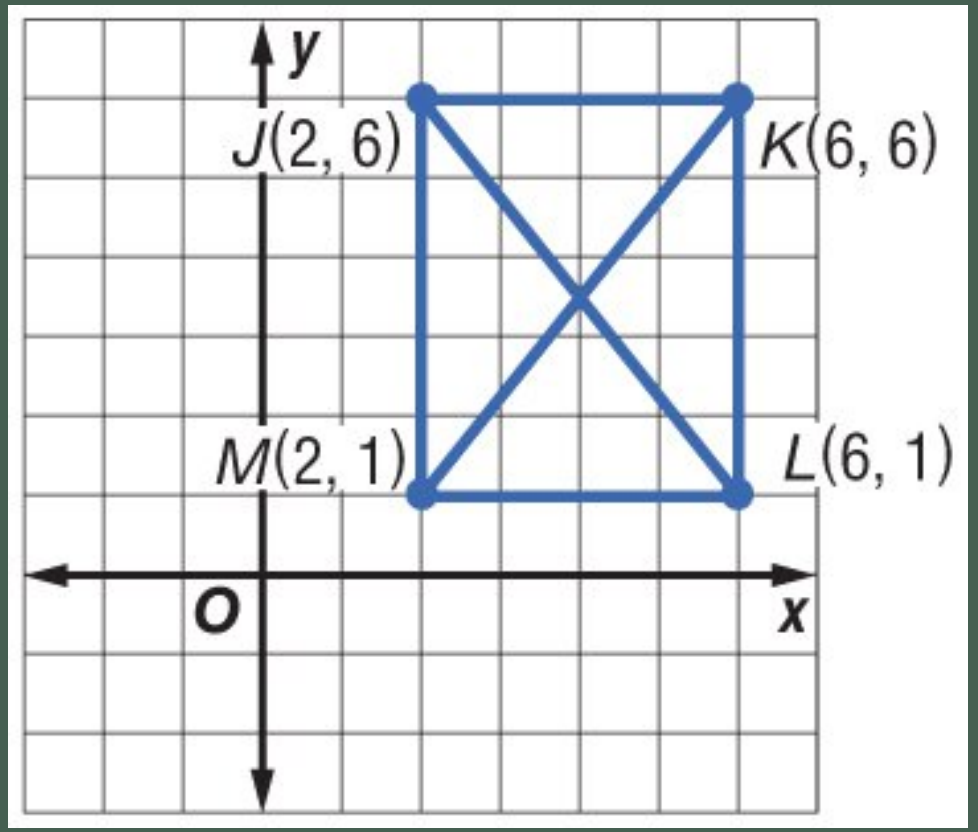
- Write an equation in slope-intercept form for the line that passes through (4,-1) and is perpendicular to the graph of $2x - 2y = 3$

Model 2

- On the plans for a treehouse, a beam represented by $\overline{QR}$ has endpoints Q(-6,2) and R(-1,8). A connecting beam represented by $\overline{ST}$ has endpoints S(-3,6) and T(-8,5). Are the beams perpendicular? Explain.
  - Slope QR = $\frac{8 - 2}{-1 + 6}$ Slope ST = $\frac{5 - 6}{-8 + 3}$
  - $= \frac{6}{5}$ $= \frac{-1}{-5} = \frac{1}{5}$
  - 6/5 and 1/5 are not opposite reciprocals so no, not perpendicular

Collaborate

The graph shows the diagonals of a rectangle. Determine whether $\overline{JL}$ is perpendicular to $\overline{KM}$.



Model 3

- Determine whether the graphs of 6x – 2y = -2, y = 3x – 4, and y = 4 are parallel or perpendicular. Explain.
  - 6x – 2y = -2
    -6x -6x
    -2y = -6x – 2
    -2 -2 -2
    y = 3x + 1
    Slope: 3, y-int: 1
  - y = 3x – 4
    Slope: 3, y-int: -4
  - y = 4
    Slope: 0, y-int: 4

6x - 2y = -2 and y = 3x - 4 have the same slopes and different y-intercepts so they are parallel lines. Y = 4 is a horizontal line so it is not parallel or perpendicular to either of the others.