

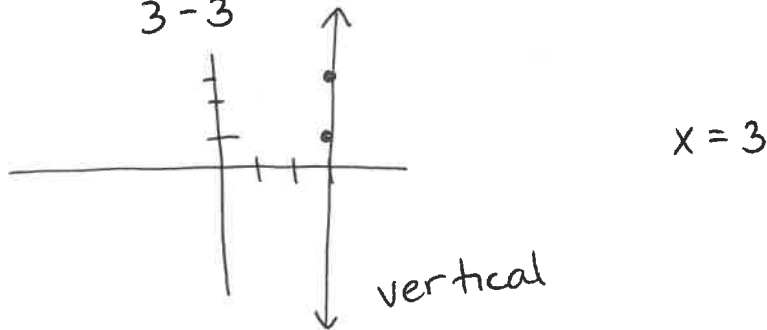
Slope: $\frac{\text{rise}}{\text{run}}$ $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$

1. Find the slope of a line that passes through the points (-2, 3) and (4, -9)

$$m = \frac{3 - (-9)}{-2 - 4} = \frac{12}{-6} = -2$$

2. Find the slope of a line that passes through the points (3, 1) and (3, 3)

$$m = \frac{3 - 1}{3 - 3} = \frac{2}{0} = \text{undefined}$$



3. Find the slope of a line that passes through the points (2, 4) and (-3, 4)

$$m = \frac{4 - 4}{-3 - 2} = \frac{0}{-5} = 0$$



Equations of a Line

- Slope-Intercept Form

$$y = mx + b$$

- Point-Slope Form

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

- Standard Form

$$Ax + By = C$$

- * no fractions
- A positive

4. Write an equation for a line that goes through (3, 5) and has slope $m = 2$ in slope intercept form. $y = mx + b$

$$\begin{aligned} \textcircled{1} \quad 5 &= 2(3) + b \\ 5 &= 6 + b \\ -1 &= b \end{aligned}$$

$$\begin{aligned} \textcircled{2} \quad y - y_1 &= m(x - x_1) \\ y - 5 &= 2(x - 3) \\ y - 5 &= 2x - 6 \\ \boxed{y} &= \boxed{2x - 1} \end{aligned}$$

$$\boxed{y = 2x - 1}$$

5. Write an equation for a line that goes through (2, -3) and (1, 1) in standard form. $Ax + By = C$

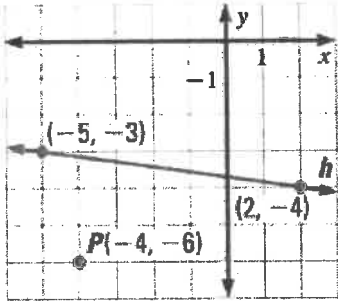
$$m = \frac{1 - (-3)}{1 - 2} = \frac{4}{-1} = -4$$

$$m = -4 \quad (1, 1)$$

$$\begin{aligned} y - 1 &= -4(x - 2) \\ y - 1 &= -4x + 8 \end{aligned}$$

$$\begin{aligned} 4x + y - 1 &= 8 \\ \boxed{4x + y} &= \boxed{9} \end{aligned}$$

6. Write an equation for the line in the coordinate plane below



$$m = \frac{-4 - (-3)}{2 - (-5)} = \frac{-1}{7}$$

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-4) &= -\frac{1}{7}(x - 2) \\ y + 4 &= -\frac{1}{7}(x - 2) \end{aligned}$$

7. Write an equation for the line that has x-intercept = 2 and y-intercept = -1 in all three forms.

$$(2, 0) \quad (0, -1)$$

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

$$y = mx + b$$

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

$$y - y_1 = m(x - x_1) \quad * (0, -1)$$

$$\boxed{y + 1 = \frac{1}{2}(x - 0)}$$

$$Ax + By = C$$

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

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

$$\boxed{x - 2y = 2}$$

Geometry CP
3.3 Slopes of Lines &
3.4 Equations of Lines

A	B
$y = \frac{4}{5}x + 6$ vs. $y - 3 = \frac{4}{5}(x + 2)$	$y = -\frac{1}{2}x - 3$ vs. $y = 2x + 5$
$y = -x + 2$ vs. $x + y = 6$	$y = 3x + 4$ vs. $y - 3 = -\frac{1}{3}(x - 1)$
$y = -3x - 5$ vs. $3x + y = 2$	$2x + 4y = 3$ vs. $y = 2x - 9$

What do you notice?

Categorize:

$$y = \frac{3}{4}x + 4 \quad \text{vs.} \quad 3x - 4y = 2$$

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

$$5x - y = 9 \quad \text{vs.} \quad y = -\frac{1}{5}x - 10$$

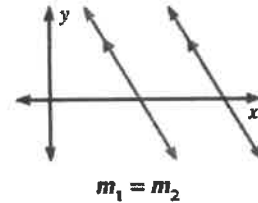
POSTULATES

For Your Notebook

POSTULATE 17 Slopes of Parallel Lines

In a coordinate plane, two nonvertical lines are parallel if and only if they have the same slope.

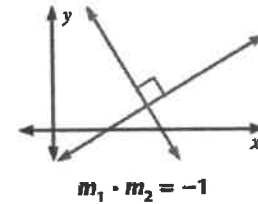
Any two vertical lines are parallel.



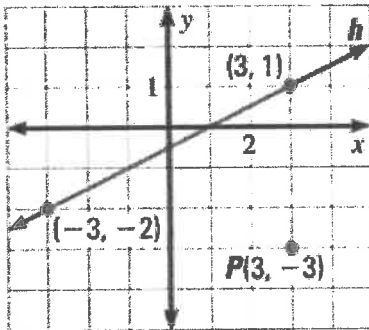
POSTULATE 18 Slopes of Perpendicular Lines

In a coordinate plane, two nonvertical lines are perpendicular if and only if the product of their slopes is -1 .

Horizontal lines are perpendicular to vertical lines.



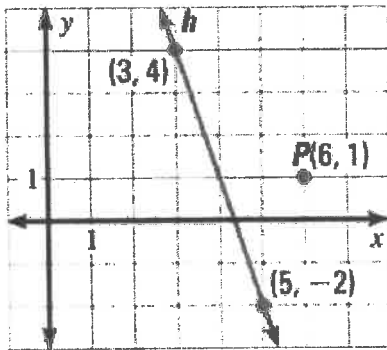
1. Write an equation parallel to the line h below that goes through the point P :



$$m = \frac{1}{2} \quad (3, -3)$$

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

2. Write an equation perpendicular to line h below that goes through the point P :



$$m = -3 \quad (6, 1)$$

$$y - 1 = -3(x - 6) \text{ parallel}$$

$$m_{\perp} = \frac{1}{3}$$

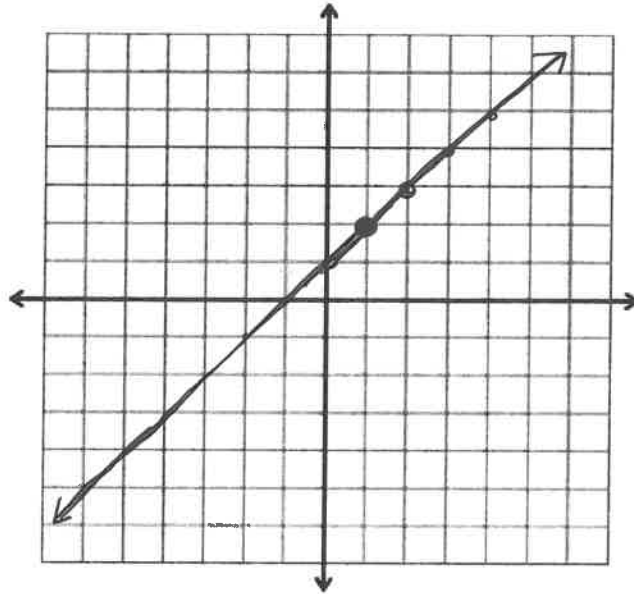
$$y - 1 = \frac{1}{3}(x - 6) \text{ perpendicular}$$

3. Graph a line with the given description:

Through (1, 2) and parallel to the line (-2, 4) and (-5, 1)

$$m = \frac{1-4}{-5-(-2)} = \frac{-3}{-3}$$

$$= 1$$



4. Write an equation of the line that passes through (2, 3) and is perpendicular to

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

★ slope

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

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

5. Write an equation of the line that passes through the point (-7, -4) and is parallel to $y = 16$

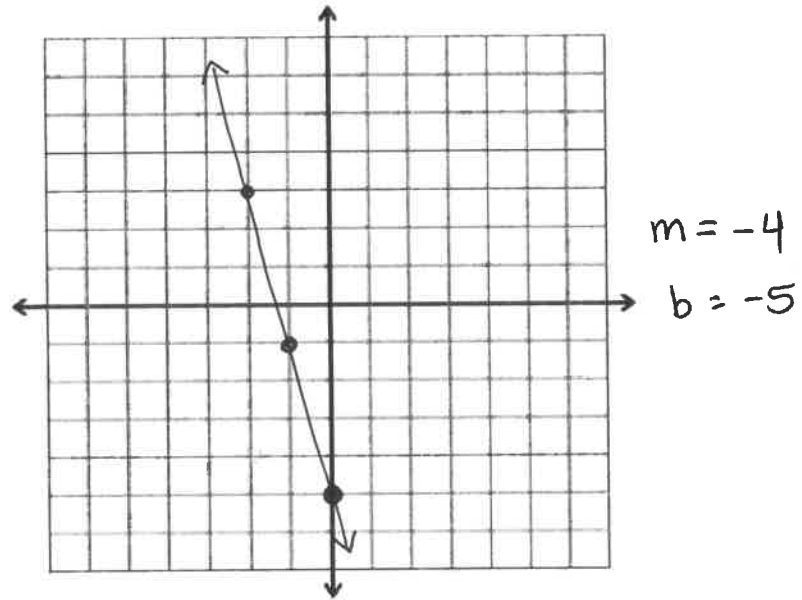
$$m = 0$$

$$y - (-4) = 0(x - (-7))$$

$$y + 4 = 0$$

$$y = -4$$

5. Graph the equation $8x + 2y = -10$



$$8x + 2y = -10$$

$$2y = -8x - 10$$

$$y = -4x - 5$$