

Algebra 2 2.4

Write the equation of a line given a slope and a point on the line.*

$$y = \underline{m}x + \underline{b}$$

Write the equation of a line parallel to a given line.*

Write the equation of a line perpendicular to a given line.*

*Algebra 1

$$(0, 4) \quad (2, 5)$$

$$\frac{5-4}{2-0} = \frac{1}{2}$$

slope

$$m = \frac{\text{rise}}{\text{run}}$$

parallel

$$m_1 = m_2$$

perpendicular

$$\text{opp}^{\text{slope}} \text{ recip}$$

slope intercept form

point slope form

whiteboards

Quiz 2.3-2.4 Thurs.

$$(5) \left(-\frac{1}{5}\right) = -1$$

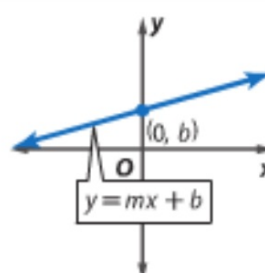
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KeyConcept Slope-Intercept Form

Words The slope-intercept form of the equation of a line is $y = mx + b$, where m is the slope and b is the y -intercept.

Symbols $y = \overset{\text{slope}}{mx} + \overset{\text{y-intercept}}{b}$

Model

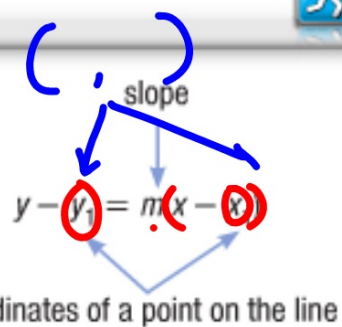


KeyConcept Point-Slope Form

Words

The point-slope form of the equation of a line is $y - y_1 = m(x - x_1)$, where (x_1, y_1) are the coordinates of a point on the line and m is the slope of the line.

Symbols



Follow directions for form: if not specified, then you can decide.

$$m = \frac{1}{2} \quad (3, 5)$$

$$y - 5 = \frac{1}{2}(x - 3)$$

Whiteboards

Example 2 Write an Equation Given Slope and One Point

Write an equation of the line through $(6, -2)$ with a slope of -4 .

$$\begin{aligned} y &= mx + b \\ y &= -4x + 22 \\ -2 &= -4 \cdot 6 + b \\ -2 &= -24 + b \\ +24 \quad +24 \\ \hline 22 &= b \end{aligned}$$

$$\begin{aligned} y - y_1 &= m(x - x_1) \\ y - (-2) &= -4(x - 6) \\ y + 2 &= -4(x - 6) \\ y + 2 &= -4x + 24 \\ y - 2 &= -4x + 22 \\ \hline y &= -4x + 22 \end{aligned}$$

Guided Practice

pt. slope

Write an equation in ~~slope-intercept form~~ for the line described.

2A. passes through $(2, 3)$; $m = \frac{1}{2}$

2B. passes through $(-2, -1)$; $m = -3$

$$y = mx + B$$

$$3 = \frac{1}{2} \cdot 2 + B$$

$$3 = 1 + B$$

$$2 = B$$

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

$$y - -1 = -3(x - -2)$$

$$y + 1 = -3(x + 2)$$

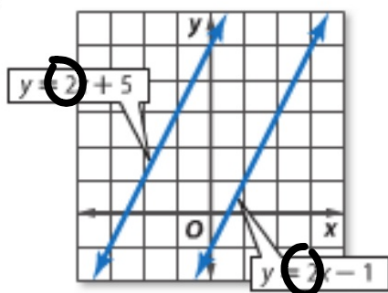
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KeyConcept Parallel and Perpendicular Lines**Parallel Lines**

Two nonvertical lines are **parallel** if and only if they have the same slope. All vertical lines are parallel.

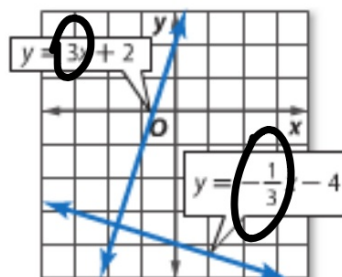
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$$y = 2x + 5 \text{ and } y = 2x - 1$$

Perpendicular Lines

Two nonvertical lines are **perpendicular** if and only if the product of the slopes is -1 . Vertical lines and horizontal lines are perpendicular.



$$y = 3x + 2 \text{ and } y = -\frac{1}{3}x - 4$$

Guided Practice

4. Write an equation in slope-intercept form for the line that passes through $(3, 7)$ and is parallel to the line with equation $y = \frac{3}{4}x - 5$.

same

$$y = mx + B$$

$$7 = \left(\frac{3}{4} \cdot 3\right) + B$$

$$7 = \frac{9}{4} + B$$

$$\frac{19}{4} = B$$

$$y = \frac{3}{4}x + \frac{19}{4}$$

7 passes through $(4, -10)$, parallel to $y = \frac{7}{8}x - 3$

$$y = mx + b$$

$$-10 = \frac{7}{8} \cdot 4 + b$$

$$-10 = \frac{28}{8} + b$$

$$-13.5 = b$$

$$y = \frac{7}{8}x - 13.5$$

6. passes through $(-9, -3)$, perpendicular to $y = -\frac{5}{3}x - 8$

$$m = \frac{3}{5}$$

$$y = \frac{3}{5}x + \frac{12}{5}$$

$$-3 = \frac{3}{5} \cdot (-9) + B$$

~~$$y = \frac{3}{5}x + \frac{12}{5}$$~~

$$-\frac{15}{5} = -\frac{27}{5} + B$$

$$B = \frac{12}{5}$$

23. passes through (4, 2), perpendicular to $y = -2x + 3$

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

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

$$y = \frac{1}{2}x + 0$$

$$2 = \frac{1}{2} \cdot 4 + B$$

$$\begin{array}{r} 2 \\ -2 \end{array} = \begin{array}{r} 2 \\ -2 \end{array} + B$$

$$0 = B$$

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