

Algebra 1 4.3

Write equations of lines in point-slope form

Write linear equations in different forms

slope-intercept form

$$y = mx + B$$

point-slope form

standard form (Ch. 3)

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

speed dating

$$Ax + By = C$$

KeyConcept Point-Slope Form

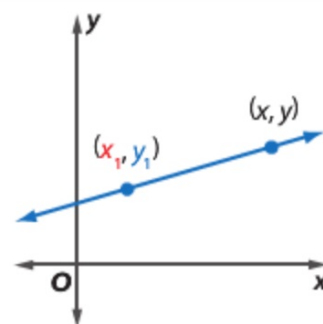
Words

The linear equation $y - y_1 = m(x - x_1)$ is written in point-slope form, where (x_1, y_1) is a given point on a nonvertical line and m is the slope of the line.

Symbols

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

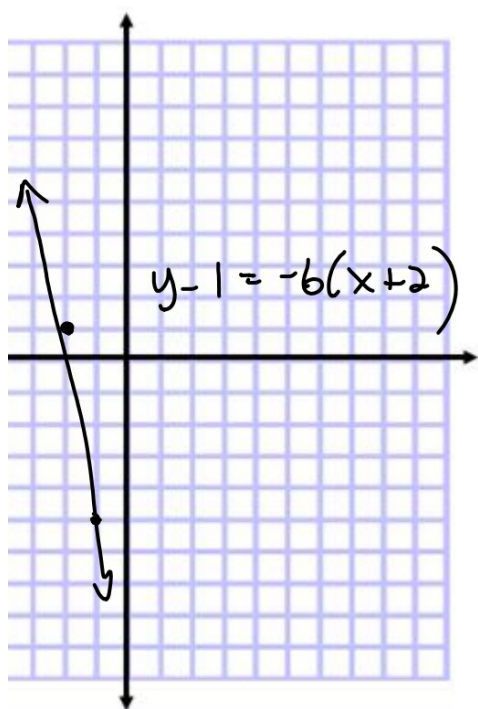
Handwritten annotations: A box is drawn around the equation. Below the y in $y - y_1$ is a handwritten y . Below the x in $x - x_1$ is a handwritten x . An arrow points from the handwritten y to the m .



Guided Practice

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

1. Write an equation in point-slope form for the line that passes through $(-2, 1)$ with a slope of -6 . Then graph the equation.



$$= -6(x + 2)$$

$$-6(x + 2)$$

$$-6x + -12$$

$$+ -11$$

$$\rightarrow \text{s.i. } y = mx + b$$

GuidedPractice

3. Write $y + 6 = -3(x - 4)$ in slope-intercept form.

A graph of the linear function $y = -3x + 6$ is shown on a coordinate plane. The line is plotted on a grid with a blue background. The line has a negative slope and passes through the points $(0, 6)$ and $(2, 0)$. The equation $y = -3x + 6$ is written in the upper right quadrant of the graph.

Example 3 Slope-Intercept Form

Write $y + 3 = \frac{3}{2}(x + 1)$ in slope-intercept form.

$$y + 3 = \frac{3}{2}x + \frac{3}{2} \cdot 1$$

$$y + 3 = \frac{3}{2}x + 1.5$$

$\begin{array}{cc} -3 & -3 \end{array}$

$$\rightarrow y = \frac{3}{2}x - 1.5$$

$$\rightarrow y = \frac{3}{2}x - \frac{3}{2}$$

$$Ax + By = C$$

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

$$\begin{array}{r} -\frac{3}{2}x \\ \hline -\frac{3}{2}x + y = -\frac{3}{2} \\ \hline \frac{-1}{-1} \quad \frac{-1}{-1} \quad \frac{-1}{-1} \end{array}$$

$$2 \cdot \frac{3}{2}x - 2y = 2 \cdot \frac{3}{2}$$

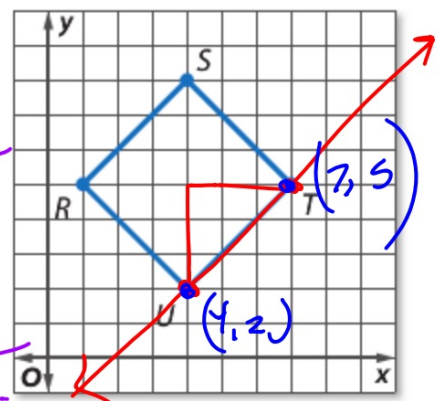
$$3x - 2y = 3$$

Example 4 Point-Slope Form and Standard Form

GEOMETRY The figure shows square $RSTU$.

- a. Write an equation in point-slope form for the line containing side \overline{TU} .

$$\begin{aligned}
 & y - y_1 = m(x - x_1) \\
 \Rightarrow & y - 2 = 1(x - 4) \rightarrow y - 2 = x - 4 + 2 \\
 \Rightarrow & y - 5 = 1(x - 7) \rightarrow y - 5 = x - 7 + 2 \\
 & \qquad \qquad \qquad y - 2 = x - 4 + 2 \\
 & \qquad \qquad \qquad y - 5 = x - 7 + 2 \\
 & \qquad \qquad \qquad y - 2 = x - 2 \\
 & \qquad \qquad \qquad y - 5 = x - 2
 \end{aligned}$$

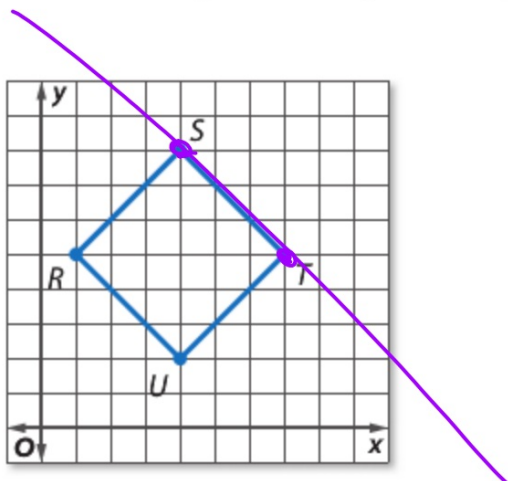


- b. Write an equation in standard form for the same line.

SF:
In order
Integers
GCF

Guided Practice

4A. Write an equation in point-slope form of the line containing side \overline{ST} .



4B. Write an equation in standard form of the line containing \overline{ST} .

St. Form

$$Ax + By = C$$

1. in order
2. integers
3. pos A, no GCF

$$2x + 5y = -3$$

$$A=2 \quad B=5 \quad C=-3$$

$$\begin{array}{r} -2x \quad y = 2x - 5 \\ -2x \quad -2x \end{array}$$

$$\begin{array}{r} -2x + y = -5 \\ \underline{-1 \quad -1 \quad -1} \end{array}$$

$$2x - y = 5$$

$$\begin{array}{r} y = -\frac{1}{3}x + 2 \\ +\frac{1}{3}x \quad +\frac{1}{3}x \end{array}$$

$$\begin{array}{r} 3 \cdot \frac{1}{3}x + 3 \cdot y = 3 \cdot 2 \\ \hline \end{array}$$

$$x + 3y = 6$$

