

Point-Slope Form of a Line

MATH 101 *College Algebra*

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Fall 2022

Objectives

- ▶ Graph a line given its slope and the coordinates of a point on the line.
- ▶ Find the equation of a line given its slope and the coordinates of a point on the line.
- ▶ Find the equation of a line given the coordinates of two points on the line.

Background

We have discussed two forms of the equation of a line.

Standard Form $Ax + By = C$

Slope-Intercept Form $y = mx + b$

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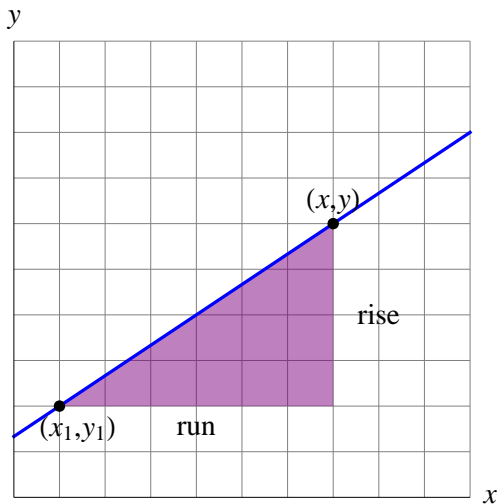
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Slope-Intercept Form $y = mx + b$

Recall the slope $m = \frac{\text{rise}}{\text{run}}$

Graphing a Line

Given the coordinates of a point on a line, say (x_1, y_1) , and the slope of the line $m = \frac{\text{rise}}{\text{run}}$, another point on the line would be **rise** units vertically from (x_1, y_1) and **run** units horizontally from the point.



Point-Slope Form

Given the **coordinates** (x_1, y_1) of any point on a line and the **slope** m of the line, then any other point (x, y) will satisfy the slope formula:

$$\frac{y - y_1}{x - x_1} = m$$

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This formula can be written as

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

which is called the **point-slope form** of the equation of a line.

Two Points

If (x_1, y_1) and (x_2, y_2) are two points on the same line, then we can find the equation of the line in two steps:

1. Find the slope $m = \frac{y_2 - y_1}{x_2 - x_1}$.
2. Use the slope m and one of the points in the point-slope formula $y - y_1 = m(x - x_1)$.

Parallel and Perpendicular Lines

Parallel and perpendicular lines are related through their slopes.

- ▶ **Parallel lines** never intersect and have **equal** slopes.
- ▶ **Perpendicular lines** intersect at 90° angles and whose slopes are **negative reciprocals** of each other.