Slope-Intercept Form

MATH 101 *College Algebra*

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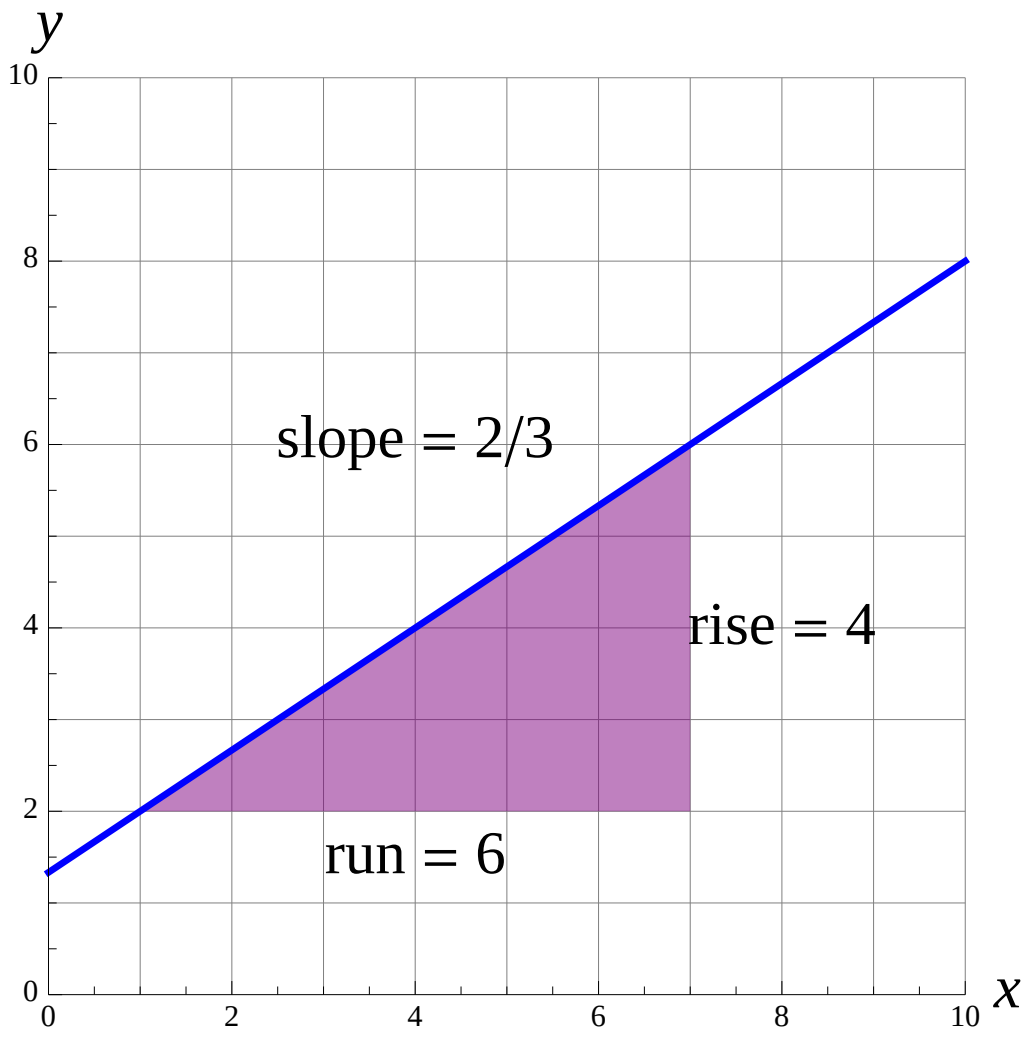
Objectives

- Interpret the slope of a line as a rate of change.
- Find the slopes of lines given two points.
- Find the slopes of an graph horizontal and vertical lines.
- Find the slopes and y-intercepts of lines and then graph the lines.
- Write the equations of lines given the slopes and y-intercepts.

Meaning of Slope

For a straight line, the **slope of the line** is the **ratio of the rise to the run**.



Rate of Change

The slope can be thought of as a **rate of change** of one quantity with respect to another.

Example

- If you drive 100 miles in 2 hours, the rate of change in distance with respect to time is a slope:

$$\text{velocity} = \frac{100\,\text{miles}}{2\,\text{hours}} = 50\,\text{mph}$$

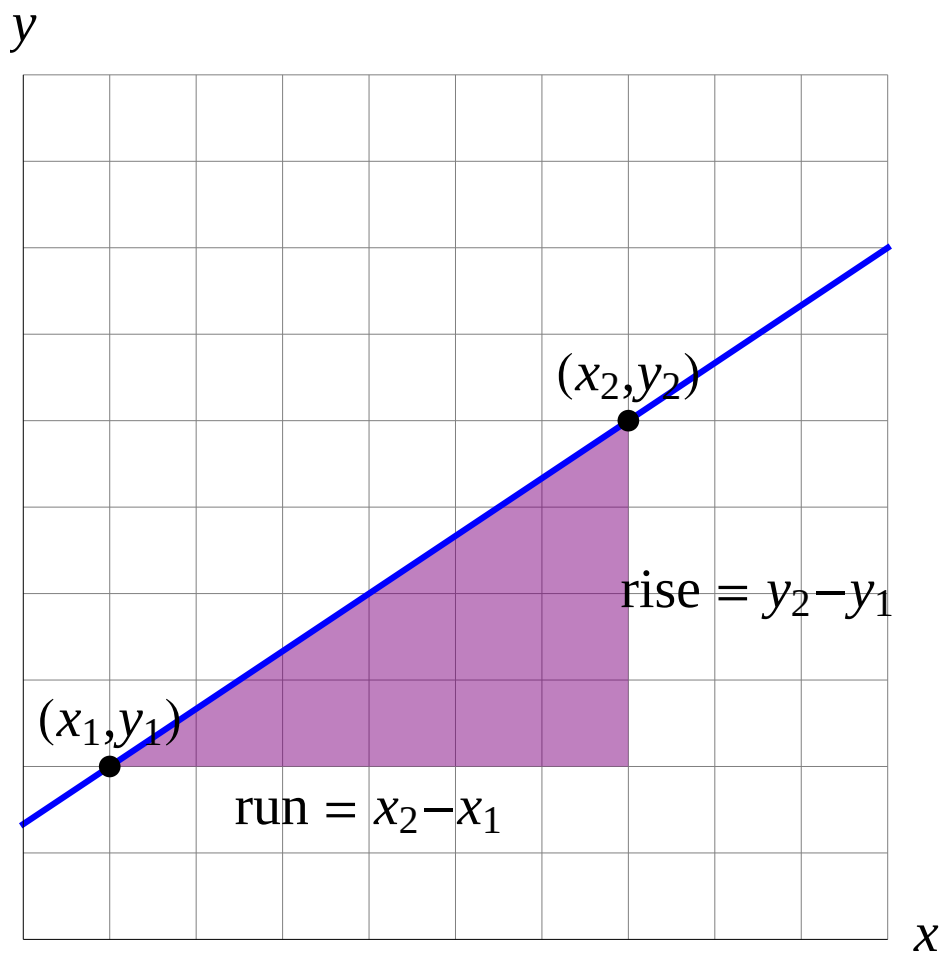
- If a copier prints 60 pages in 0.5 minutes, the rate of change in pages printed with respect to time is a slope:

$$\frac{60\,\text{pages}}{0.5\,\text{minutes}} = 120\,\text{ppm}$$

Calculating Slope

Let $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ be two points on a line. The **slope** can be calculated as

$$\text{slope} = \frac{\text{rise}}{\text{run}} = m = \frac{y_2 - y_1}{x_2 - x_1}$$



Horizontal and Vertical Lines

- If two points have the same y-coordinate (for example $(-2, 4)$ and $(3, 4)$) then the line through these points will be **horizontal**. **The slope of any horizontal line will be 0.** The equation of a horizontal line will be of the form $y = b$.
- If two points have the same x-coordinate (for example $(3, 4)$ and $(3, -2)$) then the line through these points will be **vertical**. **The slope of any vertical line is undefined.** The equation of a vertical line will be of the form $x = a$.

Slope-Intercept Form

Given an equation of the form $y = mx + b$, the

- slope of the line is m, and
- the y-intercept of the line is b.

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Remark: the equation $y = mx + b$ is called the **slope-intercept form of a line**.