

# The Slope of a Line



# Preliminaries and Objectives

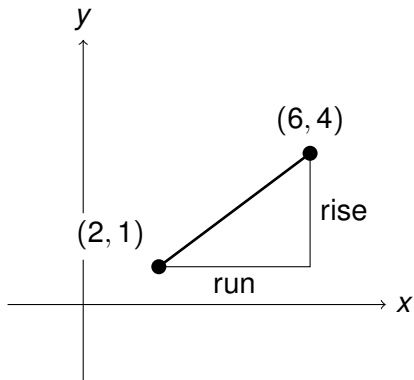
## Preliminaries

- Rates of Change

## Objectives

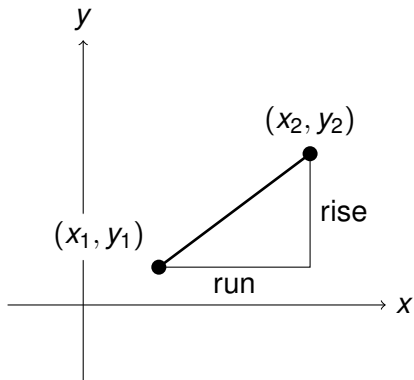
- Formally define the slope of a line
- Use the slope to find missing values

# The Slope Formula



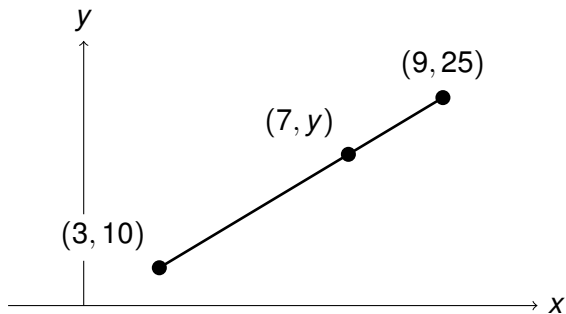
$$\text{slope} = \frac{4 - 1}{6 - 2} = \frac{3}{4}$$

# The Slope Formula



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

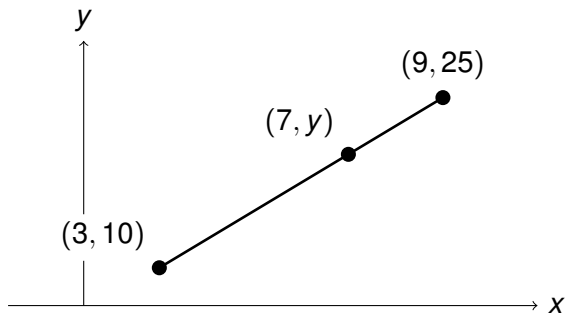
# Interpolation



x	y
3	10
7	
9	25

$$\text{slope} = \frac{25 - 10}{9 - 3} = \frac{15}{6} = \frac{5}{2}$$

# Interpolation

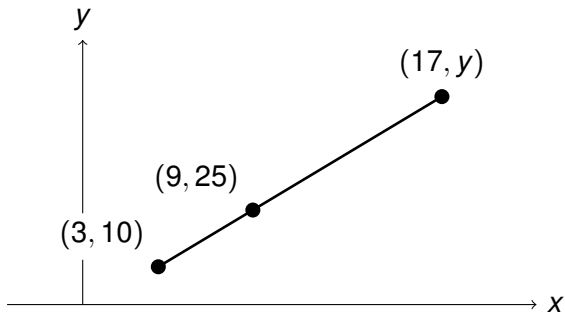


x	y
3	10
7	
9	25

$$\text{slope} = \frac{25 - 10}{9 - 3} = \frac{15}{6} = \frac{5}{2}$$

$$\Rightarrow \frac{y - 10}{7 - 3} = \frac{5}{2} \Rightarrow y = 20$$

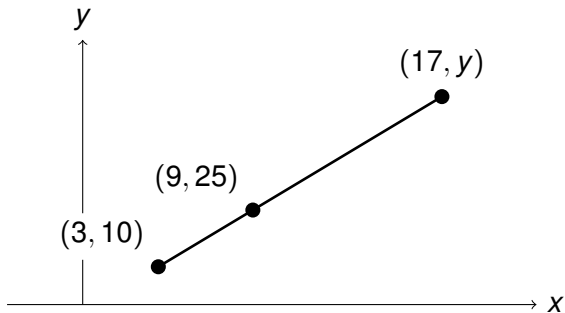
# Extrapolation



x	y
3	10
9	25
17	

$$\text{slope} = \frac{25 - 10}{9 - 3} = \frac{15}{6} = \frac{5}{2}$$

# Extrapolation



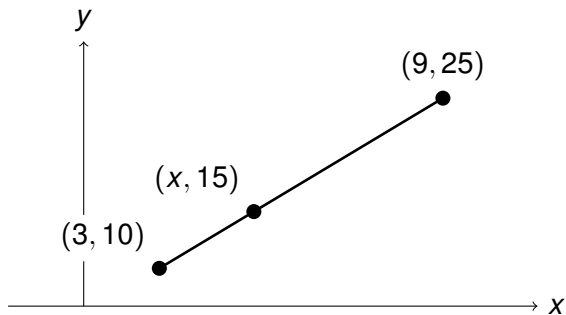
x	y
3	10
9	25
17	

$$\text{slope} = \frac{25 - 10}{9 - 3} = \frac{15}{6} = \frac{5}{2}$$

$$\Rightarrow \frac{y - 10}{17 - 3} = \frac{5}{2} \Rightarrow y = 45$$



# Finding Missing Input Value



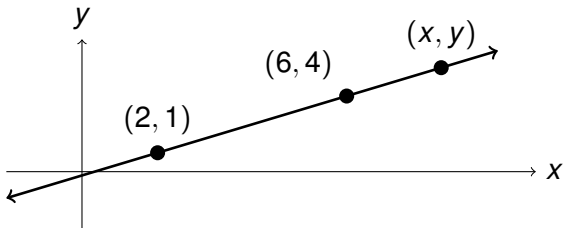
x	y
3	10
	15
9	25

$$\text{slope} = \frac{25 - 10}{9 - 3} = \frac{15}{6} = \frac{5}{2}$$

$$\Rightarrow \frac{15 - 10}{x - 3} = \frac{5}{2} \Rightarrow x = 5$$

# Point-Slope Form of a Line

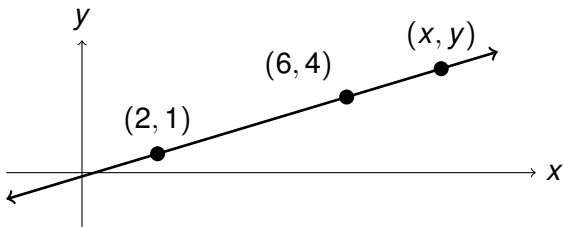
Find the equation of a line passing through the points  $(2, 1)$  and  $(6, 4)$ .



$$\text{slope} = \frac{4 - 1}{6 - 2} = \frac{3}{4}$$

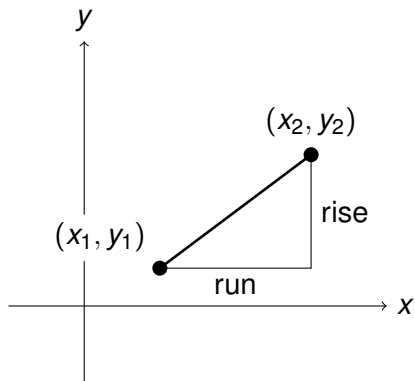
# Point-Slope Form of a Line

Find the equation of a line passing through the points  $(2, 1)$  and  $(6, 4)$ .



$$\text{slope} = \frac{4 - 1}{6 - 2} = \frac{3}{4} = \frac{y - 4}{x - 6}$$

# Recap



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

# Credits

Written by: Mike Weimerskirch

Narration: Mike Weimerskirch

Graphic Design: Mike Weimerskirch

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