Math Review

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Graphs of Two variables: The Coordinate System

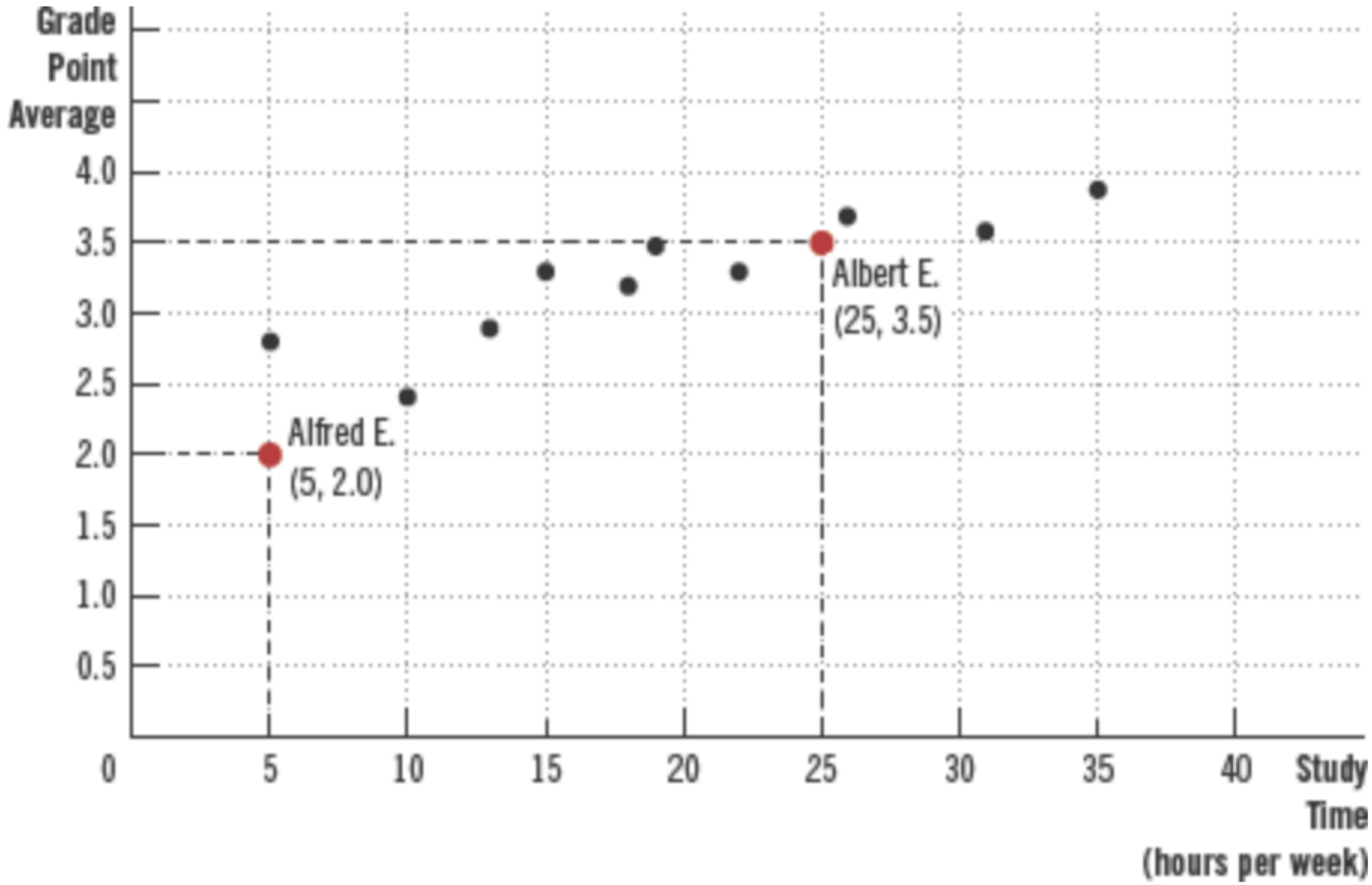
- Coordinate system: Arrangement of reference lines or curves used to identify the location of points in space.
- In two dimensions, the most common system is the Cartesian system.
- Points are designated by their distance along a horizontal (x) and vertical (y) axis from a reference point, the origin, designated (0, 0).

Graphs of Two variables: The Coordinate System

- Suppose I want to examine the relationship between study time and average GPA.
- For each student in my class, I could record a pair of numbers: (study hours per week, average GPA).
- These ordered pairs of numbers could be plotted as points on the coordinate system.

Graphs of Two variables: The Coordinate System

A Scatter Plot plots scattered points.



Graphs of Two variables: The Coordinate System

- The first number in each ordered pair is called the x-coordinate, denoting the horizontal location of the point.
- The second number in each ordered pair is called the y-coordinate, denoting the vertical location of the point.
- Alfred, (5, 2.0): tells us Alfred studies 5 hours a week and his average GPA is 2.0.
- Emma, (25, 3.5): tells us James studies 5 hours a week and her average GPA is 3.5.

The Slope Intercept Form Equation of a Straight Line

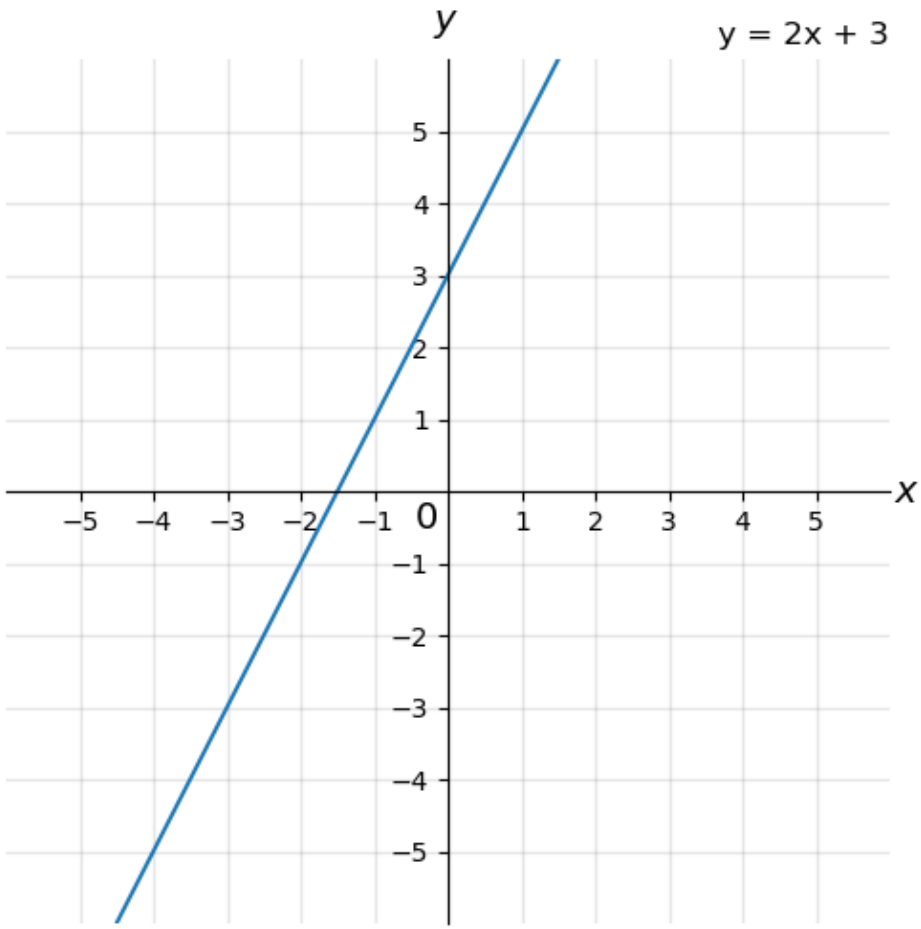
- How to represent a straight line using a equation?
  - The slope intercept form: $y = m * x + b$
  - m is the slope; b is the intercept
  - The equation represents the **linear** relationship between x and y.
  - Example: $y = 2x + 3$
  - The slope is 2; the intercept is 3.

The Slope Intercept Form Equation of a Straight Line

- Chart Vs Graph
  - Example: $y = 2x + 3$
  - The slope is 2; the intercept is 3.
- Chart:

x =	-5	-3	-1	0	1	3	5
y =	-7	-3	1	3	5	9	13

The Slope Intercept Form Equation of a Straight Line



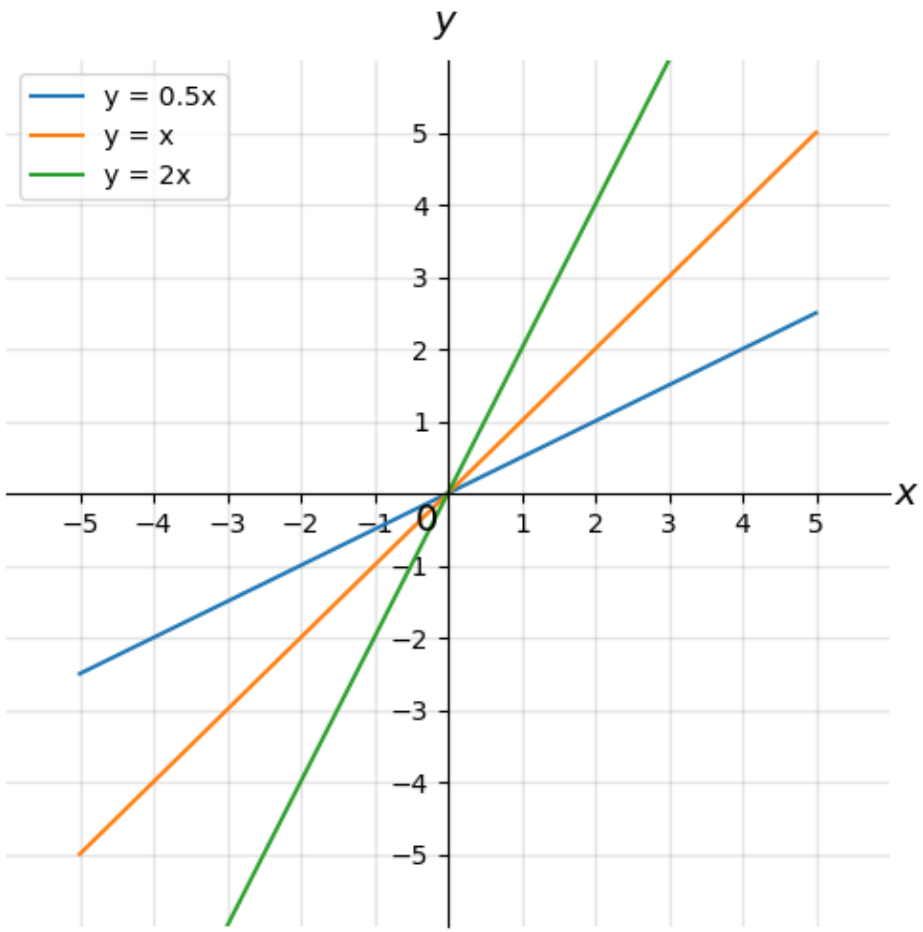
Slope and Intercept

- Slope: the slope of a line is a number that describes both the direction and the steepness of the line.
- Slope is calculated by finding the ratio of the "vertical change" to the "horizontal change" between (any) two distinct points on a line.
  - The steepness a line is measured by the absolute value of the slope.
  - A slope with a greater absolute value indicates a steeper line.
- $m = \frac{y_2 - y_1}{x_2 - x_1}$

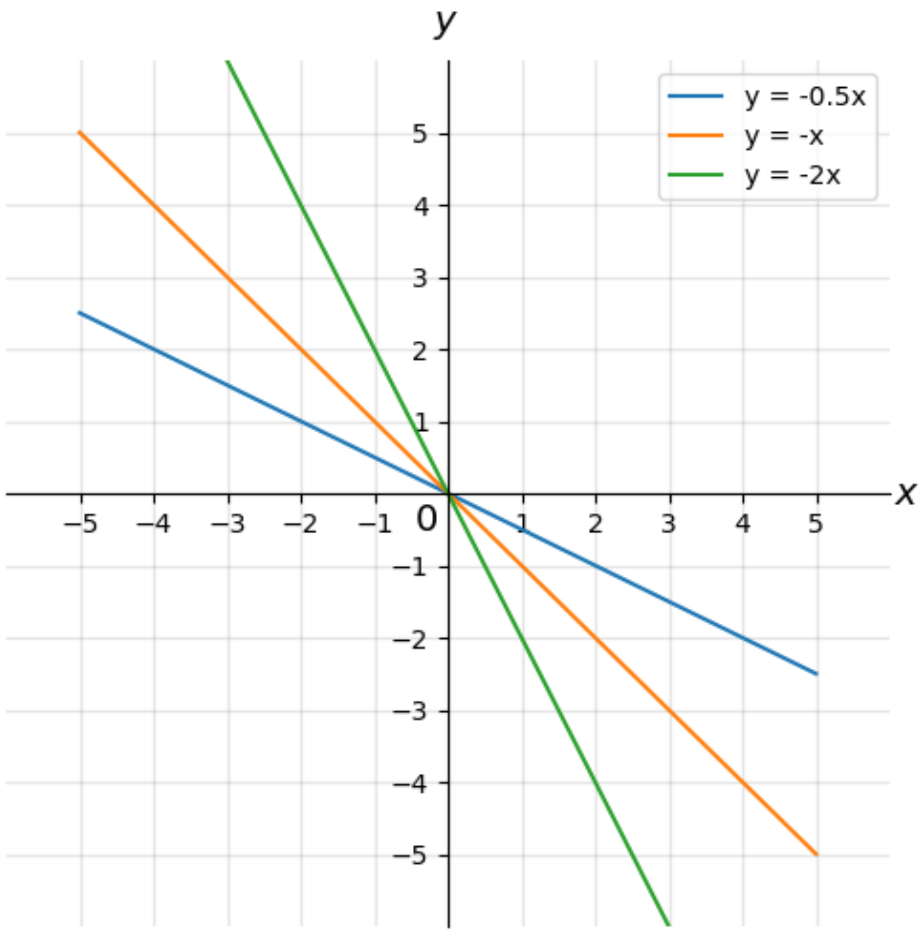
Slope and Intercept

- Slope: the slope of a line is a number that describes both the direction and the steepness of the line.
- Slope is calculated by finding the ratio of the "vertical change" to the "horizontal change" between (any) two distinct points on a line.
  - A line is increasing if it goes up from left to right. The slope is positive, m $>$ 0
  - A line is decreasing if it goes down from left to right. The slope is negative, m $<$ 0
  - If a line is horizontal the slope is zero.
  - If a line is vertical the slope is undefined
- $m = \frac{y_2 - y_1}{x_2 - x_1}$

The Slope Intercept Form Equation of a Straight Line



The Slope Intercept Form Equation of a Straight Line



Slope and Intercept

- Intercept: the point where the line or curve crosses the axis of the graph is called intercept.
  - A y-intercept is where the graph crosses (or just touches) the y-axis (that is, the vertical axis).
  - An x-intercept is where a graph crosses (or at least touches) the x-axis (that is, the horizontal axis).
  - A y-intercept is a solution to the equation when the x-value has been set to zero.
  - An x-intercept is a solution to the equation when the y-value has been set to zero.

The Slope Intercept Form Equation of a Straight Line