

Parent Newsletter

Chapter 2: Graphing and Writing Linear Equations

Students will...

Understand that lines represent solutions of linear equations.

Graph linear equations.

Find slopes of lines using two points.

Find slopes of lines from tables.

Find slopes and y-intercepts of graphs of linear equations.

Graph linear equations written in slope-intercept form.

Graph linear equations written in standard form.

Write equations of lines in slope-intercept form.

Write equations of lines using slope and a point.

Write equations of lines using two points.

Solve real-life problems involving linear equations.

Essential Questions

How can you recognize a linear equation? How can you draw its graph?

How can the slope of a line be used to describe the line?

How can you describe the graph of the equation $y = mx + b$?

How can you describe the graph of the equation $ax + by = c$?

How can you write an equation of a line when you are given the slope and y-intercept of the line?

How can you write an equation of a line when you are given the slope and a point on the line?

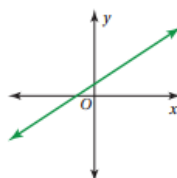
How can you use a linear equation in two variables to model and solve a real-life problem?

Slope

The **slope** of a line is a ratio of the change in y (the **rise**) to the change in x (the **run**) between any two points, (x_1, y_1) and (x_2, y_2) , on the line.

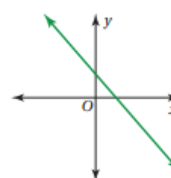
$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}$$

Positive slope



The line rises from left to right.

Negative slope



The line falls from left to right.

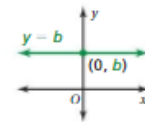
Key Ideas

Linear Equations

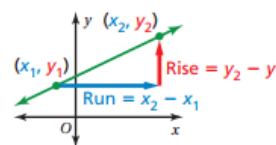
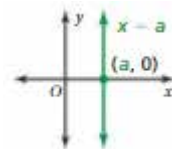
- A **linear equation** is an equation whose graph is a line.
- The points on the line are **solutions** of the equation.

Graphing Horizontal and Vertical Lines

- The graph of $y = b$ is a horizontal line passing through $(0, b)$.



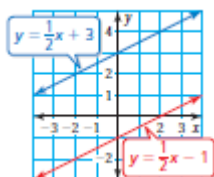
- The graph of $x = a$ is a vertical line passing through $(a, 0)$.



Key Ideas

Parallel Lines and Slopes

- Two different lines in the same plane that never intersect are parallel lines. Nonvertical parallel lines have the same slope.
- All vertical lines are parallel.



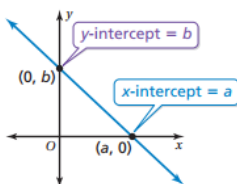
Perpendicular Lines and Slopes

- Two lines in the same plane that intersect to form right angles are **perpendicular lines**. Two nonvertical lines are perpendicular if and only if the product of their slopes is -1 .
- Vertical lines are perpendicular to horizontal lines.



Intercepts

- The x -intercept of a line is the x -coordinate of the point where the line crosses the x -axis. It occurs when $y = 0$.
- The y -intercept of a line is the y -coordinate of the point where the line crosses the y -axis. It occurs when $x = 0$.



Slope-Intercept Form

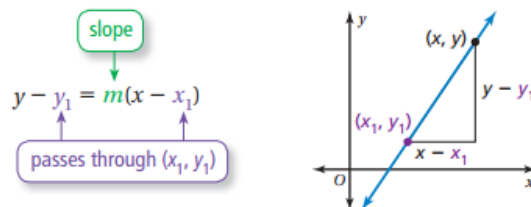
- A linear equation written in the form $y = mx + b$ is in slope-intercept form. The slope of the line is m and the y -intercept of the line is b .
- $y = mx + b$
↑ slope ↑ y -intercept

Standard Form of a Linear Equation

The standard form of a linear equation is $ax + by = c$, where a and b are not both zero.

Point-Slope Form

- A linear equation written in the form $y - y_1 = m(x - x_1)$ is in point-slope form. The line passes through the point (x_1, y_1) and the slope of the line is m .



Standards

Common Core:

A.CED.2: Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

A.CED.3: Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.

A.REI.10: Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).

F.IF.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

Standards

Common Core:

F.IF.6: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

8.F.3: Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear.

8.F.4: Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Key Terms

linear equation

solution of a linear equation

slope

rise

run

perpendicular lines

x-intercept

y-intercept

slope-intercept form

standard form

point-slope form

Games

- Six in a Row

This is available online in the *Game Closet* at www.bigideasmath.com.

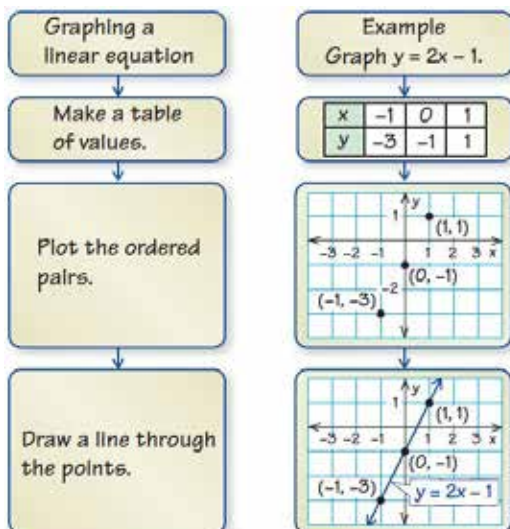
Quick Review

- Another way to discuss the equation $y = b$ is to say that “y always equals a certain number, while x can equal anything.” For example, if $y = -4$, the table of values may look like this:

x	-1	0	1	2
y	-4	-4	-4	-4

Reference Tools

A **Process Diagram** can be used to show the steps involved in a procedure. Process diagrams are particularly useful for illustrating procedures with two or more steps, and they can have one or more branches.



- Another way to discuss the equation $x = a$ is to say that “x always equals a certain number, while y can equal anything.” For example, if $x = -2$, the table of values may look like this:

x	-2	-2	-2	-2
y	-1	0	1	2

- The *point-slope form* of the equation of a line is equivalent to the *slope-intercept form* and is the equation of a unique line.

What's the Point?

The STEM Videos available online show ways to use mathematics in real-life situations. The Chapter 2: Hurricane! STEM Video is available online at www.bigideasmath.com.

