Chapter 1 Functions and Their Graphs

Section 1.1 Lines in the Plane

Objective: In this lesson you learned how to find and use the slope of a line to write and graph linear equations.

I. The Slope of a Line (Pages 3–4)

The formula for the slope of a line passing through the points \((x_1, y_1)\) and \((x_2, y_2)\) is

\[ m = \frac{y_2 - y_1}{x_2 - x_1}. \]

To find the slope of the line through the points \((-2, 5)\) and \((4, -3), \ldots\)

A line whose slope is positive _______ from left to right.
A line whose slope is negative _______ from left to right.
A line with zero slope is ________.
A line with undefined slope is ________.

II. The Point-Slope Form of the Equation of a Line (Pages 5–6)

The point-slope form of the equation of a line is

\[ y - y_1 = m(x - x_1). \]

This form of equation is best used to find the equation of a line when . . .
The **two-point form** of the equation of a line is
______________________________.

The two-point form of equation is best used to find the equation of a line when . . .

**Example 1:** Find an equation of the line having slope \(-2\) that passes through the point \((1, 5)\).

The approximation method used to estimate a point between two given points is called _____________. The approximation method used to estimate a point lying outside the given points is called ________________.

A **linear function** has the form _______________. Its graph is a __________ that has slope _______ and a y-intercept at __________.

### III. Sketching Graphs of Lines (Pages 7–8)

The **slope-intercept form** of the equation of a line is ______________, where \(m\) is the _____________ and the y-intercept is (______, ____).

**Example 2:** Determine the slope and y-intercept of the linear equation \(2x - y = 4\).

The equation of a **horizontal line** is ________. The slope of a horizontal line is _____. The y-coordinate of every point on the graph of a horizontal line is ____________.

The equation of a **vertical line** is ________. The slope of a vertical line is ___________. The x-coordinate of every point on the graph of a vertical line is ____________.
The **general form** of the equation of a line is

\[
Ax + By = C
\]

Every line has an equation that can be written in

\[
Ax + By = C
\]

When a graphing utility is used to sketch a straight line, the graph of the line may not visually appear to have the slope indicated by its equation because . . .

**Example 3:** Use a graphing utility to graph the linear equation

\[2x - y = 4\]

using (a) a standard viewing window, and (b) a square window.

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**IV. Parallel and Perpendicular Lines** (Pages 9–10)

Two lines are ____________ if they do not intersect.

Two lines are ____________ if they intersect at right angles.

The relationship between the slopes of two lines that are parallel is . . .

The relationship between the slopes of two lines that are perpendicular is . . .

A line that is parallel to a line whose slope is 2 has slope _____.

A line that is perpendicular to a line whose slope is 2 has slope _____.

What must be done to make the graphs of two perpendicular lines appear to intersect at right angles when they are graphed using a graphing utility?
Example 4: Use a graphing utility to graph the perpendicular lines $y = 2x - 3$ and $y = -0.5x + 5$ using (a) a standard viewing window, and (b) a square window.

Homework Assignment

Page(s)

Exercises