Chapter 2 Section 4
Linear Functions and Slope

Graphing Using Intercepts
Linear Function: function whose graph is a straight line.
Standard form of the equation of a line: Ax + By = C where A and B are not both zero.

Graph in this form: Ax + By = C
Intercepts:

x-intercept of the graph: x-coordinate where the graph intersects the x-axis.
Ordered pair: (x, 0)
The y-coordinate corresponding to an x-intercept is always zero.

y-intercept of the graph:
ordered pair: (0, y)
The x-coordinate corresponding to a y-intercept is always zero.

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Using Intercepts to Graph $Ax + By = C$

1. Find the x-intercept. Let $y = 0$ and solve for x.
2. Find the y-intercept. Let $x = 0$ and solve for y.
3. Find a checkpoint, a third ordered-pair solution.
4. Graph the equation by drawing a line through the three points.

Example 1: page 138
Graph: 4x – 3y = 6

The slope of a line

Slope: steepness of a line.
Compares the vertical change (rise) to the horizontal change (run) when moving from one fixed point to another along the line.
Calculate: ratio that compares the change in y to the change in x.

Definition of slope:

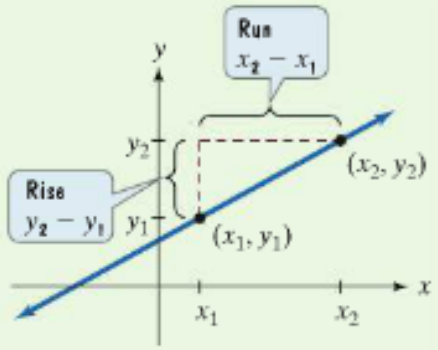
Definition of Slope

The **slope** of the line through the distinct points (x_1, y_1) and (x_2, y_2) is

$$\frac{\text{Change in } y}{\text{Change in } x} = \frac{\text{Rise}}{\text{Run}} = \frac{y_2 - y_1}{x_2 - x_1},$$

(Rise: Vertical change; Run: Horizontal change)

where $x_2 - x_1 \neq 0$.

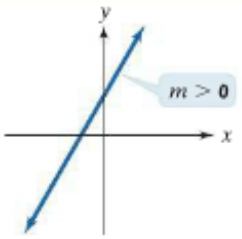
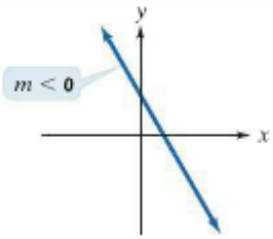
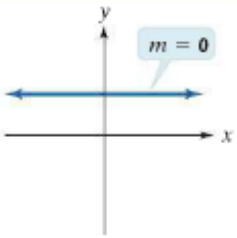
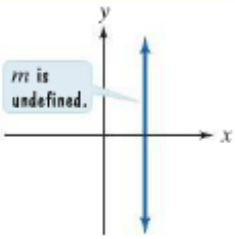


Notation: common to use letter 'm' represent slope of a line

Letter m is used because it is the first letter of French verb, monter, meaning, to rise or to ascend.

Example 2: page 139
Find the slope of a line passing through each pair of points.
a) (-3, -4) and 9-1, 6) b) (-1, 3) and (-4, 5)

Table 2.2 Possibilities for a Line's Slope

Positive Slope	Negative Slope	Zero Slope	Undefined Slope
			
Line rises from left to right.	Line falls from left to right.	Line is horizontal.	Line is vertical.

The Slope-Intercept Form of the Equation of a Line
Graph: y = 2x + 4
Find:
x-intercept
y-intercept
slope
the slope-intercept form of the equation, nonvertical line with slope, m, y-intercept, b is
y = mx + b

Find the slope and y-intercept

a) $y = 3x - 4$

b) $f(x) = \frac{1}{2}x + 2$

Convert standard form to slope-intercept form

$5x + 3y = -12$

b) $3x + y = 2$

Graphing using the slope and y-intercept

$y = 3x - 4$

b) $y = \frac{1}{2}x - 3$

c) $f(x) = \frac{3}{2}x + 2$

Equations of Horizontal and Vertical Lines

Graph: $y = -4$

$x = 2$