3.2 The Slope of a Line

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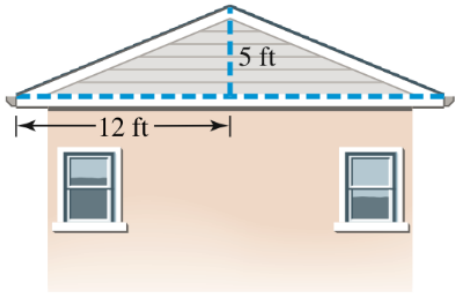
Objectives:

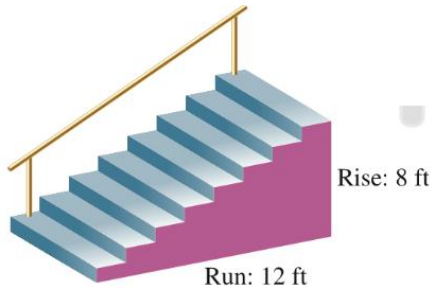
- Find the slope of a line, given two points on the line.
- Find the slope of a line, given an equation of a line.
- Graph a line, given its slope and a point on the line.
- Use slopes to determine whether two lines are parallel, perpendicular, or neither.
- Solve problems involving average rate of change.

Slope -

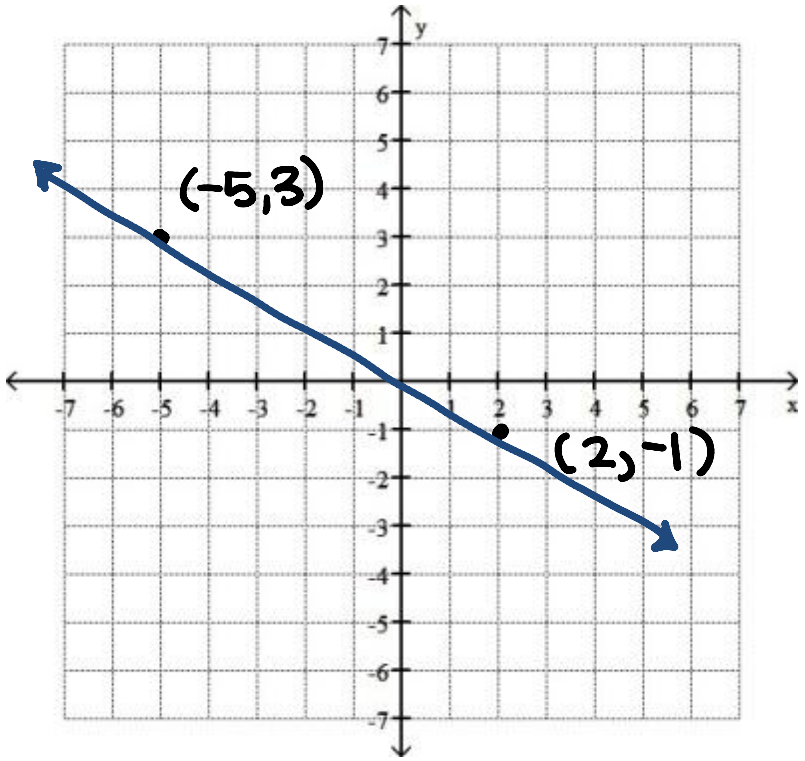
Other practical applications:



$\frac{5}{12}$ roof pitch



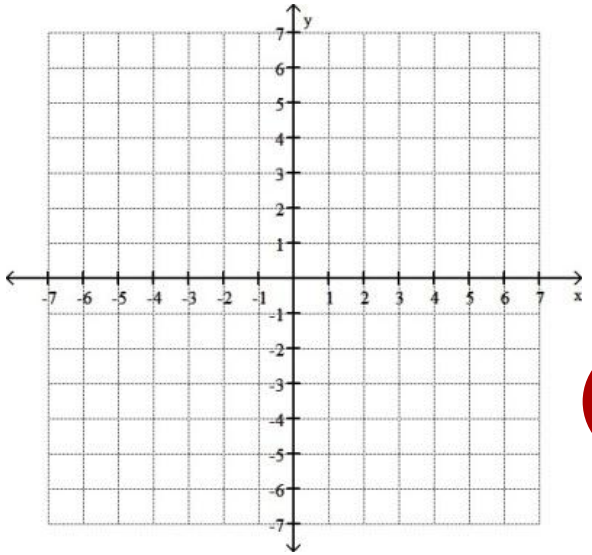
Slope of a stairwell


y
x
(-5,3)
(2,-1)

Slope Formula

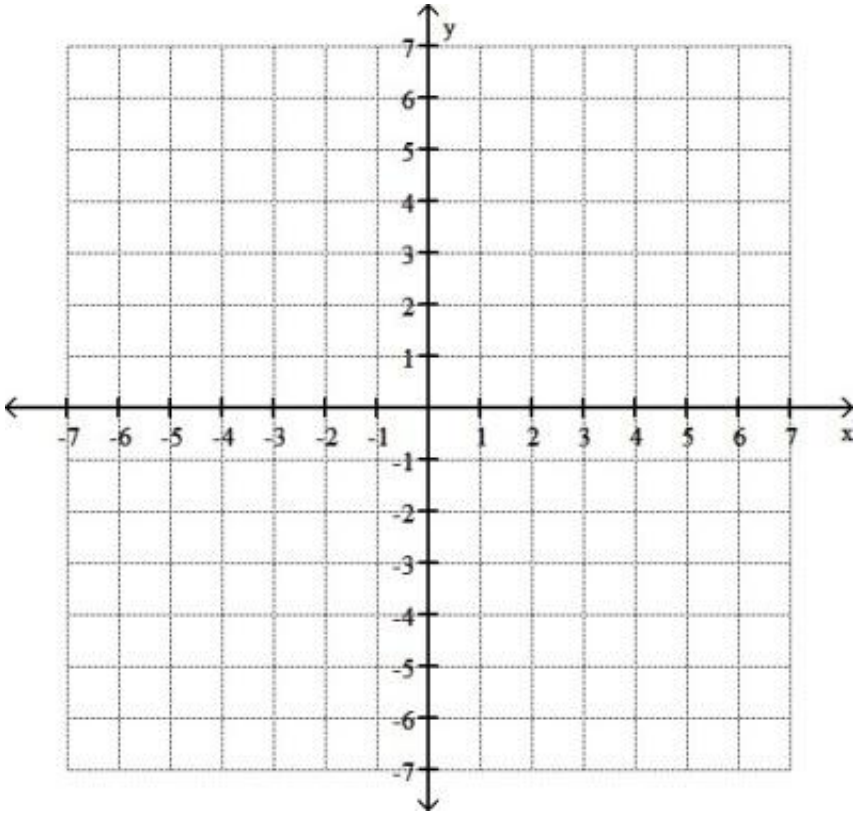
The **slope** m of the line through the distinct points (x_1, y_1) and (x_2, y_2) is

Find the slope of the line through the points $(-6,7)$ and $(3,-5)$.



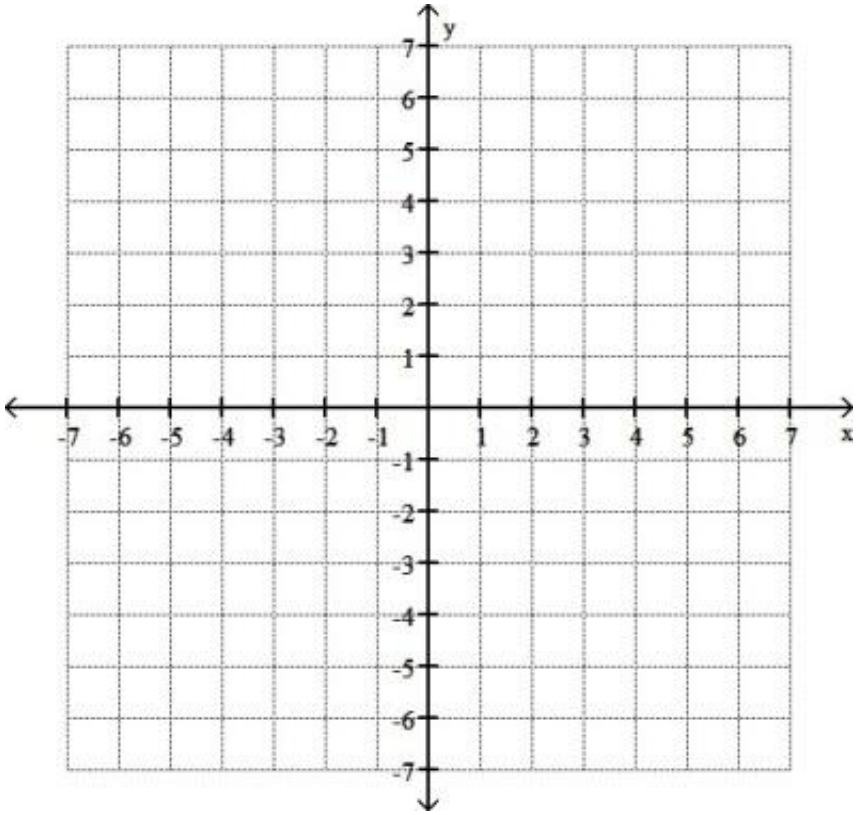
Example 1

- Find the slope of the line $3x - 4y = 12$.



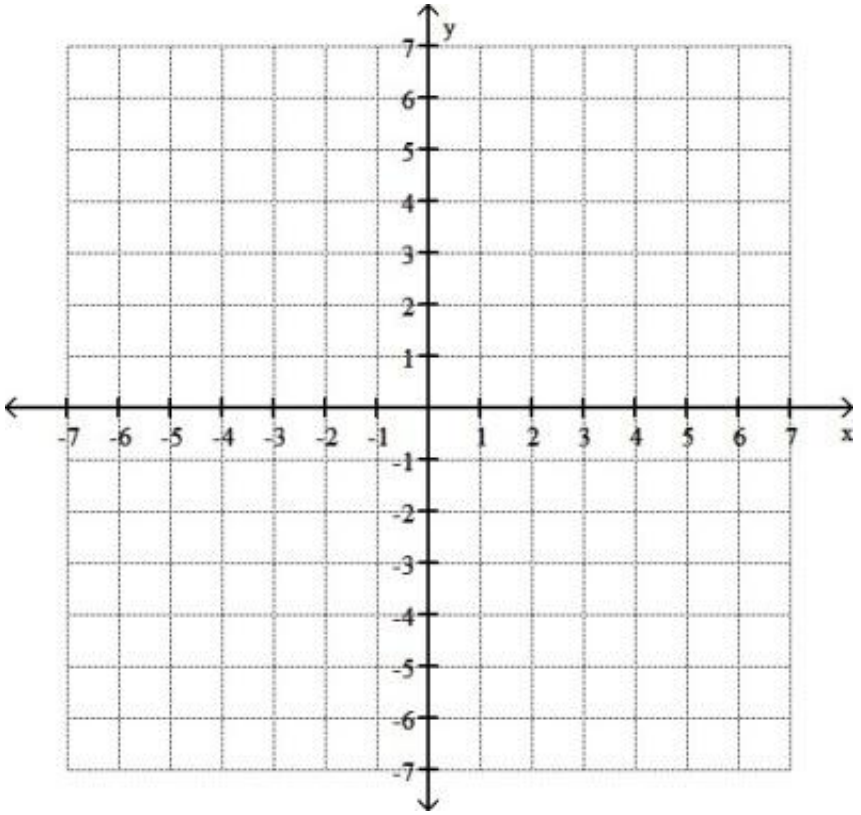
Example 2

- Find the slope of the line $y + 3 = 0$



Example 3

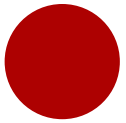
- Find the slope of the line $x = -6$.



Finding the Slope of a Line from its Equation

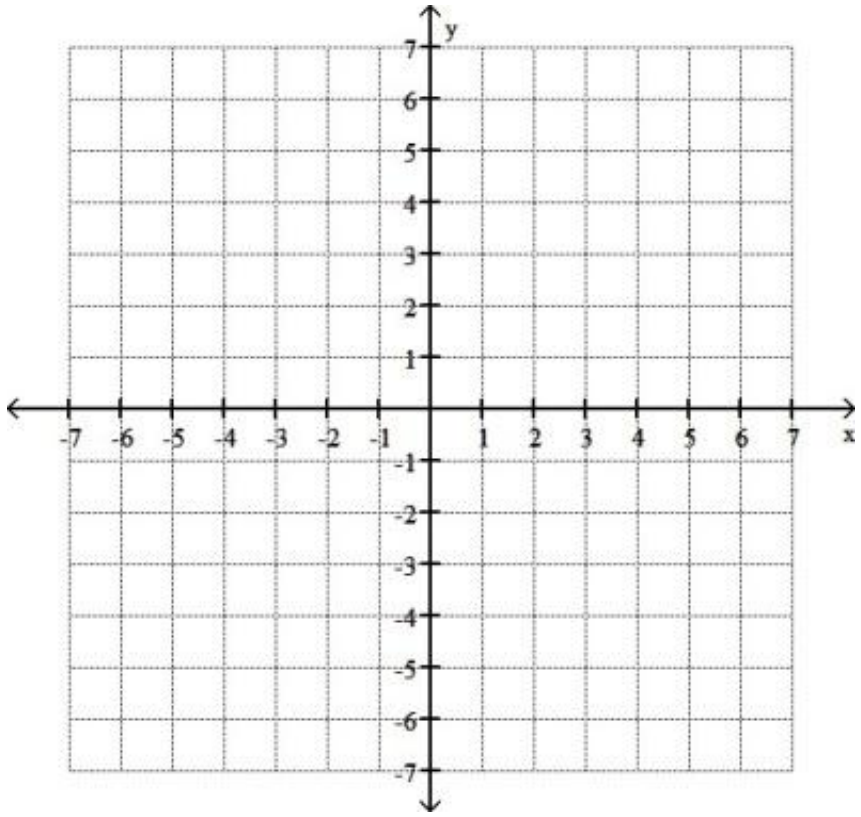
- Step 1:
- Step 2:

Find the slope of the line $5x - 4y = 7$.



Example 4

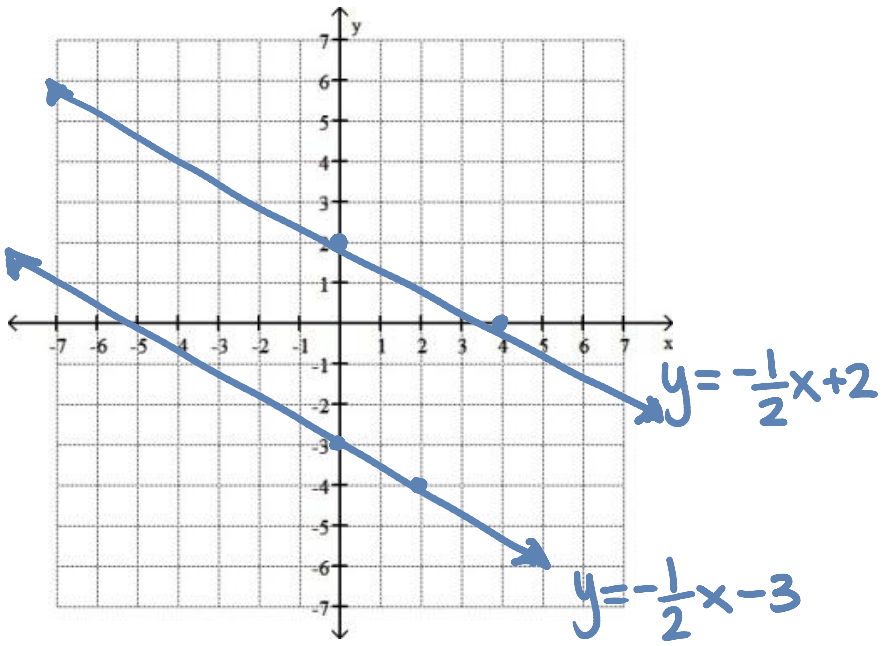
- Graph the line passing through $(-3, -2)$ that has a slope of $\frac{1}{2}$.



The Story of Slope

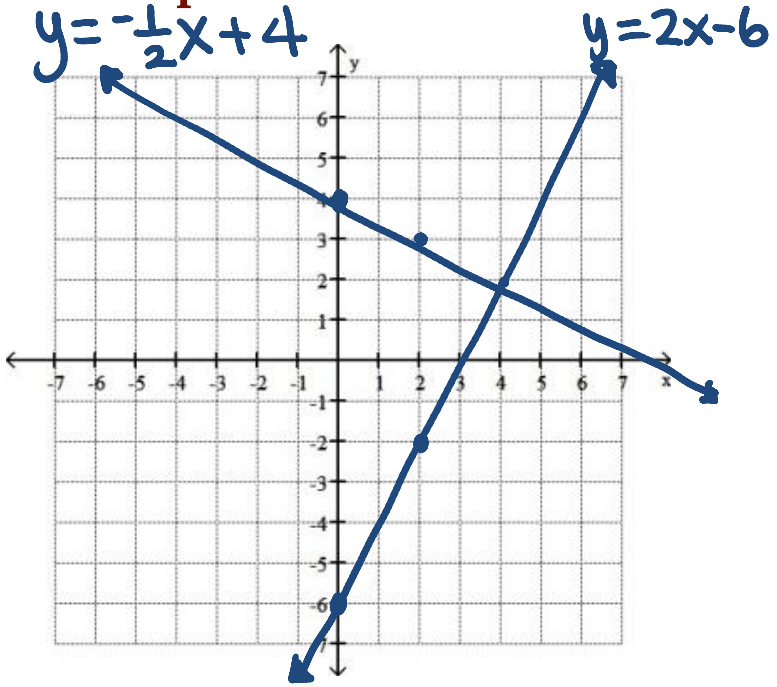
Parallel and Perpendicular Lines

Parallel Lines



- Two lines in a plane that never intersect are _____.
- Non-vertical parallel lines have _____.

Perpendicular Lines



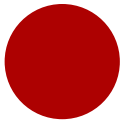
- Two lines in a plane that intersect at a 90° angle are _____.
- Perpendicular lines have the _____.

Example 5

- Determine whether the lines are parallel, perpendicular or neither.

Line 1 through $(-1,2)$ and $(3,5)$.

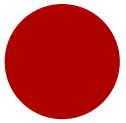
Line 2 through $(4,7)$ and $(8,10)$.



Example 6

- Determine whether the lines are parallel, perpendicular or neither.

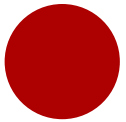
$$4x - y = 2$$
$$x - 4y = -8$$



Example 7

- Determine whether the lines are parallel, perpendicular or neither.

$$3x - y = 4$$
$$x + 3y = 9$$



Example 8

- During the year 2000, the average person in the United States spent 812 hours watching broadcast TV. In 2005, the average number of hour per person spent watching broadcast TV was 679. Find the average rate of change in the number of hour per year.