

Section 3.3: Slope and Graphs of Linear Equations

Objectives:

- ◇ Determine the slope of a line through two points.
- ◇ Graph linear equations in slope-intercept form.
- ◇ Use slopes to determine whether two lines are parallel, perpendicular or neither.
- ◇ Use slopes to describe rates of change in real-life problems.

Positive or negative slope?

Parallel or perpendicular?

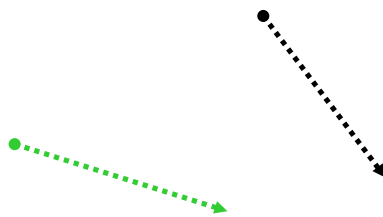
$$3x - 2y = 6$$

$$3x + 2y = 4$$

$$2x - 3y = -6$$

$$2x + 3y = -2$$

Slope is something you are familiar with. Think of a ski hill.
What makes it more exciting?



The slope of a line given points (x_1, y_1) and (x_2, y_2) is

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

Examples of slope:

Parallel lines



Perpendicular lines



① EXAMPLE

Find the slope of the line connecting each pair of points.

a) $(-3, 2)$ and $(5, 2)$

b) $(-3, 2)$ and $(-3, 5)$

c) $(-3/2, -1/2)$ and $(5/8, 1/2)$

d) $(9, -2)$ and $(-7, 2)$

How to graph the equation of a line in slope-intercept form:

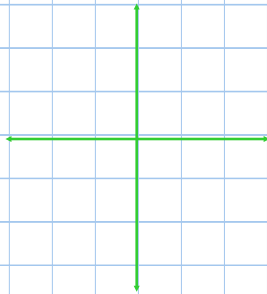
Slope-intercept form: $y = mx + b$

m = slope $(0,b)$ is the y -intercept.

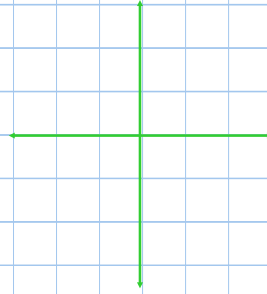
② EXAMPLE

Sketch each of these.

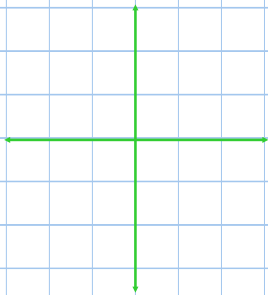
a) $y = 3x + 2$



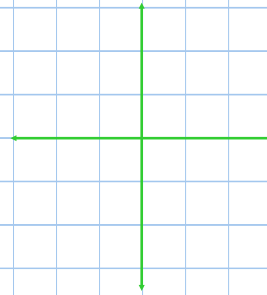
b) $3x - 2y = 8$

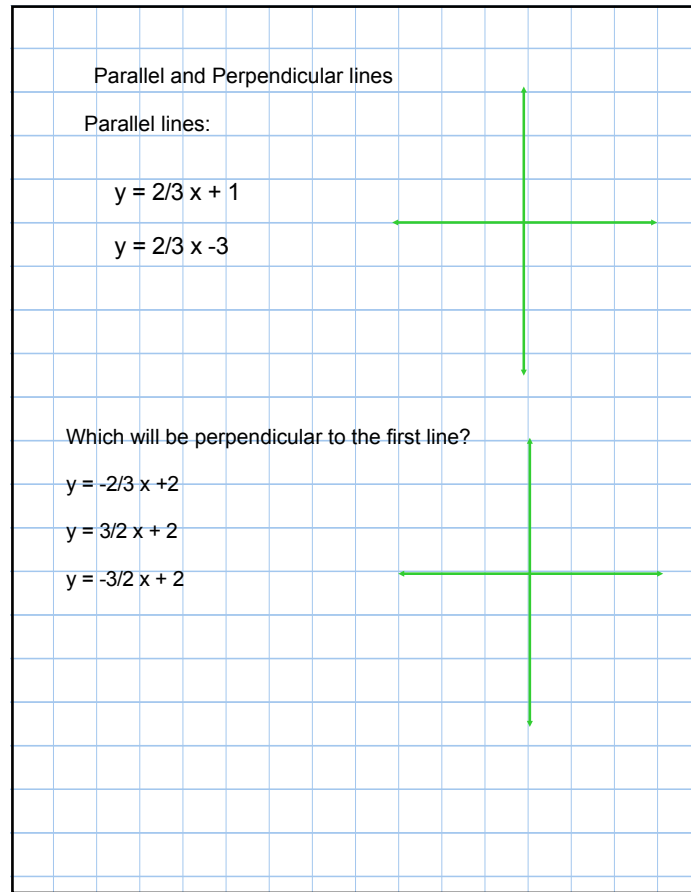


c) $6y - 5x + 15 = 0$



d) $2x + y = 0$





③ EXAMPLE

Given the line $2x - 3y = 6$

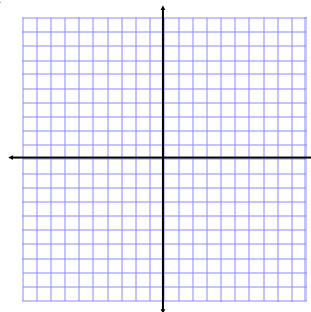
a) Write an equation of a line parallel to that line through the origin, $(0,0)$.

(The form will be $y = mx + 0$.)

b) Write an equation of a line perpendicular to that line through the origin, $(0,0)$.

(The form will be $y = mx + 0$.)

c) Graph the three lines.



④ EXAMPLE:

Slope in real life ~ make a sketch of the problem.

a) A skate-board ramp has a length of 26 feet. The top is 10 feet off the ground. What is the slope of the ramp?

b) One of the Egyptian Pyramids is 70 meters tall and 110 meters across the base. What is the slope of the face of the pyramid?