

4.3 Equations in the Form $y = mx + b$

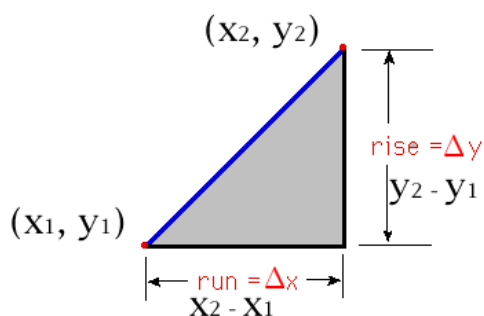
Recall:

😊 slope = rate of change

$$m = \frac{\text{rise}}{\text{run}}$$

$$m = \frac{\Delta y}{\Delta x}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



Δ is a symbol which means "Change In".

😊 b = initial value
= y-intercept (where the graph crosses the y axis)

Let's investigate. Sketch each equation in your notes and make observations.

1. Changing m :

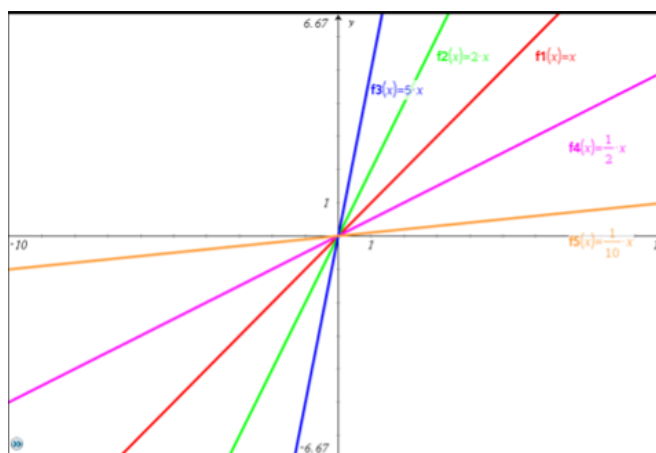
a) $y = x$

b) $y = 2x$

c) $y = 5x$

d) $y = \frac{1}{2}x$

e) $y = \frac{1}{10}x$



How does the value of m affect the graph?

f) $y = -x$

g) $y = -2x$

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



1 The graph of $y = 3.5x$ is _____ than $y = 2x$.

A steeper

B less steep

C same steepness

2 The graph of $y = -2x$ is _____ than $y = 2x$.

- A steeper
- B less steep
- C same steepness

3 The graph of $y = -3x + 4$ goes

A down to the left

B up to the left

C up to the right

2. Changing b :

- a) $y = x$
- b) $y = x + 2$
- c) $y = x + 5$
- d) $y = x - 3$
- e) $y = x - 7$



How does the value of b affect the graph?

- 4 The graph of $y = -3x - 8$ is _____ than $y = -3x + 2$
- A higher
 - B lower
 - C same y-intercept

3. Try these pairs of lines:

a) $y = 2x$ $y = 2x - 4$

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

c) $y = -\frac{2}{5}x + 5$ $y = -\frac{2}{5}x - 2$



What can you say about each pair of lines?

What is the same in each pair of equations?

4. Try these pairs of lines with a square window:

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

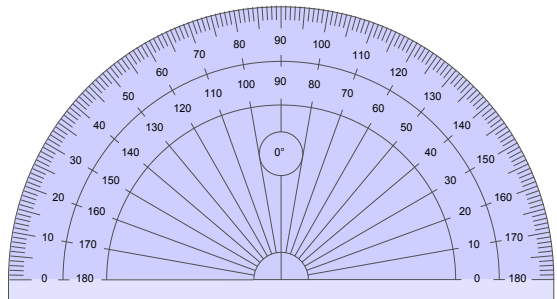
b) $y = \frac{3}{4}x + 2$ $y = -\frac{4}{3}x - 1$

c) $y = -\frac{5}{2}x + 5$ $y = \frac{2}{5}x - 2$



What can you say about each pair of lines?

What do you notice about the slope in each pair of equations?

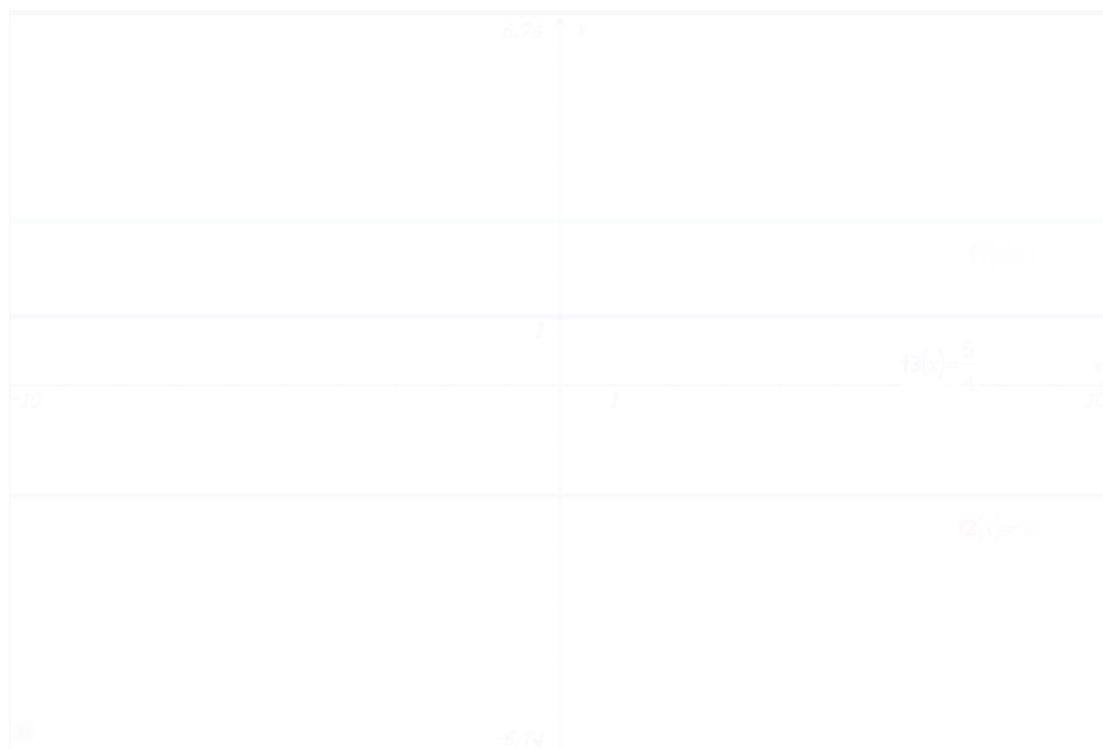


5. More...

a) $y = 3$

b) $y = -2$

c) $y = \frac{5}{4}$



What do you notice about these lines?

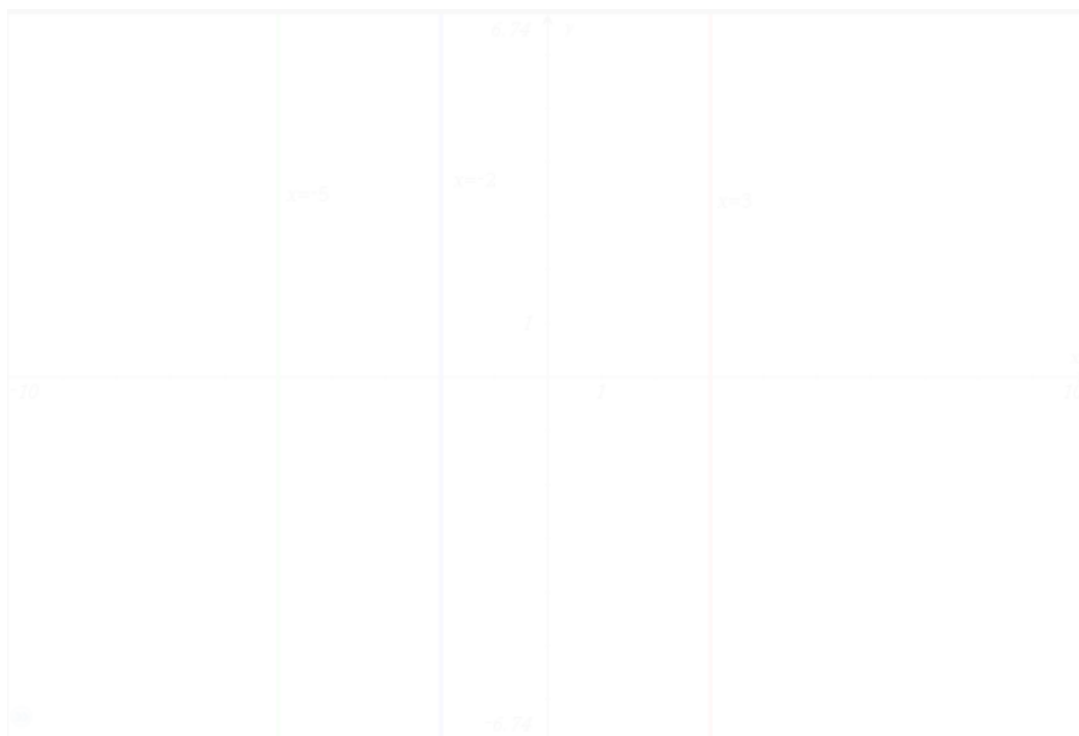
What is the slope of each line?

5. Graph (by hand)

a) $x = 3$

b) $x = -2$

c) $x = -5$



What do you notice about these lines?

What is the slope of each line?

SUMMARY

- ★ The equation of a line can be written in slope-intercept form:
 $y = mx + b$ where m is the slope & b is the y-intercept
- ★ Parallel lines have equal slopes.
- ★ Perpendicular lines have slopes that are negative reciprocals.
- ★ A horizontal line is written in the form $y = b$. The slope of a horizontal line is 0.
- ★ A vertical line is written in the form $x = a$. The slope of a vertical line is undefined.

Homework:
Page 303 #C1,C3,1 to 4

