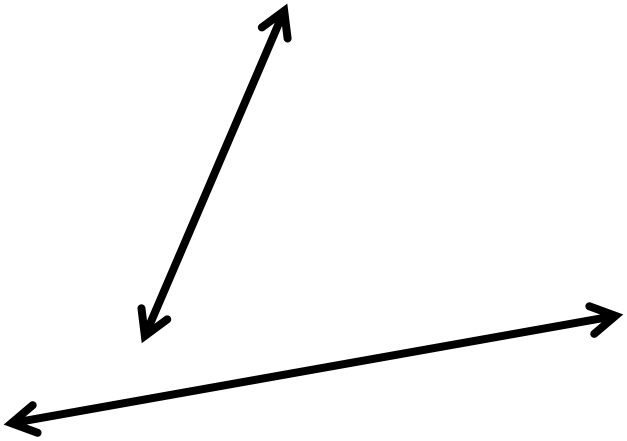
LINEAR FUNCTION

- Function where the graph is a line
- Changes by a constant amount at set intervals

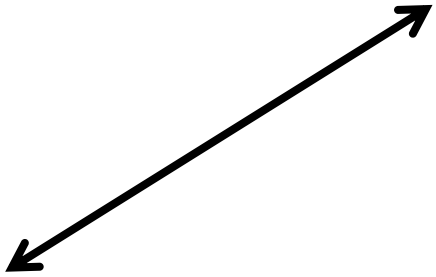
Slope ➔ a fraction that tells the slant of a line

- Big slope

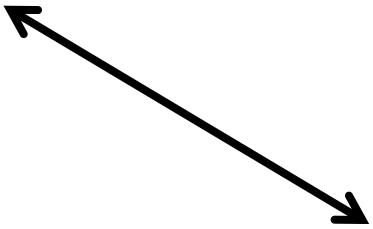


- Small slope

- Positive slope



- Negative slope

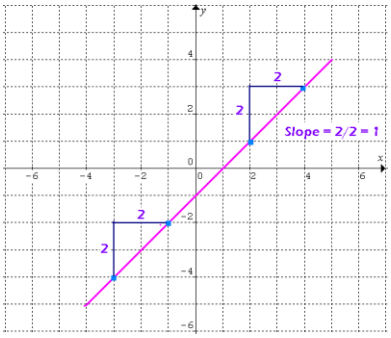


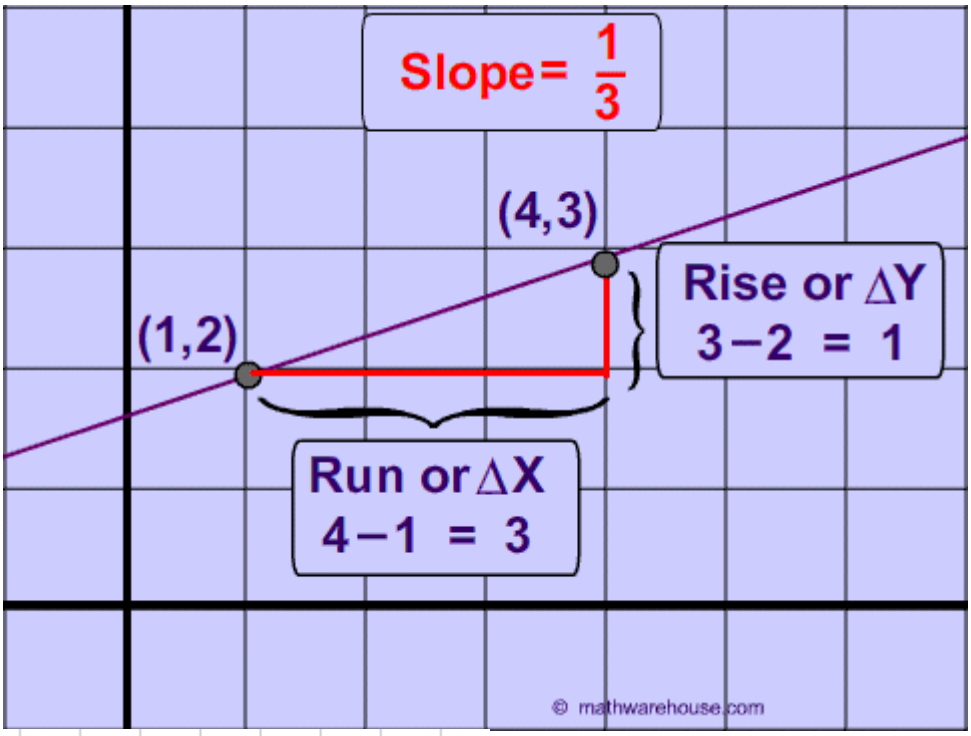
- Zero slope

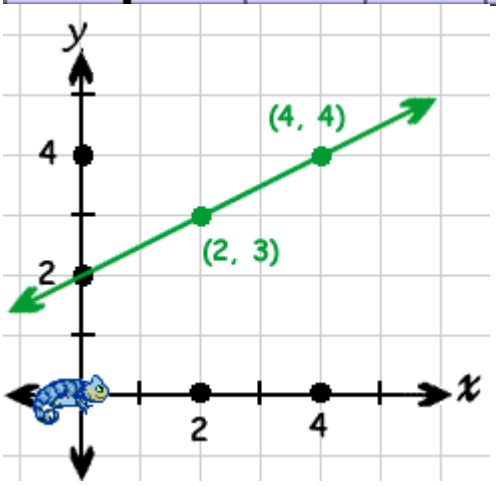
- Undefined slope

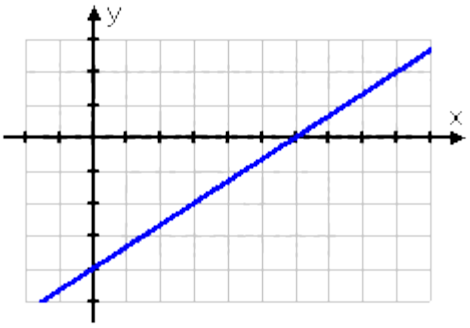
Slope

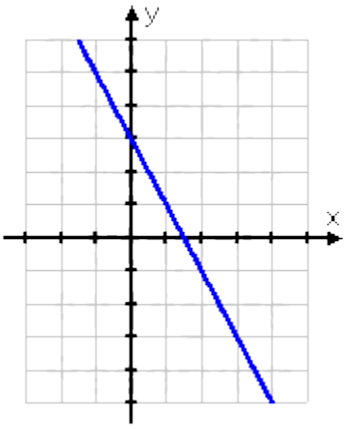
$$m = \frac{Vertical\ \ Change}{Horizontal\ \ Change}$$











If you know two points on a line, you can find the slope by using this formula:

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

Example: Find the slope of the line through (3,5) and (7,10).

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

$$m = \frac{10 - 5}{7 - 3} = \frac{5}{4}$$

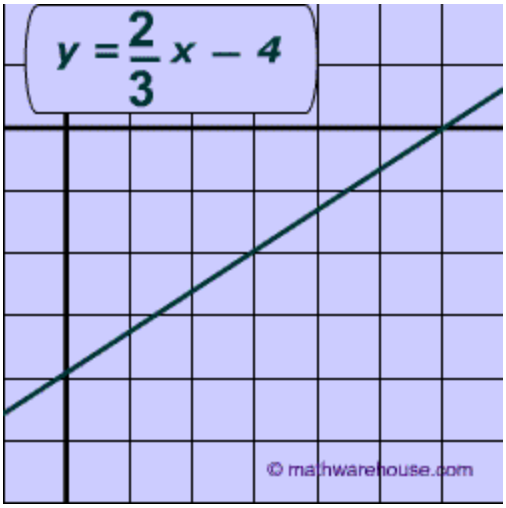
Find the slope of the line through (4,9) and (-1,12)

$$m = \frac{12 - 9}{-1 - 4} = \frac{3}{-5}$$

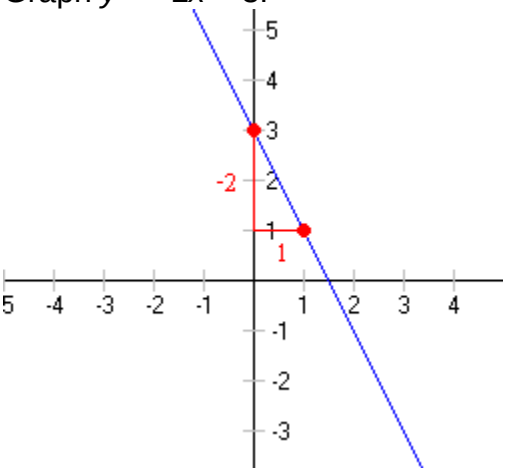
It's easy to use slope to graph linear functions.

- If a function is written in the form y = mx + b or f(x) = mx + b …
  - m (the number by x) is the slope
  - b (the number by itself) is the y-intercept, the place where the line crosses the y-axis.

Example: Graph $y = \frac{2}{3}x - 4$

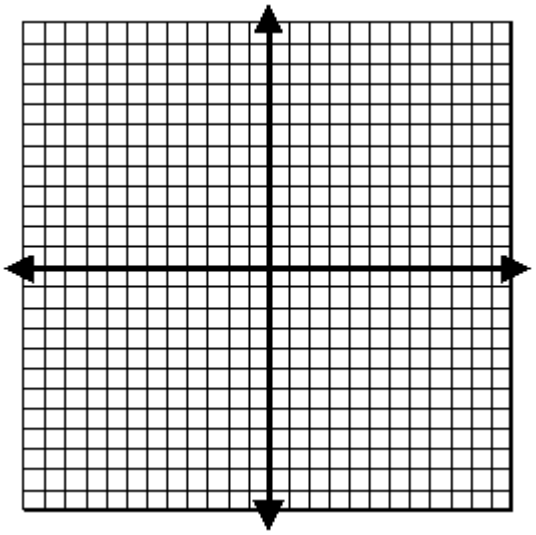


Graph $y = -2x + 3$.



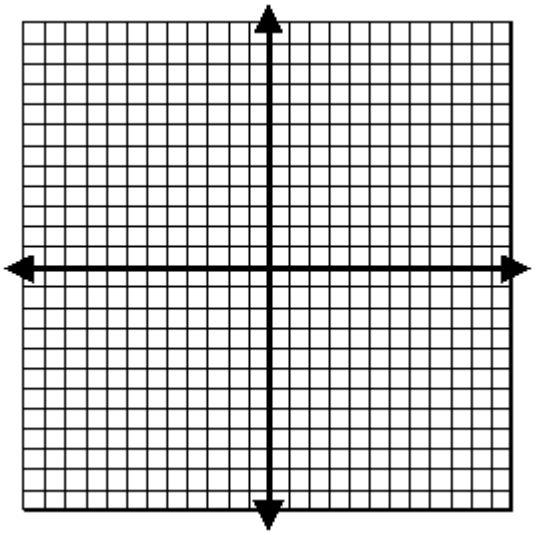
Example: Graph

$$y = \frac{4}{3}x + 5$$



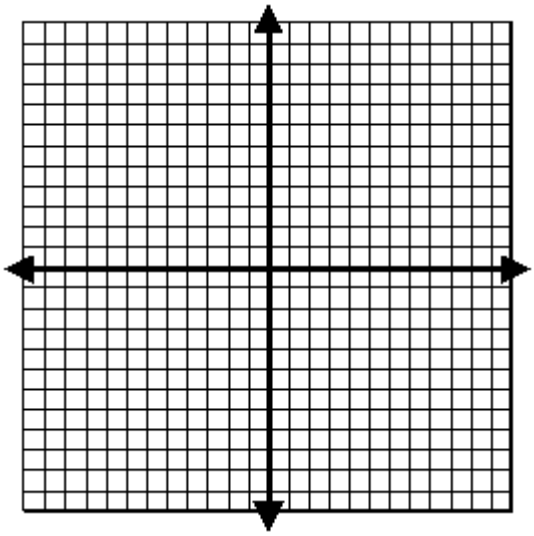
Example: Graph

$$f(x) = \frac{1}{4}x - 2$$



Example: Graph

$$y = -3x + 4$$

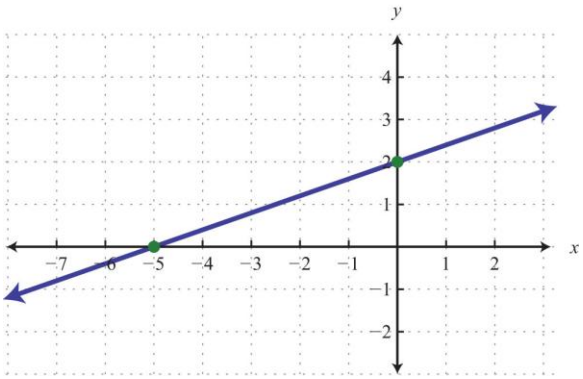


You can also graph lines by using the intercepts (the places where x and y = 0)

Plug in 0 for each variable, and see what the other one is.

EXAMPLE:

Graph 2x – 5y = -10

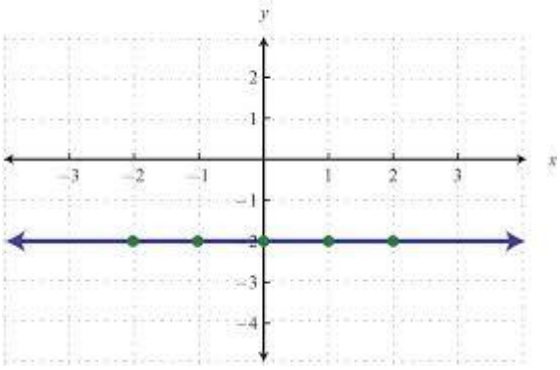


Horizontal and Vertical Lines

Horizontal lines

- Slope = 0
- … So, can be written in the form y = 0x + b
- This simplifies to just
  y = b
- Whenever an equation says y = #, the graph is a **horizontal** line through that number.

Graph y = -2

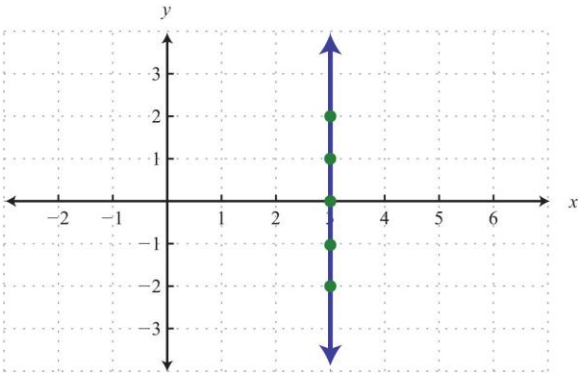


Vertical lines

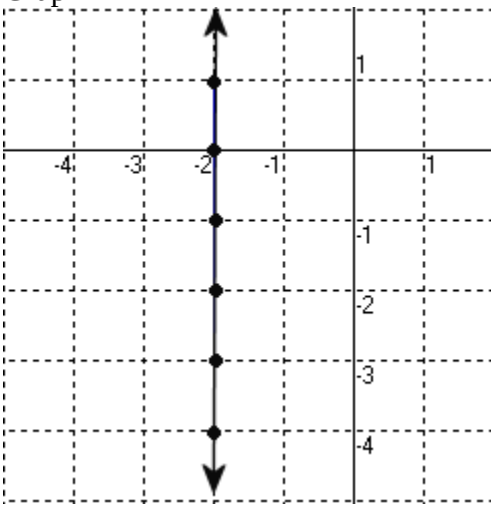
- Slope is **<u>undefined</u>**
- These are the only lines that **<u>CAN'T</u>** be written in the form y = mx + b.
- Vertical lines always have equations of the form
  x = #.

y = # → horizontal
x = # → vertical

Graph x = 3



Graph x = -2



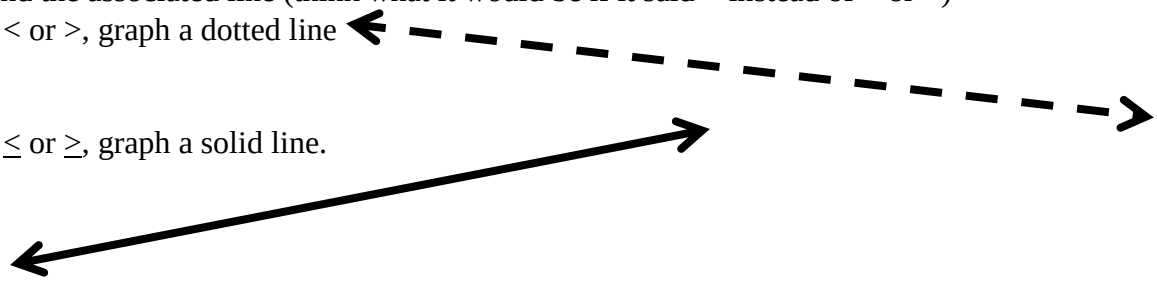
Linear inequalities

Example: $y < 3x - 1$

Example: $y \geq \frac{-2}{5}x + 7$

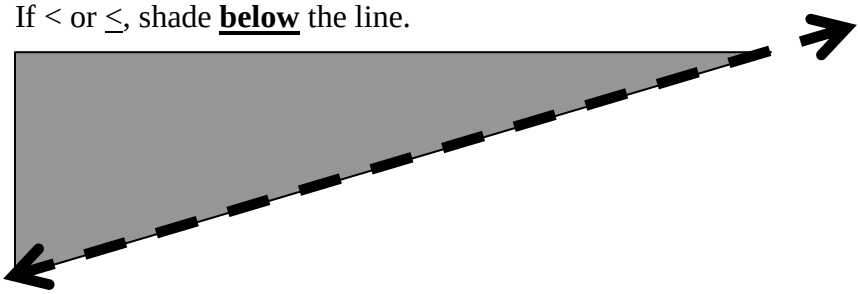
To graph:

- Find the associated line (think what it would be if it said = instead of < or >)
- If < or >, graph a dotted line



- If $\leq$ or $\geq$, graph a solid line.

- If < or $\leq$, shade **<u>below</u>** the line.



- Of > or $\geq$, shade above the line.