Intercepts & Slope (3.3, 3.4)

Note Title

So far, we've graphed linear functions by plotting points. We're now going to look more in depth at the equations of lines and their graphs.

Key ideas

- intercepts
- slope & rate of change

① If you work for comission and have a base salary, you can model this with a linear function. Say you make $200 per week, and 25% comission. Model this with a function.

FINDING x- AND y-INTERCEPTS

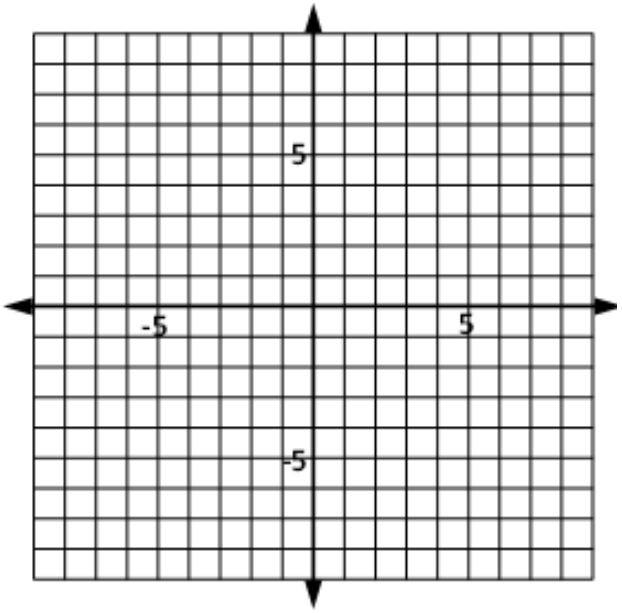
The x-coordinate of a point where a graph intersects the x-axis is an ***x*-intercept**. To find an x-intercept, let $y = 0$ in the equation and solve for x.

The y-coordinate of a point where a graph intersects the y-axis is a ***y*-intercept**. To find a y-intercept, let $x = 0$ in the equation and solve for y.

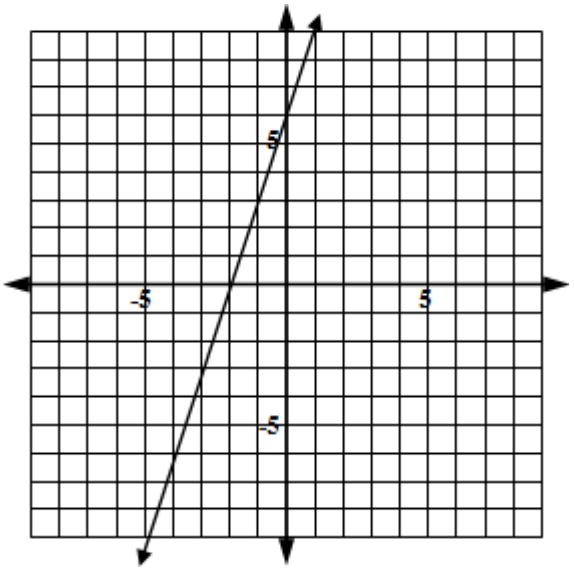
What are the intercepts of the previous example, and what do they represent?

(2) Find the x & y-intercepts (and graph).

a) $7x - 4y = -28$



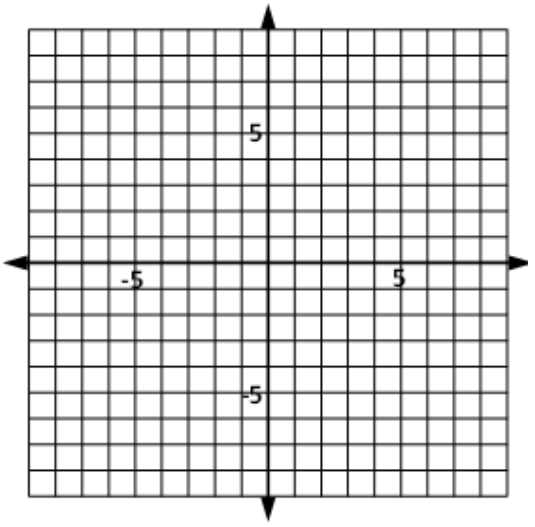
b)



(3) Graph (find intercepts?)

a) $y = 3$

b) $x = -4$



HORIZONTAL LINE

The equation of a horizontal line with y-intercept b is $y = b$.

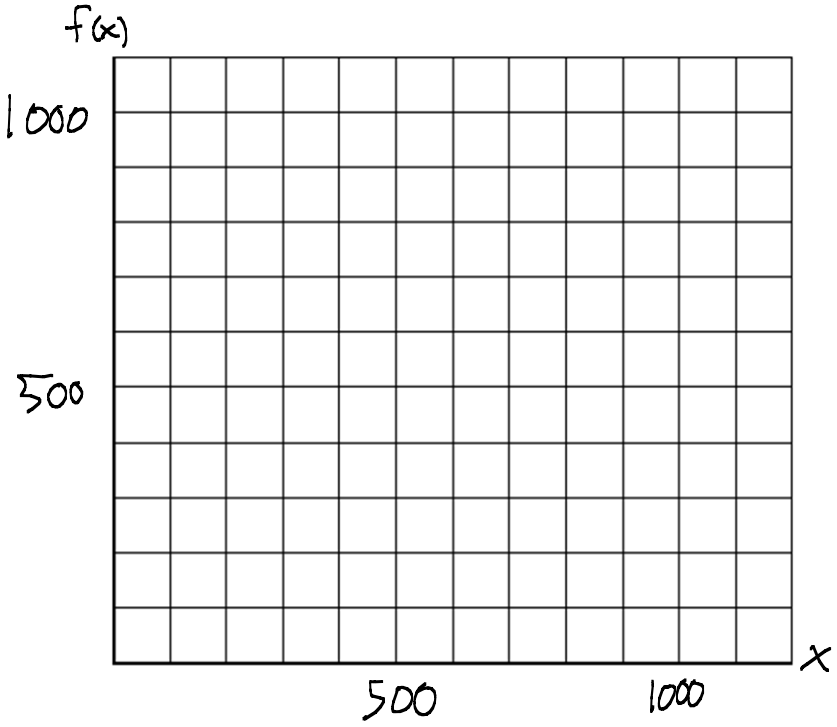
VERTICAL LINE

The equation of a vertical line with x-intercept k is $x = k$.

In the first example, the comission earned is the increase in your salary, the rate of change of your income. Every $100 sold, you earn $25. This rate of change is called _____.

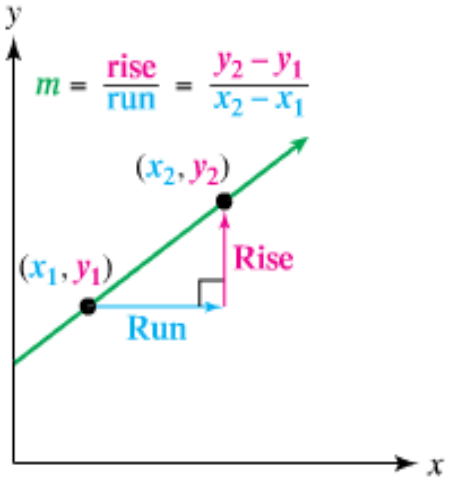
Graph

$f(x) = 200 + .25x$



Slope measures the _____ of the line.

We most commonly say "_____"



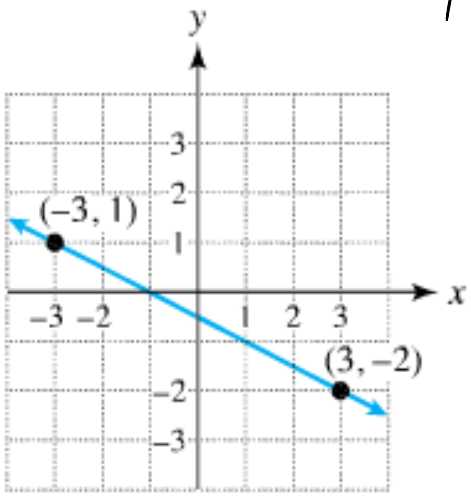
SLOPE

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

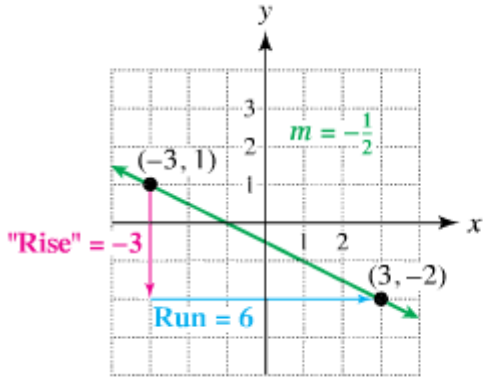
$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1},$$

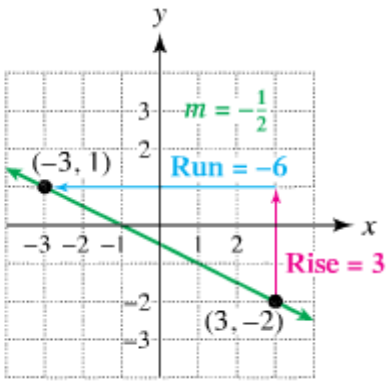
where $x_1 \neq x_2$. That is, slope equals rise over run.

④ Find the slope of the following.



How does negative slope translate?





Key point to remember:

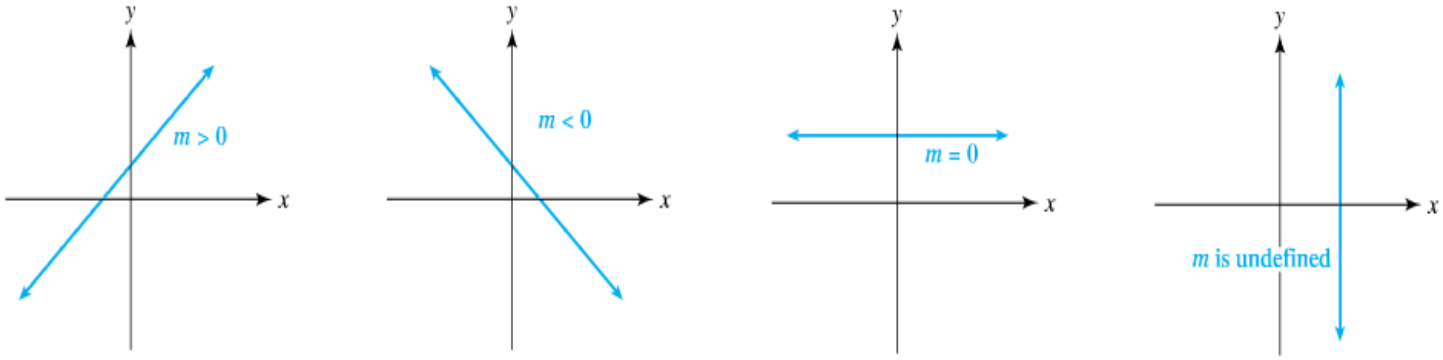
⑤ Find the slope of the line through the points.

a) $(-3,-4)$ & $(2,-2)$

b) $(-4,3)$ & $(1,-2)$

c) (3, 2) & (-2, 2)

d) (4, -5) & (4, -3)



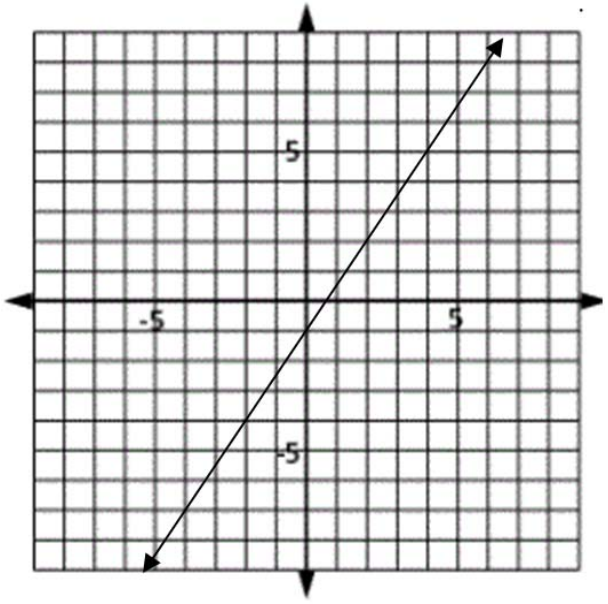
(a) Positive Slope (b) Negative Slope (c) Zero Slope (d) Undefined Slope

SLOPE OF A LINE

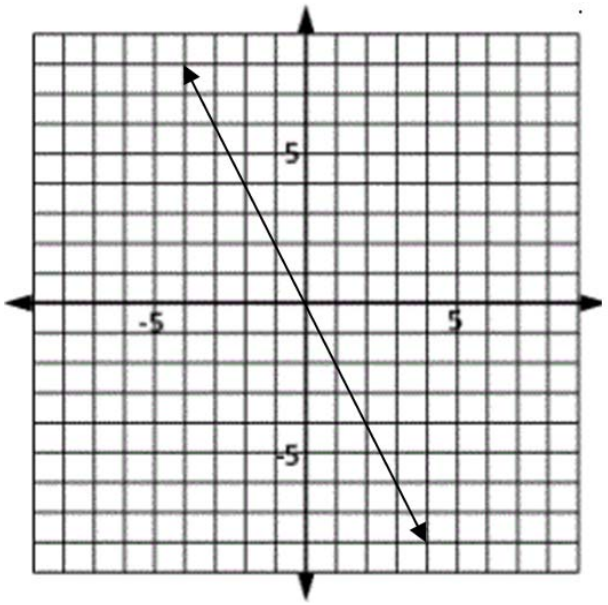
1. A line that rises *from left to right* has positive slope.
2. A line that falls *from left to right* has negative slope.
3. A horizontal line has slope 0.
4. A vertical line has undefined slope.

⑥ Find the slope of the line.

a)



b)



7) A company makes a profit of $1250 when it sells 500 shirts, and $3000 when it sells 1000 shirts.

a) Find the slope of this data.

b) interpret the slope in real world terms.