Algebra 1 3.3

Use rate of change to solve problems *8th grade standard

Find the slope of a line*

rate of change

slope $m = \frac{\text{rise}\ (y\text{'s})}{\text{run}\ (x\text{'s})}$ ± →

positive slope

negative slope

zero slope

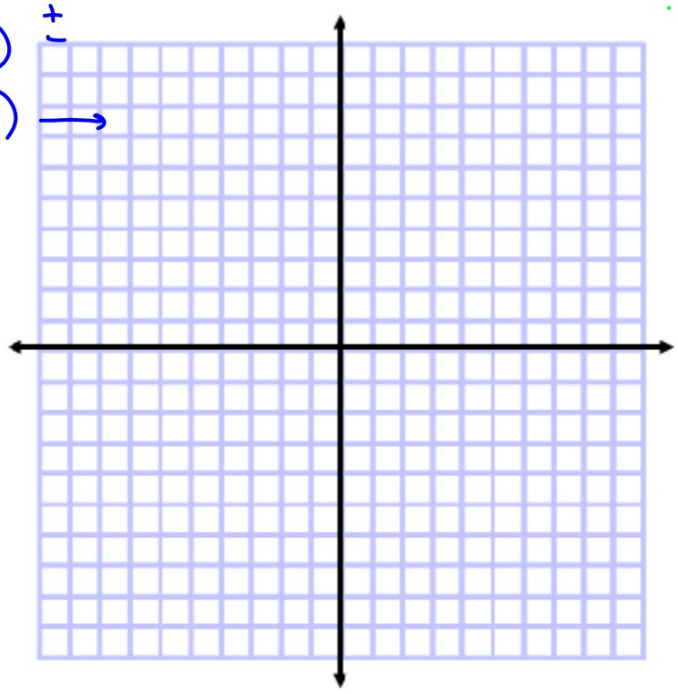
undefined slope

constant stay the same (number)

linear

whiteboards

slope song



1 Rate of Change

Rate of change is a ratio that describes, on average, how much one quantity changes with respect to a change in another quantity.

KeyConcept Rate of Change

If x is the independent variable and y is the dependent variable, then

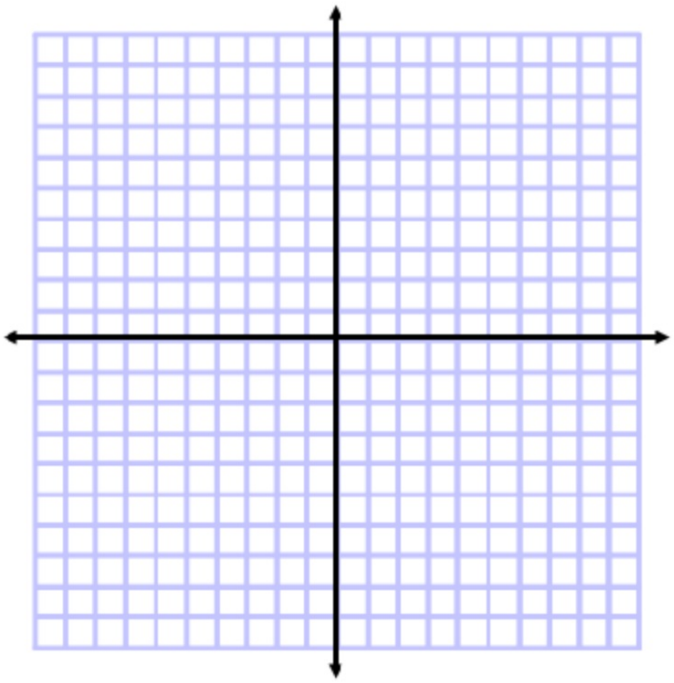
$$\text{rate of change} = \frac{\text{change in } y}{\text{change in } x}.$$

Whiteboards

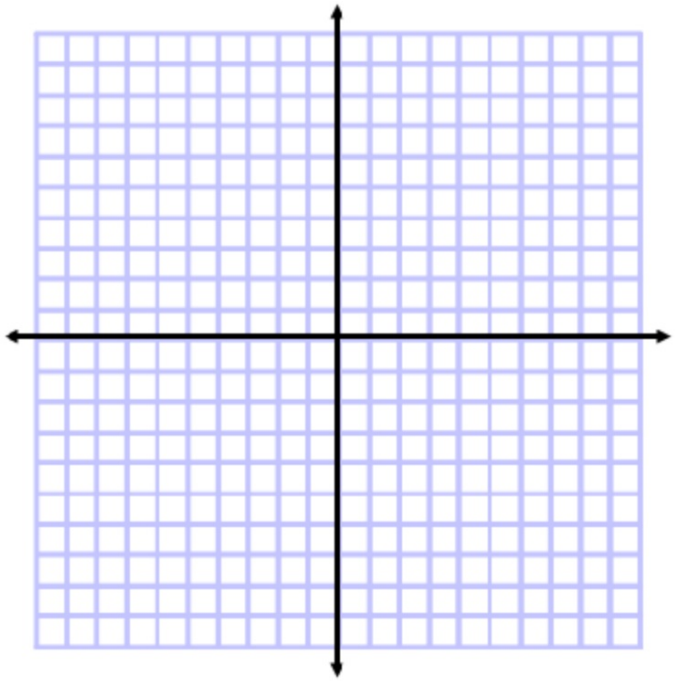
Example 4 Positive, Negative and Zero Slope

Find the slope of a line that passes through each pair

a. $(-2, 0)$ and $(1, 5)$



b. $(-3, 4)$ and $(2, -3)$

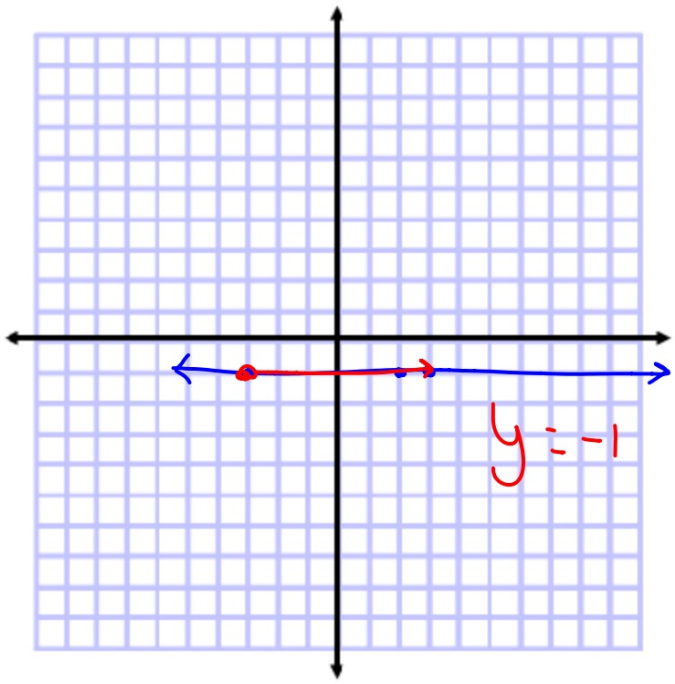


c. $(-3, -1)$ and $(2, -1)$

$m = \frac{0}{6} = 0$

horizontal

$y =$ constant



$y =$ constant

$y = -1$

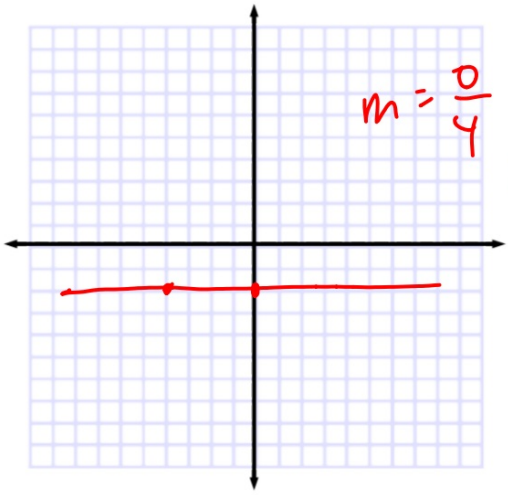
GuidedPractice

Find the slope of the line that passes through each pair of points.

4A. (3, 6), (4, 8)

4B. (−4, −2), (0, −2)

4C. (−4, 2), (−2, 10)



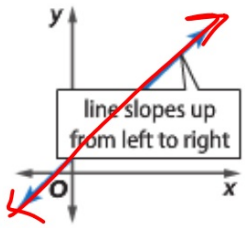
$$m = \frac{5}{0} = 0 \text{ :(}$$

$$= \text{error} \text{ :(}$$

$$= \text{undefined} \text{ :)}$$

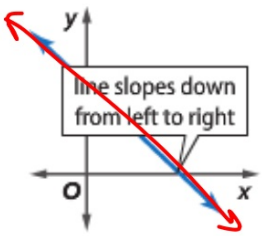
ConceptSummary Slope

positive slope



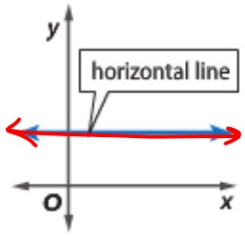
The function values are increasing over the entire domain.

negative slope



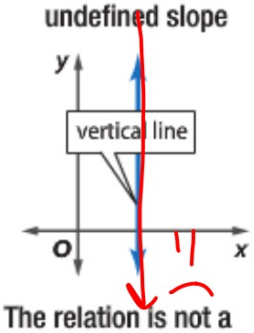
The function values are decreasing over the entire domain.

slope of 0



The function values are constant over the entire domain.

undefined slope

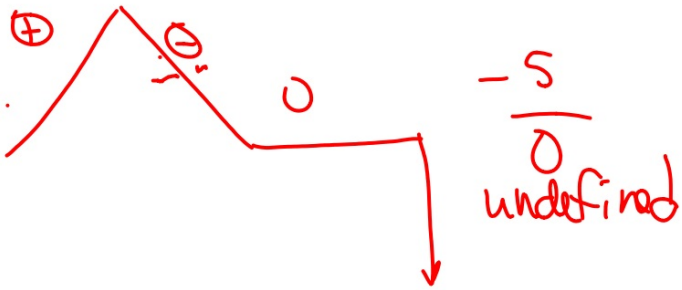


The relation is not a function.

$x = \text{constant}$

$x = 3$

Special case: horizontal line
vertical line



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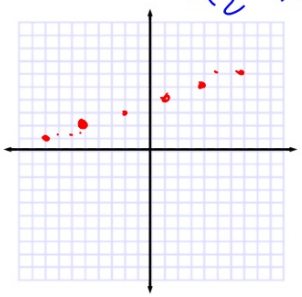
(6) $(1,4)\ (-5,r)$ $m = \frac{1}{3}$

2 ?

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad \frac{1}{3} = \frac{r-4}{-5-1}$



$\frac{1}{3} = \frac{r-4}{-6}$

$-6 = 3r - 12$

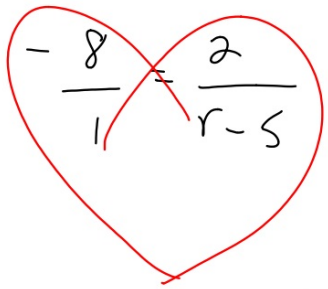
$+12 \qquad +12$

$\frac{6}{3} = \frac{3r}{3}$

$r = 2$

$(5, -8)$ $(r, -6)$ $m = -8$

$$\frac{-8}{1} = \frac{-6+8}{r-5}$$



$$\frac{-8}{1} = \frac{2}{r-5}$$

$$2 = -8(r-5)$$

$$2 = -8r + 40$$

$$-40 \qquad -40$$

$$\frac{-38}{-8} = \frac{-8r}{-8}$$

$$r = 4\frac{3}{4} = \frac{19}{4} = \frac{-19}{-4}$$