

4.2 Slope of a Line p.150

Slope is the **rate of change** between any two points on a straight line. It is represented by the letter **m**

It measures the **steepness** of a line.

- ✓ It is written as a **fraction** b/c it is a **ratio** of the change in y (rise) to the change in x (run) between any two points on a line
- ✓ A **steeper** line indicates a **greater** rate of change (larger number)
- ✓ A **less steep** line indicates a **smaller** rate of change (smaller number)
- ✓ Since slope is a rate of change, it can be **positive** (slanted upward) or **negative** (slanted downward)

To find the slope of a line, find the ratio of the **change in Y** to the **change in X** .

$$\frac{\text{rise}}{\text{run}} \quad \begin{array}{c} \updownarrow \\ \text{(rise over run)} \end{array} \quad \begin{array}{c} \longleftrightarrow \\ \end{array} \quad \boxed{\frac{y}{x}}$$

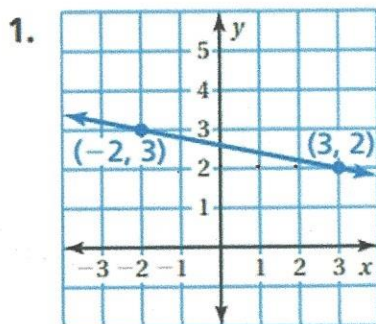
*always reduce
 *leave improper
 *whole numbers can be written as is
 ex: $5/1 = 5$

1. How to find the slope from a graph:

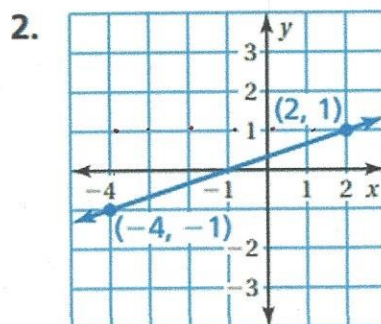
$$\frac{\text{Count how many units up}}{\text{Count how many units across}} = \frac{\text{rise}}{\text{run}} = \frac{y}{x}$$

- ✓ Look to see if it's positive or negative

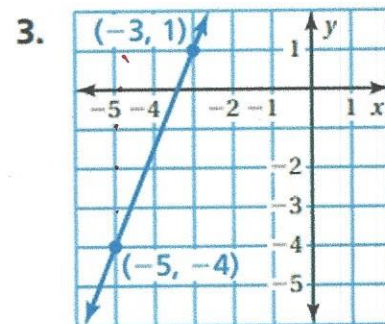
Find the slope of the line.



$$-\frac{1}{5}$$

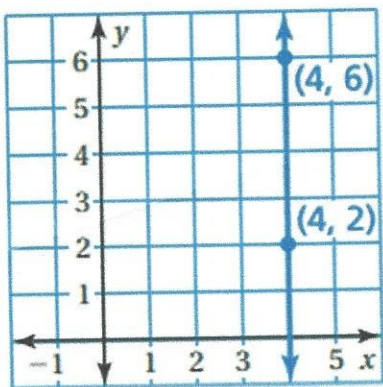


$$\frac{2}{6} = \boxed{\frac{1}{3}}$$



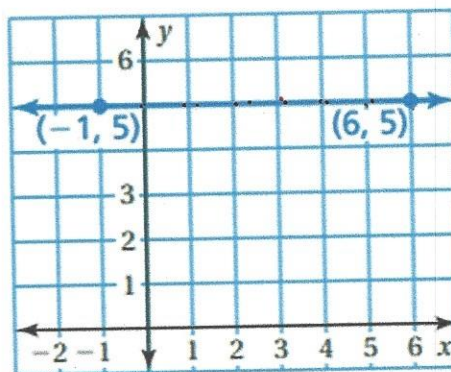
$$\frac{5}{2}$$

Special Slopes:



$$\frac{\text{rise}}{\text{run}} = \frac{4}{0}$$

Vertical line is undefined
b/c division by 0 is undefined
(no slope)



$$\frac{\text{rise}}{\text{run}} = \frac{0}{7} = 0$$

Horizontal line is 0

2. Finding the slope b/w 2 points (w/o graphing)

1) $(-3, -1), (3, 4)$

2) $(-1, 1), (1, -2)$

3) $(2, -5), (2, 7)$

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

1) $\frac{x}{y}$

-3	-1
3	4

$$\frac{-1 - 4}{-3 - 3} = \frac{-5}{-6} = \boxed{\frac{5}{6}}$$

2) $\frac{x}{y}$

-1	1
1	-2

$$\frac{1 - (+2)}{-1 - 1} = \boxed{\frac{3}{-2}}$$

3) $\frac{x}{y}$

2	-5
2	7

$$\frac{-5 - 7}{2 - 2} = \frac{-12}{0}$$

Reading

In the slope formula, x_1 is read as "x sub one," and y_2 is read as "y sub two." The numbers 1 and 2 in x_1 and y_2 are called *subscripts*.

Find the slope of the line through the given points.

4. $(1, -2), (7, -2)$ \mathcal{Q}

5. $(-2, 4), (3, 4)$ \mathcal{Q}

6. $(-3, -3), (-3, -5)$ undefined

7. $(0, 8), (0, 0)$ undefined

8. How do you know that the slope of every horizontal line is 0? How do you know that the slope of every vertical line is undefined?

b/c the change in y is \mathcal{Q}

b/c the change in x is \mathcal{Q}

undefined

3. Finding the slope from a ratio table

Choose 2 ordered pairs

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

x	1	3	5	7
y	2	5	8	11

$$\frac{11 - 8}{7 - 5} = \boxed{\frac{3}{2}}$$

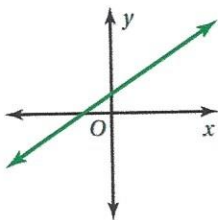
x	-3	-2	-1	0
y	6	4	2	0

$$\frac{2 - 0}{-1 - 0} = \frac{2}{-1} = \boxed{-2}$$

Summary

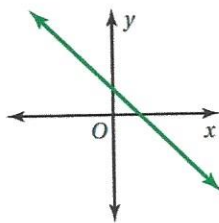
Slope

Positive Slope



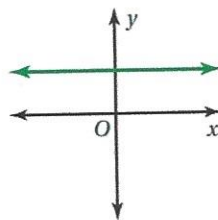
The line rises from left to right.

Negative Slope



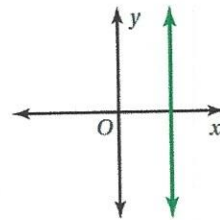
The line falls from left to right.

Slope of 0



The line is horizontal.

Undefined Slope



The line is vertical.