

Chapter 6: Linear Functions

- Rate of Change = Slope
- Graphing Linear Equations:
 - Slope-intercept Form
 - Slope-Point Form
 - General Form

What is slope?

Previously we had been working with:

$$\text{rate of change} = \frac{\text{Change in dependent variable, } y,}{\text{Change in independent variable, } x.}$$

This rate of change can also be called the slope.

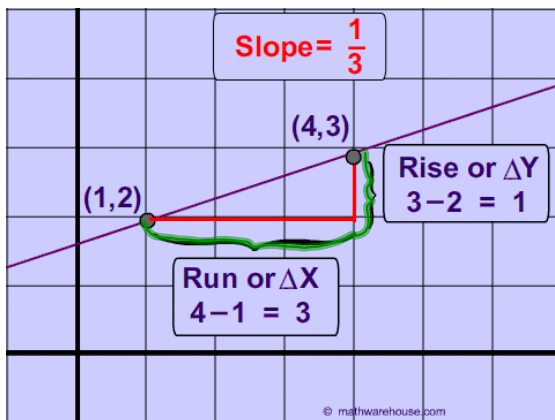
Change in the y values as the “rise”
and the change in the x values = “run”.

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta Y}{\Delta X}$$

$$\text{run } \frac{y_2 - y_1}{x_2 - x_1} \Delta X$$



Practice calculating the slope:

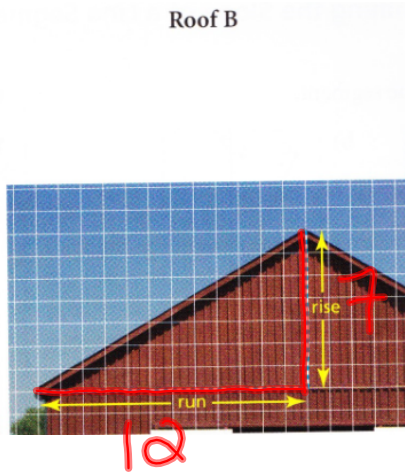


Steepness of a Roof

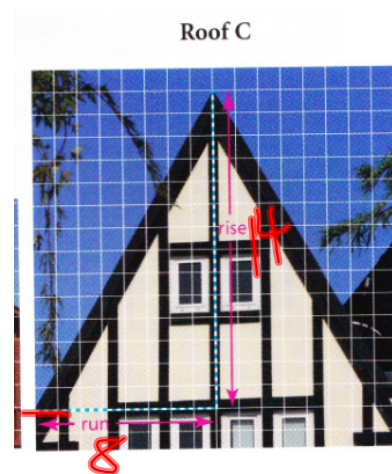
Which one is the steepest? Least steep?
Which one would have the largest slope?



$$\begin{aligned} \text{Slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{13}{13} = 1 \end{aligned}$$



$$\begin{aligned} \text{Slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{7}{12} \\ &= 0.52 \end{aligned}$$



$$\begin{aligned} \text{Slope} &= \frac{\text{rise}}{\text{run}} \\ &= \frac{14}{8} \\ &= 1.75 \end{aligned}$$

What will give us a larger slope?

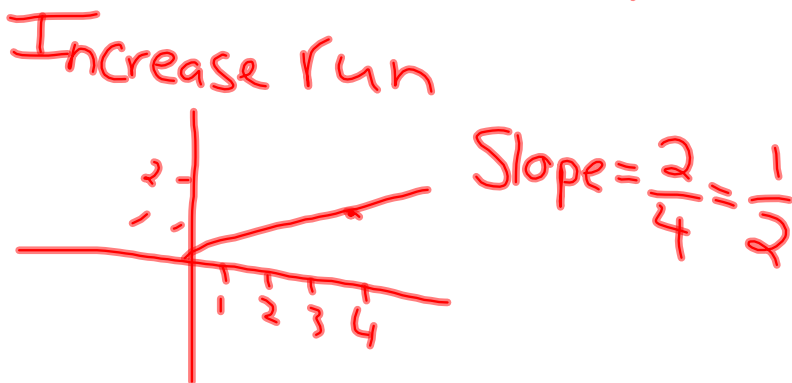
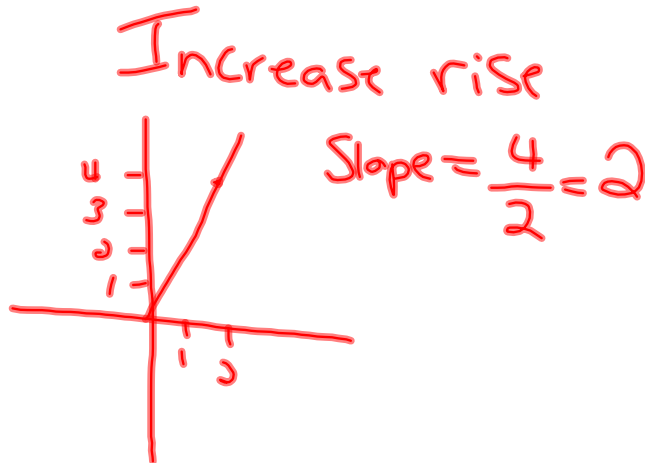
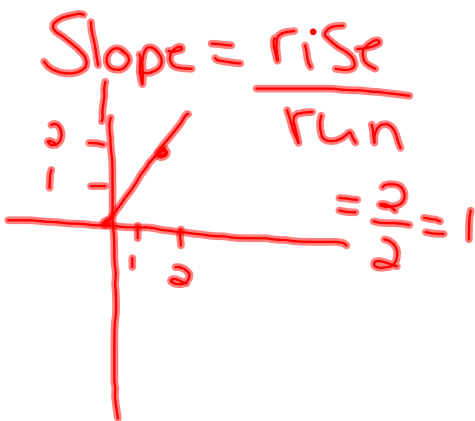
Think rise/run.

Which one do you want to be larger for a larger slope, the rise or the run?

As Numerator (**rise**) increases, the slope increases

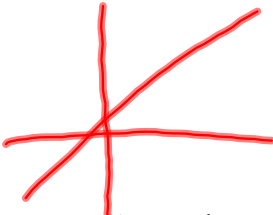
As denominator (**run**) increases, the slope decreases.

For a larger slope we want a larger numerator, Larger Rise



Types of slope:

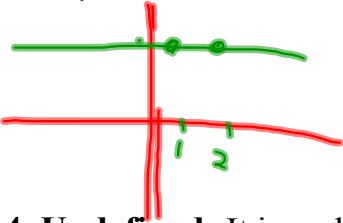
1. **Positive:** Line will go up and to the right. Example: slope of a roof



2. **Negative:** Line will go down and to the right. Example: Slope of a wheelchair ramp.

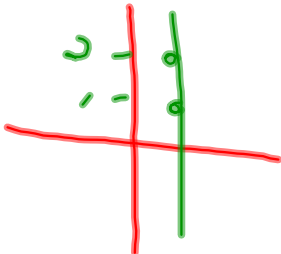


3. **Slope=0:** The slope is only zero if there is no change in the y values or the rise. Zero divided by any number is equal to 0. Example: Horizontal Line, the floor



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{0}{1} = 0$$

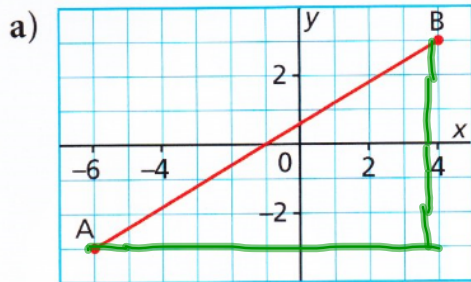
4. **Undefined:** It is undefined because the run or change in the x values is 0, no number can be divided by 0. Therefore the slope is undefined. Example: Vertical line, vertical edge of a door frame.



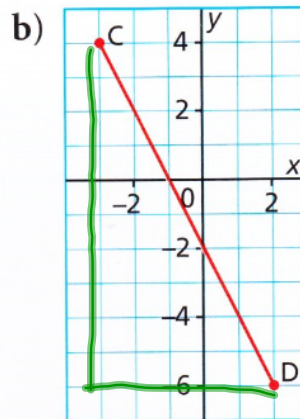
$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{1}{0} = \text{undefined}$$

Determining the slope of a line segment:

Determine the slope of each line segment.



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{5}{10} = \frac{1}{2}$$



$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{-10}{5} = -2$$

Determining the Slope given two points on a line:

Determine the slope of a line that passes through the points
C(-5, -3) and D(2, 1)

$$\begin{array}{l}
 (x_1, y_1) \quad (x_2, y_2) \quad \text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} \quad (x, y) \\
 = \frac{1 - (-3)}{2 - (-5)} = \frac{4}{7}
 \end{array}$$

E(4, -5) and F(8, 6)

$$\begin{array}{l}
 (x_1, y_1) \quad (x_2, y_2) \quad \text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} \\
 = \frac{6 - (-5)}{8 - 4} = \frac{11}{4}
 \end{array}$$

Homework

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