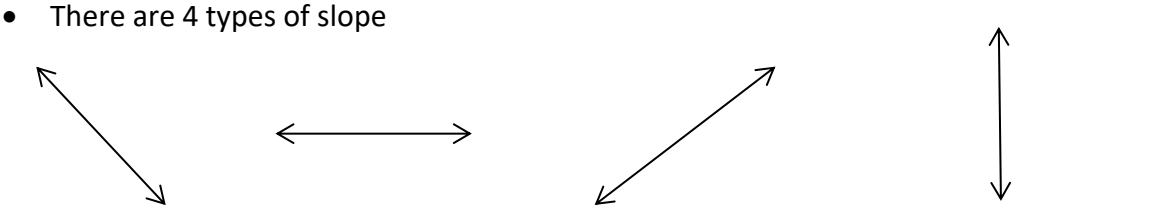
Section 2.3 – Slope

Slope

- The slope of a linear equation describes the steepness and direction of a line
- As a line is traced from left to right the slope is the vertical change relative to the horizontal change
- There are 4 types of slope



Negative Zero Positive Undefined

Finding slope from a graph

Slope (m)

$$m = \frac{vertical\ change}{horizontal\ change} = \frac{rise}{run} = \frac{change\ in\ y}{change\ in\ x}$$

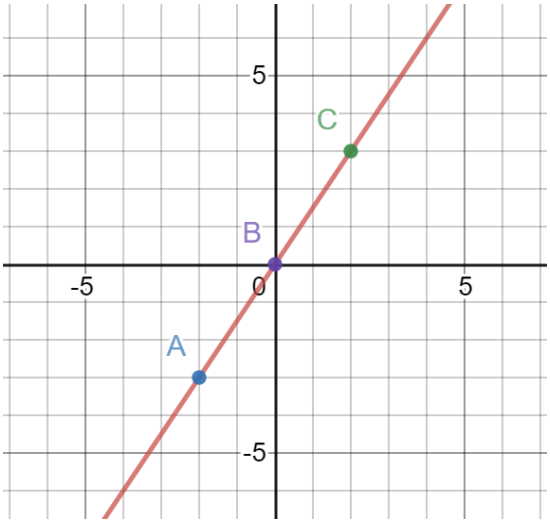
- **Slope is Constant** (it does not change)
- The word **Pitch** is also used when referring to the slope of something like a roof

Example of positive slope

Slope of segment AB $= \frac{vertical\ change}{horizontal\ change} = \frac{3}{2}$

Slope of segment AC $= \frac{vertical\ change}{horizontal\ change} = \frac{6}{4} = \frac{3}{2}$

- It doesn't matter where you start measuring, the slope of a straight line is constant between any two points you pick
- The Slope does not change!



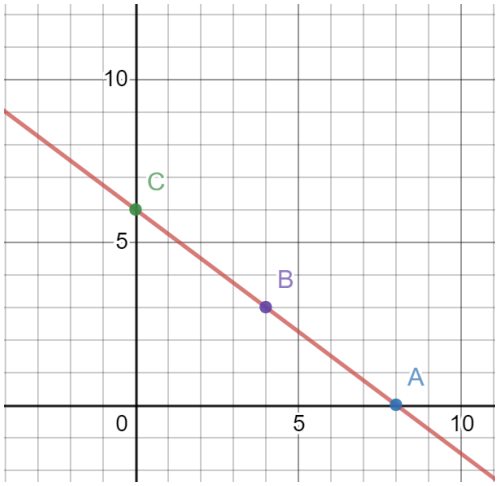
Example of negative slope

Slope of segment CB $= \frac{vertical\ change}{horizontal\ change} = \frac{-3}{4} = -\frac{3}{4}$

Slope of segment CA $= \frac{vertical\ change}{horizontal\ change} = \frac{-6}{8} = -\frac{3}{4}$

Slope of segment AB $= \frac{vertical\ change}{horizontal\ change} = \frac{3}{-4} = -\frac{3}{4}$

- It doesn't matter where you start measuring, the slope of a straight line is constant between any two points you pick
- The Slope does not change!



Finding Slope from Ordered Pairs

Slope Formula

The slope, m, of a line segment between two points (x_1, y_1) and (x_2, y_2) is

$$\boldsymbol{m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{vertical\ change}{horizontal\ change}}$$

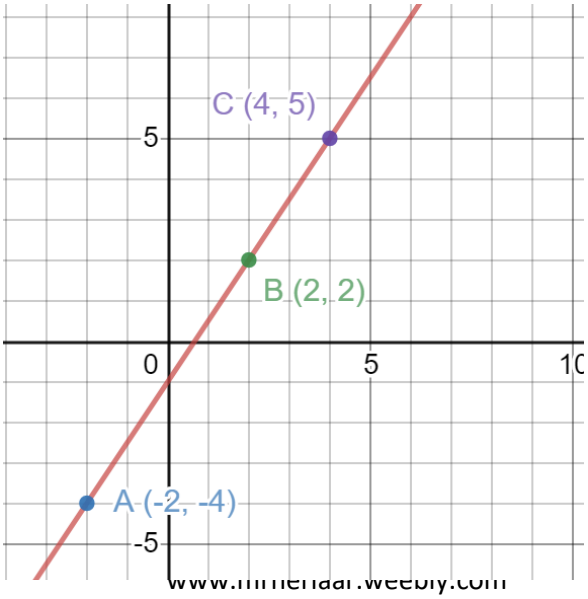
Point 1 Point 2

Example of positive slope

Slope of segment AB $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-(-4)}{2-(-2)} = \frac{6}{4} = \frac{3}{2}$

Slope of segment AC $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-(-4)}{4-(-2)} = \frac{9}{6} = \frac{3}{2}$

Slope of segment BC $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{5-2}{4-2} = \frac{3}{2}$

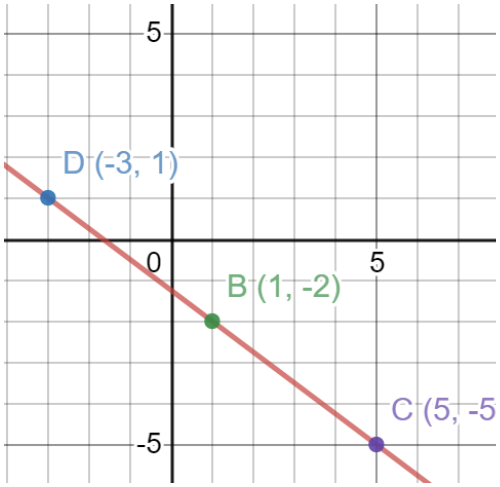


Example of negative slope

Slope of segment DE $= \frac{y_2-y_1}{x_2-x_1} = \frac{(-2)-1}{1-(-3)} = \frac{-3}{4} = -\frac{3}{4}$

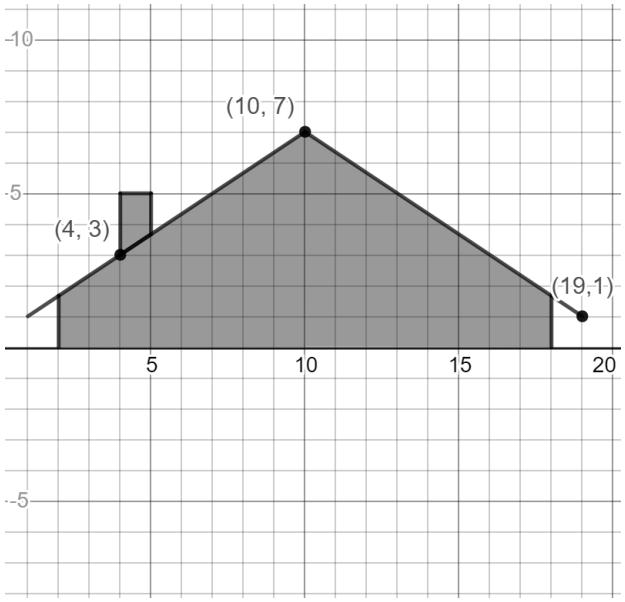
Slope of segment DF $= \frac{y_2-y_1}{x_2-x_1} = \frac{(-5)-1}{5-(-3)} = \frac{-6}{8} = -\frac{3}{4}$

Slope of segment EF $= \frac{y_2-y_1}{x_2-x_1} = \frac{(-5)-(-2)}{5-1} = \frac{-3}{4} = -\frac{3}{4}$



- The order you pick the points will not change the outcome. The Slope will be the same either way
- Switch the points and give it a try!

Example 1: Daryl is a carpenter. She drew a plan for a roof of a house on grid paper. What is the slope of the roof on either side?



Solution 1:

Slope (Pitch) of the left side:

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{7-3}{10-4} = \frac{4}{6} = \frac{2}{3}$$

Slope (Pitch) of the right side:

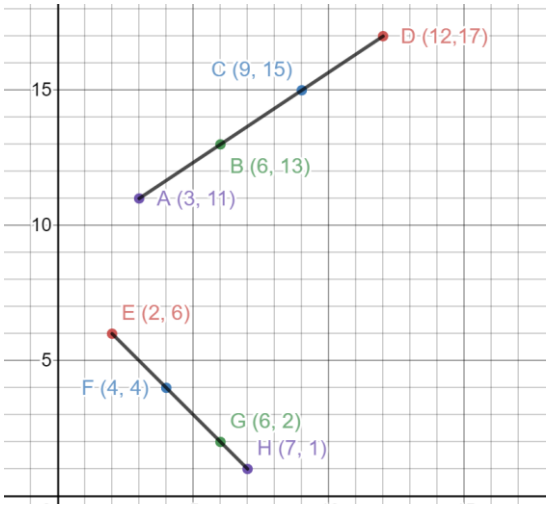
$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{1-7}{19-10} = \frac{-6}{9} = -\frac{2}{3}$$

The Pitch (slopes) of either side of the roof is the same. The change is in the positive/negative value of the slope.

Section 2.3 – Practice Problems

1. Ryder is reviewing the schematics for his roofing project. He drew the two roof sections on the grid (See Below). He needs to check to see if the pitch of the roof is constant. Use the table below to check, what changes may be needed?

Line Segment	Rise	Run	Slope
AD			
BC			
EH			
FG			



Work Space if required:

2. What is the slope of the line segment that joins the pair of points?

a) $(4, 1)\ and\ (-6, -2)$

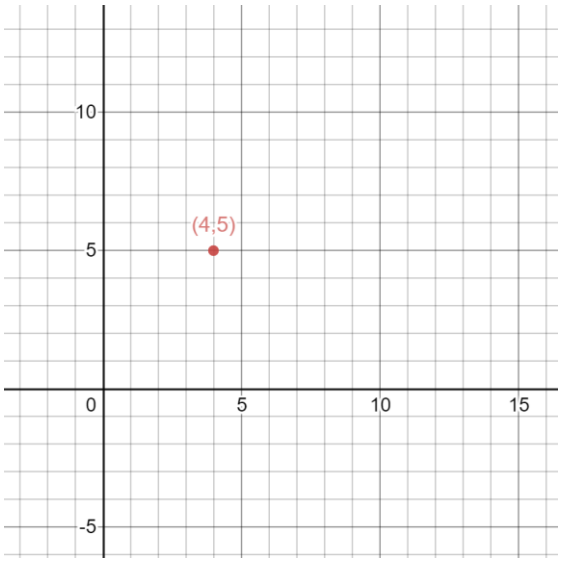
b) $(-9, 3)\ and\ (5, -7)$

c) $(5, -2)\ and\ (6, 1)$

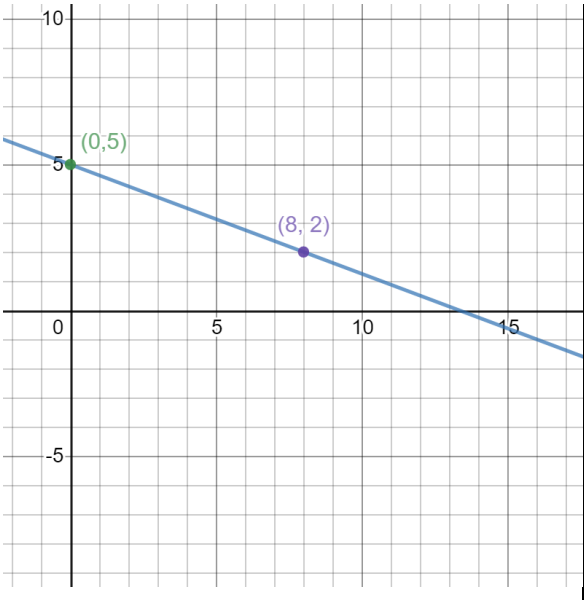
d) $(-4, -1)\ and\ (6, 2)$

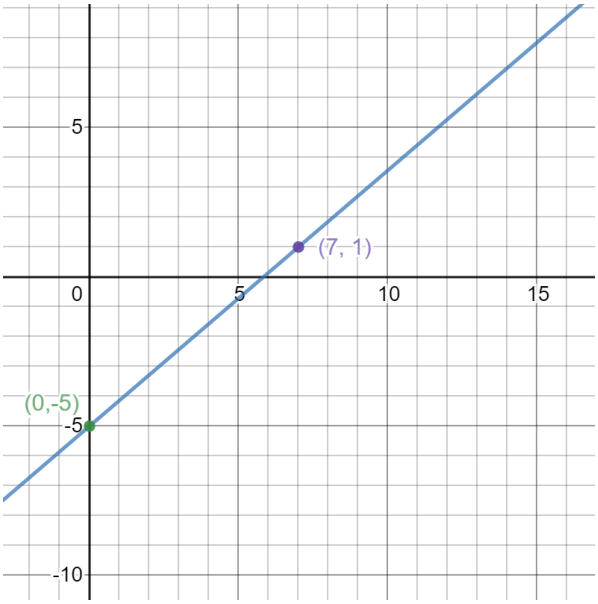
3. Draw a straight line through the point $(4, 5)$ with a slope of: $\frac{-4}{7}$. Mark that point on the line.

   Repeat from the original point but using a slope of: $\frac{4}{-7}$. Do the point line up? Why does this work?



4. What is the slope of the following lines?





Slope:

Slope:

5. Create a drawing on the grid provided. Identify at least 6 different lines and tell me their slopes.

Line Segment #1 Slope:	Line Segment #2 Slope:	Line Segment #3 Slope:
Line Segment #4 Slope:	Line Segment #5 Slope:	Line Segment #6 Slope:

Section 2.3 – Answer Key

1. $AD = \frac{2}{3}$ $BC = \frac{2}{3}$ $EH = -1$ $FG = -1$
2. a) $\frac{3}{10}$ b) $-\frac{5}{7}$ c) 3 d) $\frac{3}{10}$
3. See Website Copy; Yes they line up. It works because it does not matter if the negative is in the numerator or denominator, as long it is only on one of them. Either way the slope is negative
4. $-\frac{3}{8}$ and $\frac{6}{7}$
5. Answers Will Vary – Have fun with It