

Lesson Three – Slope

Slope is used to describe steepness:

- Skier (slope of a run)
- House (roof creates a slope)
- Ramps
- Roads

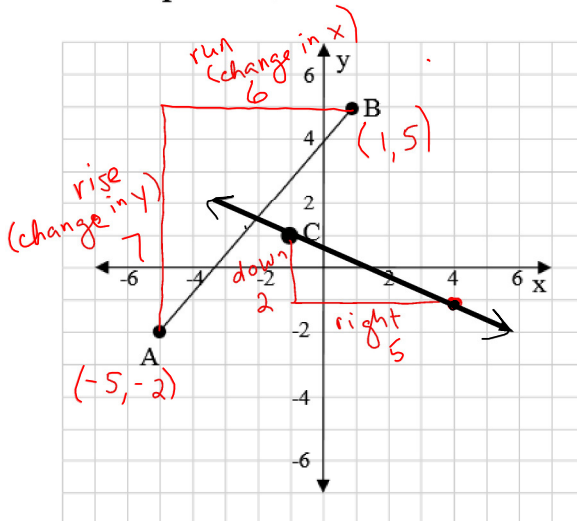
Recall:

$$\text{Slope} = \frac{\overset{(m)}{\text{rise}}}{\text{run}} = \frac{\text{vertical change}}{\text{horizontal change}} \quad \begin{matrix} \text{(change in } y\text{)} \\ \text{(change in } x\text{)} \end{matrix}$$

Find the slope of line AB.

$$\begin{aligned} \text{Slope} &= \frac{\text{rise}}{\text{run}} \\ m &= \frac{7}{6} \end{aligned}$$

From point C, draw a line that has a slope of $-\frac{2}{5}$.



$$\frac{\text{rise}}{\text{run}} = \frac{-2}{5} \quad \begin{matrix} \leftarrow \text{down } 2 \\ \leftarrow \text{right } 5 \end{matrix}$$

Slope Formula

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

← change in y (subtract y -values)
 ← change in x (subtract x -values)

Determine the slope of AB for each of the following points:

a) $A(1, 4), B(5, 7)$

$$m = \frac{7-4}{5-1} = \frac{3}{4}$$

$m > 0$
line rises to the right

b) $A(1, 4), B(5, 2)$

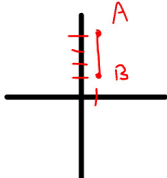
$$m = \frac{2-4}{5-1} = \frac{-2}{4} = -\frac{1}{2}$$

$m < 0$
line falls to the right

c) $A(1, 4), B(1, 1)$

$$m = \frac{1-4}{1-1} = \frac{-3}{0}$$

← can't divide by 0
∴ slope is undefined



d) $A(1, 4), B(5, 4)$

horizontal line segment
 $m = \frac{4-4}{5-1} = \frac{0}{4} = 0$

Conclusions

- 1) If $m > 0$ ^{positive} the line segment is oblique and rises to the right
- 2) If $m < 0$ ^{negative} the line segment is oblique and falls to the right
- 3) If $m = 0$ line segment is horizontal
- 4) If m is undefined (denominator = 0), the line segment is vertical

Example 1

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

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{1 - (-3)}{2 - (-5)} && \frac{1+3}{2+5} \\ &= \frac{4}{7} \end{aligned}$$

Example 2

If the slope of a line is 6 and passes through the points $(2, 5)$ and $(1, k)$, what are possible values of k ?

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

$$6 = \frac{k - 5}{1 - 2}$$

$$(-1) \quad 6 = \frac{k - 5}{-1} \quad (-1)$$

$$-6 = k - 5$$

$$-1 = k$$

Note:

$$m = 6$$

$$\frac{\text{rise}}{\text{run}} = \frac{6}{1}$$

Assignment: Pg 339; 5, 7 (a,c), 9 b, 13 a, 22

+ Assignment
Distance, Midpoint, Slope
1-8