Lesson 6.1: Slope of a Line

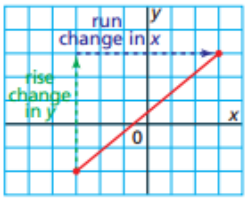
Specific Outcome: 3.1 – Determine the slope of a line segment by measuring/calculating rise and run. 3.2 – Classify lines in a given set as having positive or negative slopes. 3.3 – Explain the meaning of the slop of a horizontal or vertical line. 3.4 – Explain why the slope of a line can be determined by using any point on the line. 3.6 – Draw a line, given the slope and a point on the line. 3.7 – Determine another point on a line, given the slop and a point on the line. 3.9 – Solve a contextual problem involving slope. 5.2 – Determine the slope of the graph of a linear relation.

$$\text{Rate of change} = \frac{\text{change in dependent variable}}{\text{change in independent variable}}$$

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

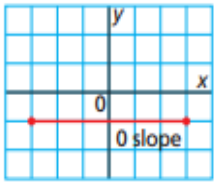
The change in y is the rise.
The change in x is the run.

$$\text{So, slope} = \frac{\text{rise}}{\text{run}}$$



PROPERTIES OF SLOPES:

- **Positive Slope –** line goes ***up*** to the right, so rise and run are both positive
- **Negative Slope –** line goes ***down*** to the right, so the rise is negative but the run is positive
- **Horizontal Line –** the change in y is 0 and x increases, so horizontal lines have ***slope = 0***
- **Vertical Line –** y increases and the change in x is 0, so vertical lines have ***slope = undefined***



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

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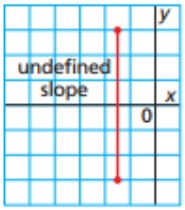

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

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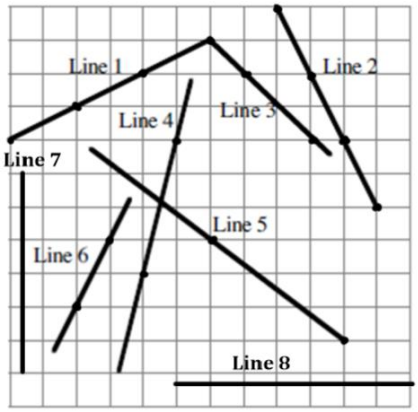
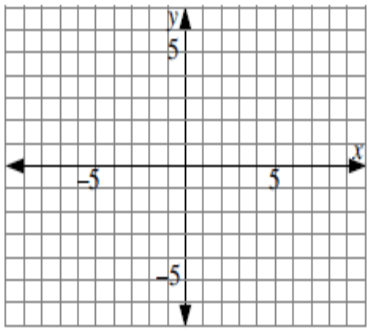
Practice: Determine the slope of each segment, in ***simplest terms***. Use the letter $\boldsymbol{m}$ for slope.



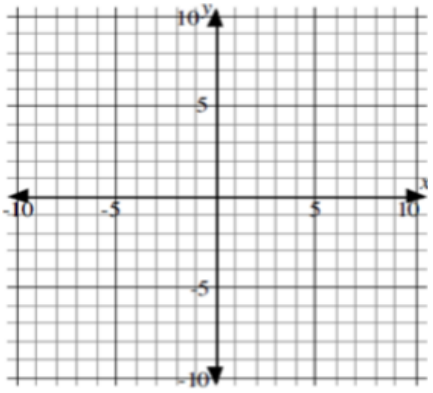
Line 1: $m = \frac{rise}{run} =$

DRAW A LINE GIVEN SLOPE AND A POINT

Draw a line that passes through the point (-4,2) and has a slope $-\frac{2}{3}$. Determine another point on the line.



Practice: Use the graph to draw the following lines, given the slope and a point for each line. Label each line on the graph.



a) Line 1: $m = 2$ *passing through point* $(-5,-2)$

b) Line 2: $m = -\frac{3}{2}$ *passing through* $(8,0)$

c) Line 5: $m = 0$ *passing through* $(3,3)$

d) Line 6: m *is undefined with point* $(-4,9)$

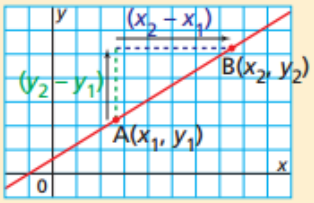
DRAW A LINE GIVEN 2 POINTS: *SLOPE FORMULA*

- The slope of a line may be calculated when 2 points are given on the line:

Slope of a Line

A line passes through $A(x_1, y_1)$ and $B(x_2, y_2)$.

Slope of line AB $= \frac{y_2 - y_1}{x_2 - x_1}$



A line passes through the points A(-3,8) and B(7,-2). Determine the slope of the line.

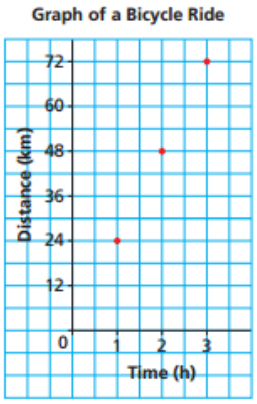
$m = \frac{y_2 - y_1}{x_2 - x_1} =$

Practice: Use the slope formula to calculate the slope of the lines with the given points.

a) C(0,2) D(12,-2) b) S(-4,5) T(8,-6) c) E(-5,3) F(-11,-7) d) Y(-19,-7) Z(-20,-30)

INTERPRETING THE SLOPE OF A LINE

Yvonne recorded the distances she travelled at certain times since she began her cycling trip along the Trans-Canada Trail. She plotted some data on a grid.



1. What is the slope of the line through these points?

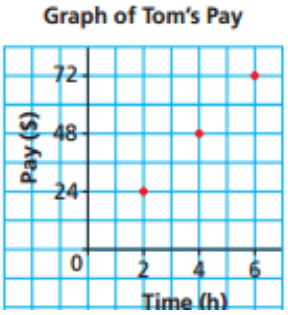
2. What does the slope represent?

3a) How far did Yvonne travel in $1\frac{3}{4}$ hours?

b) How long did it take for Yvonne to travel 60 km?

Practice:

1. Tom has a part-time job. He recorded the hours he worked and his pay for 3 different days. Tom plotted these data on a grid.



a. What is the slope of the line through these points?

b. What does the slope mean?

c. How much did Tom earn in $3\frac{1}{2}$ hours?

d. How long did it take Tom to earn $30?

2. The point $(-4, 0)$ is on a line which has a slope of $-\frac{2}{5}$. The next point with integer coordinates on the line to the right of $(-4, 0)$ is

A. $(-9, -2)$
B. $(-9, 2)$
C. $(1, -2)$
D. $(-2, -5)$

3. The slope of the line passing through $(a, 3)$ and $(-3, -2)$ is $\frac{5}{4}$. The value of a is _____.

HOMEWORK: P. 339 – 4, 6(ad), 7, 8, 11, 13(a), 15, 17, 21(a), 24