**Slope**
Lesson 1.8

**Slope** - the rate of change between any 2 points on a line
(the steepness of a line)

\[ \text{slope} = \frac{\text{change in } y}{\text{change in } x} \]

- vertical change
- horizontal change

\[
\frac{\text{rise}}{\text{run}} = \frac{3}{2}
\]
Example

1. The table below shows the relationship between the number of seconds \( y \) it takes to hear thunder after a lightning strike and the miles \( x \) you are from the lightning. Graph the data and find the slope. Explain what the slope represents.

<table>
<thead>
<tr>
<th>Miles ((x))</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seconds ((y))</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
</tr>
</tbody>
</table>

Step 1: Graph the ordered pairs from the table.

\((x, y)\)

Step 2: Find the slope.

Method 1 – Count Rise & Run on Graph

a) Draw a right triangle between 2 points on the line (make sure your triangle follows the grid lines).

b) Count the rise (up/down) and the run (across) to make the fraction. Simplify if possible.

\[
\frac{\text{rise}}{\text{run}} = \frac{10}{2} = \frac{5}{1}
\]
Method 2 – Use Slope Formula

\[
\text{slope} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}
\]

a) Choose any 2 points on the graph and write the ordered pairs. Label each coordinate.

\[
(3, 15) \text{ and } (5, 25)
\]

b) Substitute each coordinate into the formula. Solve and simplify.

\[
\begin{align*}
\frac{y_2 - y_1}{x_2 - x_1} &= \frac{25 - 15}{5 - 3} \\
&= \frac{10}{2} \\
&= \frac{5}{1}
\end{align*}
\]

\[
slope = \frac{5}{1} \text{ or } 5
\]

Step 3: Explain the slope's meaning.

For every 5 seconds between a lightening flash and the sound of thunder, there is 1 mile between you and the strike.
A. Graph the data about plant height for a science fair project. Then find the slope of the line. Explain what the slope represents in the work zone.

### Table

<table>
<thead>
<tr>
<th>Week</th>
<th>Plant Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>4.5</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

**Step 1:** Graph the ordered pairs from the table.

**Step 2:** Find the slope.

\[
\frac{\text{rise}}{\text{run}} = \frac{3}{2}
\]

\[
\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - 3}{4 - 2} = \frac{3}{2}
\]

**Step 3:** Explain the slope's meaning.

- The plant grows 1.5 cm each week.
- The plant grows 3 cm every 2 weeks.
B. The table at the right shows the number of small packs of fruit snacks \( y \) per box \( x \). Graph the data. Then find the slope of the line. Explain what the slope represents.

<table>
<thead>
<tr>
<th>Boxes, ( x )</th>
<th>3</th>
<th>5</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fruit Snacks, ( y )</td>
<td>12</td>
<td>20</td>
<td>28</td>
</tr>
</tbody>
</table>

Step 1: Graph the ordered pairs from the table.

Step 2: Find the slope.

\[
\text{rise} \div \text{run} = \frac{8}{2} = 4
\]

\[
\frac{y_2 - y_1}{x_2 - x_1} = \frac{20 - 12}{5 - 3} = \frac{8}{2} = 4
\]

Step 3: Explain the slope's meaning.

There are 4 packs for each box.
2. Renaldo opened a savings account. Each week he deposits $300. Draw a graph of the account balance versus time. Find the numerical value of the slope and interpret it in words.

Step 1: Graph the slope or constant rate of change given in the problem.

- **rise** = $300
- **run** = 1 week
- initial value = 0

Step 2: State the slope and explain its meaning.

Renaldo's account rises at a rate of $300 each week.
C. Jessica has a balance of $45 on her cell phone account. She adds $10 each week for the next four weeks. In the work zone, graph the account balance versus time. Find the numerical value of the slope and interpret it in words.

Step 1: Graph the slope or constant rate of change given in the problem.

\[ \text{rise} = 10 \]
\[ \text{run} = 1 \]
initial value = 45

Step 2: State the slope and explain its meaning.

\[ \text{Slope} = \frac{10}{1} \]

Jessica's account increases $10 each week.