**Warm Up:**
Plot each ordered pair.

A(5, 7)  
B(-4, 6)  
C(8, -3)  
D(-2, -5)

---

**Vocabulary:**

**Dependent Variable:** changes in response to another variable.  
**Independent Variable:** does NOT change in response to another variable.  
**Function:** is a relationship that pairs each input value with exactly one output value.  
**Domain:** x-values  
**Range:** y-values

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**5.1 Rate of Change and Slope**

Learning Goal: I will be able to find rates of change and find slope.

**Vocabulary:**

**Rate of Change:** shows the relationship between two changing quantities.  
Rate of change = \( \frac{\text{Change in dependent variable}}{\text{change in independent variable}} \)

**Slope:** rate of change  
Slope = \( \frac{\text{Vertical change}}{\text{Horizontal change}} = \frac{\text{Rise}}{\text{Run}} \)
Slope:
**Always referred to by the variable \( m \)**

When is slope positive?
When \( m \) is positive

When is slope negative?
when \( m \) is negative

Examples 3 and 4:
Determine whether each rate of change is constant. If it is, find the rate of change and explain what it represents.

Turtle Walking:

<table>
<thead>
<tr>
<th>Time(min)</th>
<th>Distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>21</td>
</tr>
</tbody>
</table>

Hockey Team's Offense:

<table>
<thead>
<tr>
<th>Games</th>
<th>Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

Slope Cont:
You can also calculate the slope of a line if you know two points on the line.

Given 2 points \((x_1, y_1)\) and \((x_2, y_2)\)

The formula for slope \( m \) is:

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]
**Examples 5 and 6:**
Calculate the slope. (reduce fractions)

\[
\begin{align*}
\frac{5 + 6}{3 + 2} &= \frac{11}{5} \\
\frac{-3 - 15}{2 + 2} &= \frac{-18}{4} = -\frac{9}{2}
\end{align*}
\]

**Examples 7 and 8:**
Calculate the slope. (reduce fractions)

\[
\begin{align*}
\frac{-6 - 4}{5 + 2} &= \frac{-10}{7} \\
\frac{-8 + 8}{2 + 4} &= \frac{0}{6} = 0
\end{align*}
\]

**Horizontal Lines:**

\[
\begin{align*}
\text{rise} &= 2 \\
\text{run} &= 3 \\
\text{slope} &= \frac{2}{3} = 0
\end{align*}
\]

**Vertical Lines:**

\[
\begin{align*}
\text{rise} &= 5 \\
\text{run} &= 0 \\
\text{slope} &= \text{undefined}
\end{align*}
\]

**Example 9:**
Without graphing, tell whether the slope of a line that models each situation is positive, negative, zero, or undefined. The find the slope.

The cost of tickets to the amusement park is $19.50 for 1 ticket and $78 for 4 tickets.
Example 10:

State the independent and dependent variable in each situation. Then find the rate of change for each situation.

Shelly delivered 12 newspapers after 20 minutes and 36 papers after 60 minutes.

Independent: time (x)
Dependent: newspapers (y)

\[
\frac{12}{20} = \frac{3}{5}
\]

Summary

1. What is slope? 
   \[ \begin{array}{c} \text{rise} \\ \text{run} \end{array} \]
   \[ \text{Rate of change} \]

2. What are 2 ways to find slope? 
   \[ \text{count, rise} \frac{\text{run}}{\text{run}}, \text{Formula using table} \]

3. What is the slope of a horizontal line? 
   \[ \text{Zero} \]

4. What is the slope of a vertical line? 
   \[ \text{Undefined} \]

Coursework:

pg 298 # 9-23 odd, 24, 26, 27