1.) Solve for $x$: $3x^2 + 7 = 56$

2.) Solve for $h$: $V = \frac{Bh}{3}$

3.) The length of a rectangle is 5 more than its width. If the rectangle has a perimeter of 86, what is the length of the rectangle?
Average Rate of Change \( \Rightarrow \) SLOPE

\[
\frac{\Delta y}{\Delta x}, \text{ or the change in } y \text{ over the change in } x
\]

All linear equations have a **constant** rate of change on all intervals.

Example: Use the equation \( y = mx + b \) to find the average rate of change over the intervals

A.) \( 2 \leq x \leq 5 \)

\[
(2,1) \quad (5,7)
\]

\[
\frac{7 - 1}{5 - 2} = \frac{6}{3} = 2
\]

\[
\therefore m = 2
\]

B.) \(-1 \leq x \leq 3\)

\[
(-1,-5) \quad (3,3)
\]

\[
\frac{3 - (-5)}{3 - (-1)} = \frac{8}{4} = 2
\]

\[
\therefore m = 2
\]
From Tables

Use the table of values to find the average rate of change over the given interval

<table>
<thead>
<tr>
<th>x</th>
<th>1</th>
<th>3.8</th>
<th>4.7</th>
<th>9</th>
<th>13.8</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>3</td>
<td>5.1</td>
<td>8.7</td>
<td>15.8</td>
<td>25.1</td>
<td>30.86</td>
</tr>
</tbody>
</table>

A.) \([1, 9]\)
\((1, 3) (9, 15.8)\)
\[m = \frac{15.8 - 3}{9 - 1}\]
\[m = 1.6\]

B.) \([9, 12]\)
\((9, 15.8)(12, 30.86)\)
\[m = \frac{30.86 - 15.8}{12 - 9}\]
\[m = \frac{15.06}{3}\]
\[m = 5.02\]

C.) \([3.8, 13.8]\)

D.) \([4.7, 13.8]\)
Test Prep

The table below represents the average price of a movie ticket in the given year.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Price ($)</td>
<td>3.91</td>
<td>4.21</td>
<td>4.35</td>
<td>5.06</td>
<td>6.03</td>
<td>6.88</td>
<td>7.50</td>
</tr>
</tbody>
</table>

To the nearest cent, what was the average rate of change of the ticket price between 1991 and 2009?

\[
\bar{m} = \frac{7.50 - 4.21}{2009 - 1991} = \frac{3.29}{18} = .18
\]

On average, the movie ticket prices increased by $0.18 per year from 1991 to 2009.
Test Prep

The table below shows the population of Texas since 1970.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (in millions)</td>
<td>11.2</td>
<td>14.2</td>
<td>17.0</td>
<td>20.9</td>
<td>25.1</td>
</tr>
</tbody>
</table>

A. Find the average rate of change for each decade.

\[
\frac{1970-1980}{10} = \frac{3}{10} = .3
\]

\[
\frac{1980-1990}{10} = \frac{2.8}{10} = .28
\]

\[
\frac{1990-2000}{10} = \frac{3.9}{10} = .39
\]

\[
\frac{2000-2010}{10} = \frac{4.2}{10} = .42
\]

B. During which decade was the average rate of change the largest? 2000-2010
From Graphs

Compute the average rate of change from A to B, B to C, and A to C. Which interval has the smallest rate of change?

\[
\begin{align*}
\text{A} & \to \text{B} \\
m = \frac{8 - 5}{4 - 2} = \frac{3}{2} \\
\text{B} & \to \text{C} \\
m = \frac{10 - 8}{8 - 4} = \frac{2}{4} = \frac{1}{2} \\
\text{A} & \to \text{C} \\
m = \frac{10 - 5}{8 - 2} = \frac{5}{6}
\end{align*}
\]