Slope of a Line

By the end of this video, you should:

- Be able to find the slope of a line from its graph.
- Be able to find the slope of a line when given the graph a parallel or perpendicular line.
- Be able to find the slope of a line when given 2 points on that line.
- Understand what the numerical value of the slope means graphically.
- Know the slopes of vertical & horizontal lines.

Important characteristics of a line:
1. The slope of a line – \( m \)
2. The y-intercept - \( b \)

What is slope?

Graphically: \( m = \frac{\text{change in } y}{\text{change in } x} \) from any one point to any other point on that line.

Change in \( y \) – up/down or rise

Change in \( x \) – left/right or run

\[ m = \frac{\text{rise}}{\text{run}} \]

+ up is positive

left is negative

−

down is negative

+ right is positive
More on slope of a line:

Recall:

\[
\begin{align*}
\frac{0}{2} & \text{ is } \frac{0}{0} \text{ and equals 0} \\
\frac{2}{0} & \text{ is } \frac{N}{0!} \text{ and is undefined}
\end{align*}
\]

The slope of any horizontal line has a rise of 0 from any one point to any other point on that line.

Therefore, the slope of any horizontal line is zero.

The slope of any vertical line has a run of 0 from any one point to any other point.

Therefore, the slope of any vertical line is undefined.
Video 2 Notes – Slope of a Line

Moving from *left to right*, whenever a line tilts upward,

<table>
<thead>
<tr>
<th>Slope</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>The line goes up as you move from left to right</td>
</tr>
</tbody>
</table>

Moving from *left to right*, whenever a line tilts downward,

<table>
<thead>
<tr>
<th>Slope</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>The line goes down as you move from left to right</td>
</tr>
</tbody>
</table>

The slopes of parallel lines: Slopes of parallel lines are the same.
The slopes of perpendicular lines:

Slopes of perpendicular lines are negative reciprocals.

Find the slope of the line shown:

Find the slope any line parallel to the line shown:

Find the slope any line perpendicular to the line shown:
Finding slope from 2 points:

Find the slope of the line that passes through the 2 pts: (1, 2) and (4, -5)

Given any 2 pts: \((x_1, y_1)\) and \((x_2, y_2)\)

\[ m = \frac{y_2 - y_1}{x_2 - x_1} \]

Let \((1, 2) = (x_1, y_1)\)

And \((4, -5) = (x_2, y_2)\)

So: \(m = \frac{y_2 - y_1}{x_2 - x_1}\)

At this point, you should know:

- How to find the slope of a line from a graph as long as at least 2 points are clearly defined
- A line which is tilted upward from left to right has a positive slope
- A line which is tilted downward from left to right has a negative slope
- The slope of any horizontal line is 0.
- The slope of any vertical line is undefined.
- The slopes of parallel lines are the same.
- The slopes of perpendicular lines are negative reciprocals.
- How to find the slope of a line from two points, \((x_1, y_1)\) and \((x_2, y_2)\) using: \(m = \frac{y_2 - y_1}{x_2 - x_1}\)