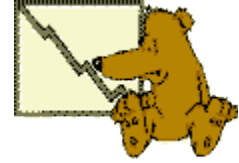


# Equations of Straight Lines

When working with straight lines, there are several ways to arrive at an equation which represents the line.



<b>Remember:</b>	<p><b>Slope</b> is found by using the formula:</p> $m = \frac{y_2 - y_1}{x_2 - x_1}$	<p><b>Slope</b> is also expressed as rise/run.</p>
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## Equation Forms of Straight Lines

Slope Intercept Form	Point Slope Form
<p>Use this form when you know the <b>slope</b> and the <b>y-intercept</b> (where the line crosses the y-axis).</p> $y = mx + b$ <p><math>m</math> = slope  <math>b</math> = y-intercept                      (where line crosses the y-axis.)</p>	<p>Use this form when you know a <b>point</b> on the line and the <b>slope</b> (or can determine the slope).</p> $y - y_1 = m(x - x_1)$ <p><math>m</math> = slope  <math>(x_1, y_1)</math> = any point on the line</p>

Horizontal Lines	Vertical Lines
<p><math>y = 3</math> (or any number)</p> <p><b>Lines that are horizontal have a slope of zero.</b> Horizontal lines have "run", but no "rise". The rise/run formula for slope always yields zero since the <b>rise = 0</b>. Since the slope is zero, we have</p> $y = mx + b$	<p><math>x = -2</math> (or any number)</p> <p><b>Lines that are vertical have no slope (it does not exist).</b> Vertical lines have "rise", but no "run". The rise/run formula for slope always has a zero denominator and is undefined.</p> <p>The equations for these lines describe what is</p>

$y = 0 \cdot x + 3$ $y = 3$	happening to the $x$ -coordinates. In this example, the $x$ -coordinates are always equal to -2.
This equation also describes what is happening to the $y$ -coordinates on the line. In this case the $y$ -coordinates are always 3.	

## Examples:

Examples using Slope-Intercept Form:	Examples using Point-Slope Form:
<p>1. Find the slope and <math>y</math>-intercept for the equation <math>2y = -6x + 8</math>.</p> <p>First solve for "y =": <math>y = -3x + 4</math>            Remember the form: <math>y = mx + b</math>  <b>Answer:</b> the slope (<math>m</math>) is -3                              the <math>y</math>-intercept (<math>b</math>) is 4</p>	<p>3. Given that the slope of a line is -3 and the line passes through the point <math>(-2,4)</math>, write the equation of the line.</p> <p>The slope: <math>m = -3</math>            The point <math>(x_1, y_1) = (-2,4)</math>            Remember the form: <math>y - y_1 = m (x - x_1)</math>            Substitute: <math>y - 4 = -3 (x - (-2))</math>            ANS. <math>y - 4 = -3 (x + 2)</math></p> <p>If asked to express the answer in "y =" form:  <math>y - 4 = -3x - 6</math>  <math>y = -3x - 2</math></p>
<p>2. Find the equation of the line whose slope is 4 and the coordinates of the <math>y</math>-intercept are <math>(0,2)</math>.</p> <p>In this problem <math>m = 4</math> and <math>b = 2</math>.            Remember the form: <math>y = mx + b</math> and that <math>b</math> is where the line crosses the <math>y</math>-axis.            Substitute: <math>y = 4x + 2</math></p>	<p>4. Find the slope of the line that passes through the points <math>(-3,5)</math> and <math>(-5,-8)</math>.</p> $m = \frac{y_2 - y_1}{x_2 - x_1}$ <p>First, find the slope:  <math>m = \frac{5 - (-8)}{-3 - (-5)} = \frac{13}{2} = 6.5</math></p> <p>Use either point: <math>(-3,5)</math>            Remember the form: <math>y - y_1 = m (x - x_1)</math>            Substitute: <math>y - 5 = 6.5 (x - (-3))</math>  <math>y - 5 = 6.5 (x + 3)</math> Ans.</p>