

### Graphing Lines

There are many ways to graph a line. Today, we'll look at graphing lines using **intercepts**, using slope-intercept form, and using point-slope form.

To graph using *intercepts*, just plug in  $x = 0$  to get point1 and  $y = 0$  to get point2. Then, graphing is as simple as connecting the dots! As a bonus, determine the slope using the formula given below.

Determine the intercepts (when $x = 0$ or $y = 0$ )	XY table	Graph	Determine the slope $\frac{RISE}{RUN} = \frac{y_2 - y_1}{x_2 - x_1}$						
<p><b>EXAMPLE</b> <math>y - 2 = 2(x + 1)</math></p> <p>Plug in <math>x = 0</math>  <math>y - 2 = 2(0 + 1)</math>  <math>y - 2 = 2(1)</math>  <math>y - 2 = 2</math>  <math>y = 4</math>     <b>(0, 4)</b></p> <p>Plug in <math>y = 0</math>  <math>0 - 2 = 2(x + 1)</math>  <math>-2 = 2x + 2</math>  <math>-4 = 2x</math>  <math>-2 = x</math>     <b>(-2, 0)</b></p>	<table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>y</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">4</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">-2</td> <td style="padding: 5px;">0</td> </tr> </table>	$x$	$y$	0	4	-2	0		<p><math>(x_2, y_2) = \mathbf{(0, 4)}</math>     <math>(x_1, y_1) = \mathbf{(-2, 0)}</math></p> <p><math>\frac{RISE}{RUN} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{4 - 0}{0 - (-2)} = \frac{4}{+2} = 2</math></p> <p>Slope: <math>m = \underline{2}</math></p>
$x$	$y$								
0	4								
-2	0								
<p>1. <math>y + 4 = -2(x - 1)</math></p> <p>Plug in <math>x = 0</math></p> <p>Plug in <math>y = 0</math></p>	<table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>y</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> </table>	$x$	$y$	0	0		<p><math>(x_2, y_2) = \underline{\hspace{2cm}}</math>     <math>(x_1, y_1) = \underline{\hspace{2cm}}</math></p> <p>Slope: <math>m = \underline{\hspace{1cm}}</math></p>		
$x$	$y$								
0	0								
<p>2. <math>y = 2x - 4</math></p> <p>Plug in <math>x = 0</math></p> <p>Plug in <math>y = 0</math></p>	<table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>y</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> </table>	$x$	$y$	0	0		<p><math>(x_2, y_2) = \underline{\hspace{2cm}}</math>     <math>(x_1, y_1) = \underline{\hspace{2cm}}</math></p> <p>Slope: <math>m = \underline{\hspace{1cm}}</math></p>		
$x$	$y$								
0	0								
<p>3. <math>y + 1 = (x + 3)</math></p> <p>Plug in <math>x = 0</math></p> <p>Plug in <math>y = 0</math></p>	<table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>y</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> </table>	$x$	$y$	0	0		<p><math>(x_2, y_2) = \underline{\hspace{2cm}}</math>     <math>(x_1, y_1) = \underline{\hspace{2cm}}</math></p> <p>Slope: <math>m = \underline{\hspace{1cm}}</math></p>		
$x$	$y$								
0	0								
<p>4. <math>y = -3x + 3</math></p> <p>Plug in <math>x = 0</math></p> <p>Plug in <math>y = 0</math></p>	<table style="border-collapse: collapse; margin: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"><math>x</math></td> <td style="padding: 5px;"><math>y</math></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">0</td> <td style="padding: 5px;">0</td> </tr> </table>	$x$	$y$	0	0		<p><math>(x_2, y_2) = \underline{\hspace{2cm}}</math>     <math>(x_1, y_1) = \underline{\hspace{2cm}}</math></p> <p>Slope: <math>m = \underline{\hspace{1cm}}</math></p>		
$x$	$y$								
0	0								

To graph using *the form of the equation*, you must first identify if it is in one of the two usable formats: slope-intercept form or point-slope form. More importantly, you must identify which one it is, so you can determine the information needed to graph the line.

<p style="text-align: center;"><u>Slope-Intercept looks like: <math>y = mx + b</math></u></p> <p><math>m</math> is the slope (distance it travels up/down and left/right)  <math>b</math> is the y-intercept (where the graph crosses the y-axis)</p>	<p style="text-align: center;"><u>Point-slope looks like: <math>y - y_1 = m(x - x_1)</math></u></p> <p><math>m</math> is the slope (distance it travels up/down and left/right)  <math>(x_1, y_1)</math> is a point on the graph</p>
---	--

Equation	Graph	Equation	Graph
<p><b>EXAMPLE</b>  <math>y - 1 = 2(x + 3)</math>  <b>looks like:</b>  <math>y - y_1 = m(x - x_1)</math></p> <p>Form: <u>POINT-SLOPE</u></p> <p><math>m = \underline{2}</math>  <i>that's the same as 2 OVER 1, so</i>  <b>RISE = +2, and RUN = +1</b></p> <p>point: <math>(-3, 1)</math>  <b>Remember, the original equation is <math>y -</math>, and <math>x -</math>!</b></p>		<p><b>EXAMPLE</b>  <math>y = -4x + 4</math>  <b>looks like:</b>  <math>y = mx + b</math></p> <p>Form: <u>SLOPE-INTERCEPT</u></p> <p><math>m = \underline{-4}</math>  <i>that's the same as -4 OVER 1,</i>  <b>so RISE = -4, and RUN = +1</b></p> <p>point: <math>b = +4</math>, so: <math>(0, 4)</math></p>	
<p>1. <math>y + 4 = -2(x - 1)</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>		<p>2. <math>y = -3x + 3</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>	
<p>3. <math>y = 2x - 4</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>		<p>4. <math>y + 1 = (x + 3)</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>	
<p>5. <math>y = -x + 2</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>		<p>6. <math>y = 3x - 2</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>	
<p>7. <math>y + 2 = 2(x + 1)</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>		<p>8. <math>y - 3 = -4(x + 3)</math></p> <p>Form: _____</p> <p><math>m =</math> _____</p> <p>point: _____</p>	

