Math 45 Summary of Techniques for Graphing a Line

Begin with Option 1. If it does not apply, try Option 2. If not Option 3, go on to Option 4, and so on.

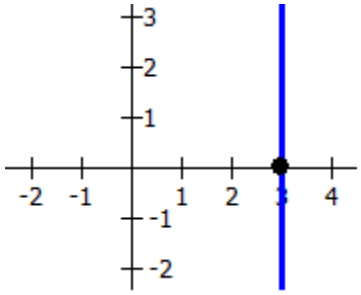
Option 1:

Ask: Is the line vertical? [Does the equation have x but no y?]

Method: Plot x-intercept and a line up and down from it.

Example 1: $x = 3$.

Plot the x-intercept at the value given, (3,0) in this example, and a line up and down from it.



Graph for Example 1

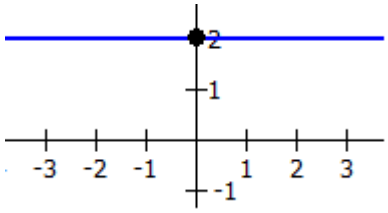
Option 2:

Ask: Is the line horizontal? [Does the equation have y but no x?]

Method: Plot the y-intercept and a line left and right from it.

Example 2: $y = 2$

Plot the y-intercept at the value given, (0,2) in example, and a line left and right from it.



Graph for Example 2

Option 3:

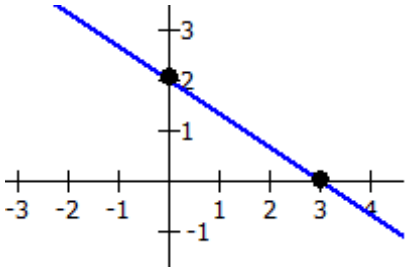
Ask: Are the x-intercept and y-intercept both integers? [Is the constant is evenly divisible by both the coefficient of the x-term and evenly divisible by the coefficient of the y-term?]

Method: Find and plot the x-intercept, find and plot the y-intercept, connect the two with a line.

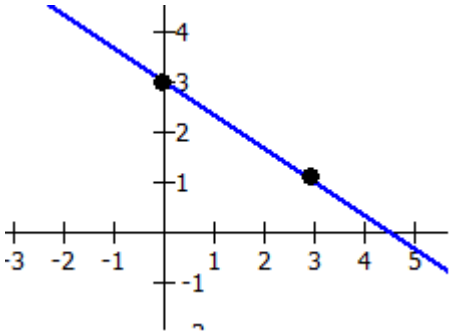
Example 3: $2x + 3y = 6$ [6 is divisible by 2 and divisible by 3]

Find the x-intercept (set y=0, solve for x), (3,0) in example, and plot it.

Find the y-intercept (set x=0, solve for y), (0,2) in example, and plot it. Connect with a line.



Graph for Example 3



Graph for Example 4

Option 4:

Ask: Is the y-intercept an integer? [Is the constant term is divisible by the y-coefficient?]

Method: Write equation in slope-intercept ($y = mx + b$) form, plot the y-intercept, use the slope.

Example 4: $2x + 3y = 9$ [9 is divisible by y-coefficient 3, but not by x-coefficient 2]

Write in slope-intercept form: $y = -\frac{2}{3}x + 3$.

Continued…

Plot the y-intercept, (0,3) in example. (continued on the back)

Write slope as $\frac{rise}{run}$. ($\frac{-2}{3}$ in example).

From the y-intercept go up *rise* units (if *rise* is positive) or down *rise* units (if *rise* is negative).

From there, go right *run* units (if *run* is positive) or left *run* units (if *run* is negative).

Option 5:

Ask: Is the x-intercept an integer? [Is the constant term is divisible by the x-coefficient?]

Method: Write equation in slope-intercept ($y = mx + b$) form, find and plot the x-intercept, use the slope.

Example 5: $2x + 3y = 4$ [4 is divisible by x-coefficient 2 but not by y-coefficient 3]

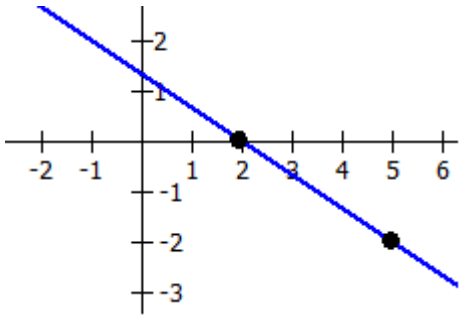
Write in slope-intercept form: $y = -\frac{2}{3}x + \frac{4}{3}$

Find and plot x-intercept (2,0).

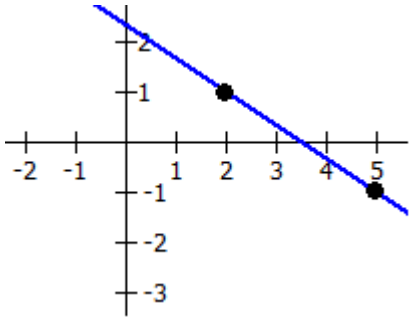
Write slope as $\frac{rise}{run}$. ($\frac{-2}{3}$ in example)

From the x-intercept go up *rise* units (if *rise* is positive) or down *rise* units (if *rise* is negative).

From there, go right *run* units (if *run* is positive) or left *run* units (if *run* is negative).



Graph for Example 5



Graph for Example 6

Option 6:

Ask: Is neither the x-intercept nor y-intercept an integer? [Is the constant term is not divisible by either the x-coefficient or the y-coefficient?]

Method: Find any point and use the slope.

Example 6: $2x + 3y = 7$. [7 is not divisible by 2 or by 3]

Choose an x-value, substitute, and solve for y, OR choose a y-value, substitute, and solve for x.]

Choosing x=0 or x=1 in this example give fractions for y. Choose x=2.

$2(2) + 3y = 7 \qquad 4 + 3y = 7 \qquad 3y = 3 \qquad y = 1$

Plot the point (in this example, (2,1))

Write the equation in slope-intercept form. ($y = -\frac{2}{3}x + \frac{7}{3}$ in this example)

Write slope as $\frac{rise}{run}$. ($\frac{-2}{3}$ in example)

From the point go up *rise* units (if *rise* is positive) or down *rise* units (if *rise* is negative).

From there, go right *run* units (if *run* is positive) or left *run* units (if *run* is negative).