6.1 Graphing with Slope-Intercept Form

Before we begin looking at systems of equations, let's take a moment to review how to graph linear equations using slope-intercept form. This will help us because one way we can solve systems of equations is to graph the equations and see where the lines cross.

Slope-Intercept Form

Any linear equation can be written in the form $y = mx + b$ where m is the slope and b is the y-intercept. Sometimes the equation we need to graph will already be in slope-intercept form, but if it's not, we'll need to rearrange the equation to get it into slope-intercept form. Take a look at the following equations:

Example 1

$$y = 2x - 1$$

This equation is already in slope-intercept form. Nothing needs to be done.

Example 2

$$2x + y = 7$$

This equation is not in slope-intercept form. We need to subtract $2x$ from both sides to get the y by itself.

$$2x - 2x + y = 7 - 2x$$

$$y = -2x + 7$$

Example 3

$$3x - 2y = 4$$

This example is also not in slope-intercept form. We'll first subtract $3x$, but then notice that we'll be left with a $-2y$. Be careful because that negative sign is important. Next divide by -2 to get y by itself.

$$3x - 3x - 2y = 4 - 3x$$

$$-2y = -3x + 4$$

$$\frac{-2y}{-2} = \frac{-3x + 4}{-2}$$

$$y = \frac{3}{2}x - 2$$

Example 4

$$-4x + 2y = 8$$

This is not in slope-intercept form. We'll first need to get rid of the $-4x$ by adding $4x$ and then we'll have to get rid of the times by 2 by dividing by 2. That will get y by itself.

$$-4x + 4x + 2y = 8 + 4x$$

$$2y = 4x + 8$$

$$\frac{2y}{2} = \frac{4x + 8}{2}$$

$$y = 2x + 4$$

So, step one in graphing is to get the equation in slope-intercept form.

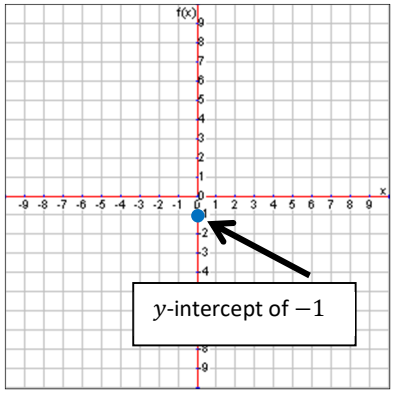
The y-Intercept and the Slope

Once you have an equation in slope-intercept form, start by graphing the y-intercept on the coordinate plane. From the y-intercept, move the rise and run of the slope to plot another point. Finally, draw the line that connects the two points. Let's use our previous equations to graph step-by-step.

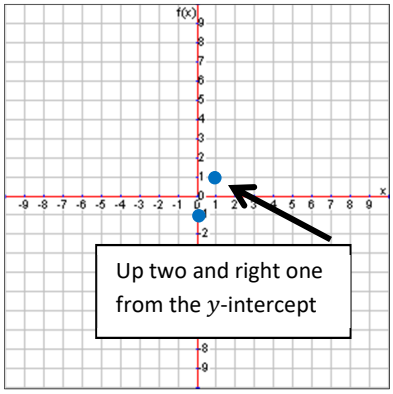
Example 1

$$y = 2x - 1$$

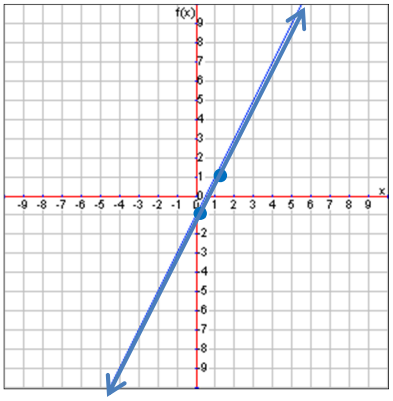
Step 1
The y-intercept is -1, so we plot a point at -1 on the y-axis to begin.



Step 2
Next, the slope is 2 which means a rise of 2 and a run of 1. So we'll move up two and right one to plot the next point.



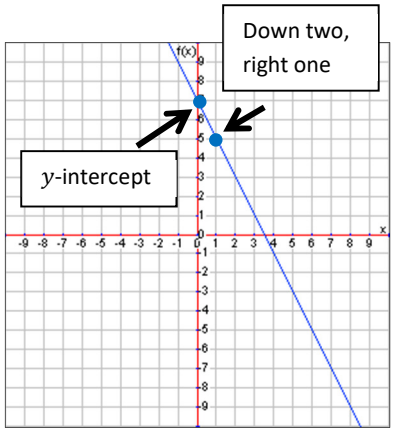
Step 3
Finally, connect the dots with a line. This completes the graph of our linear function.



Here are the rest of the examples graphed.

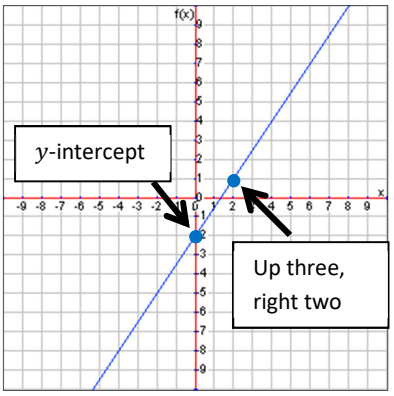
Example 2

$y = -2x + 7$



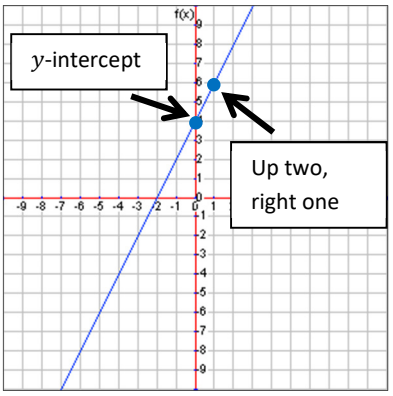
Example 3

$y = \frac{3}{2}x - 2$



Example 4

$y = 2x + 4$



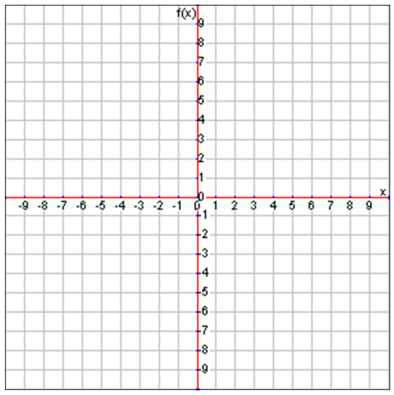
Lesson 6.1

Identify the slope as a fraction and the y-intercept of each equation. Then graph on the coordinate plane.

1. $y = 2x + 1$

Slope:

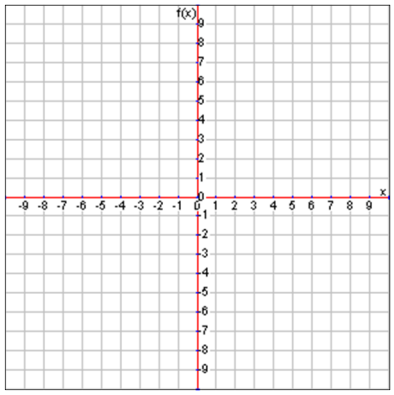
y-int:



2. $y = 3x - 4$

Slope:

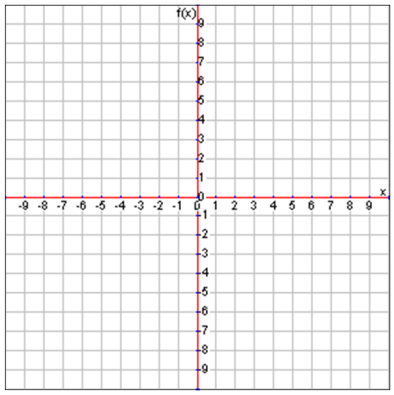
y-int:



3. $y = \frac{2}{3}x + 5$

Slope:

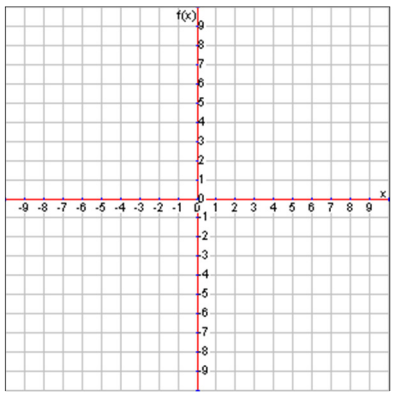
y-int:



4. $y = 7$

Slope:

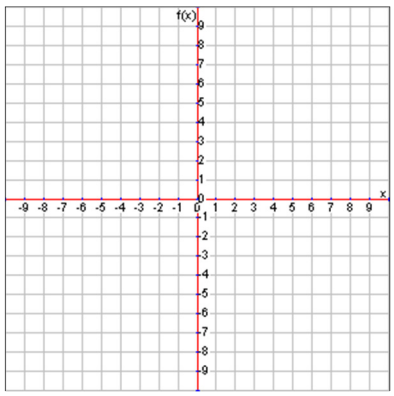
y-int:



5. $y = -3x - 2$

Slope:

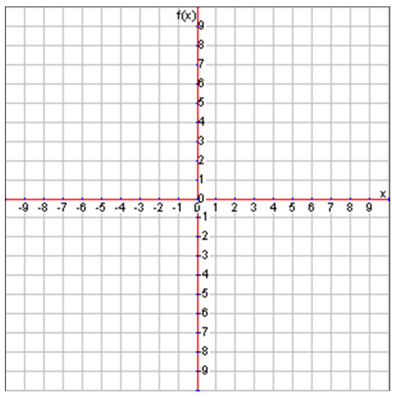
y-int:



6. $y = -\frac{1}{3}x + 5$

Slope:

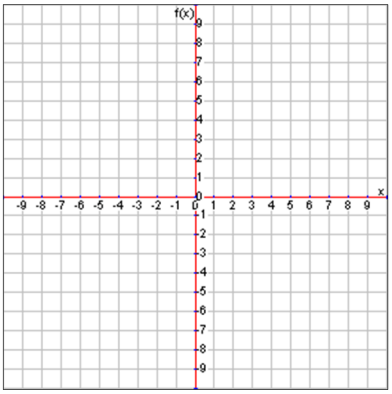
y-int:



7. $y = \frac{2}{5}x - 2$

Slope:

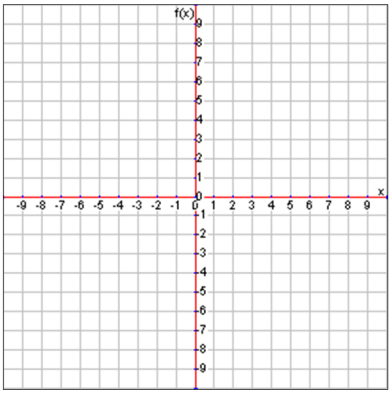
y-int:



8. $y = -\frac{3}{4}x - 1$

Slope:

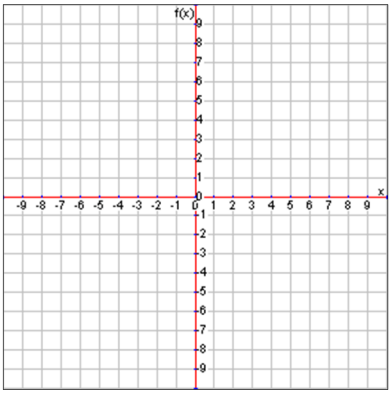
y-int:



9. $y = -4$

Slope:

y-int:

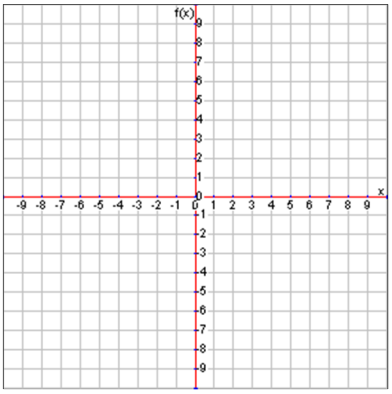


10. $x = 2$

Hint: This is not a function!

Slope:

y-int:

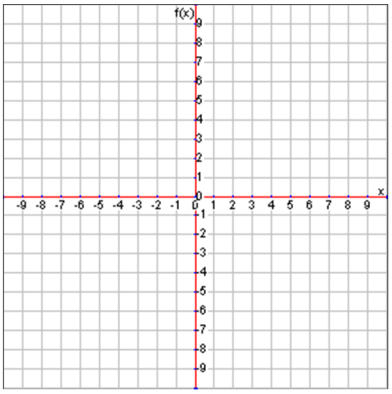


11. $x = -6$

Hint: This is not a function!

Slope:

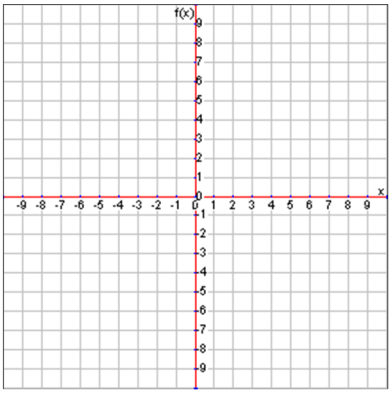
y-int:



12. $y = 4x - 5$

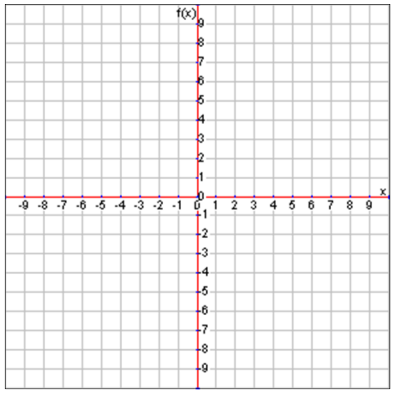
Slope:

y-int:

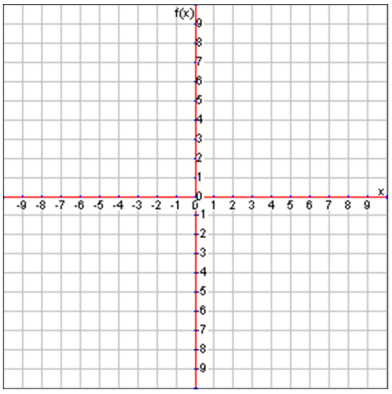


Put the following equations in slope-intercept form and then graph them on the coordinate plane.

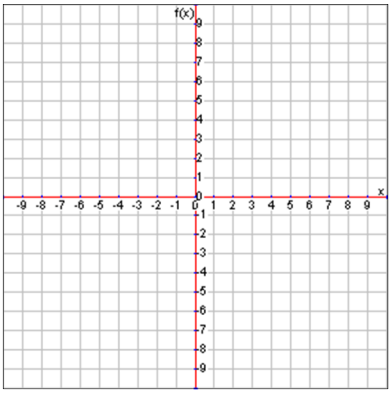
13. $2x + y = 2$



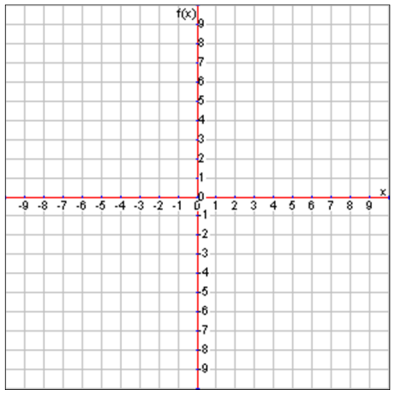
14. $-3x + y = 4$



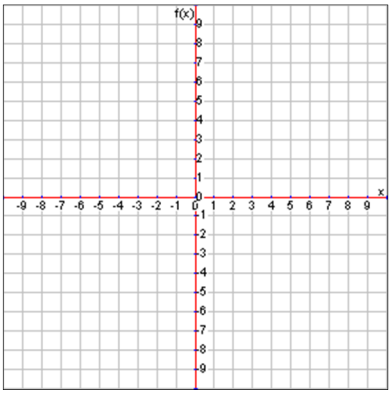
15. $4x + y = -5$



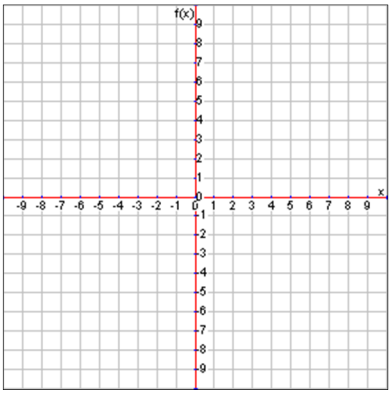
16. $4x + 2y = 6$



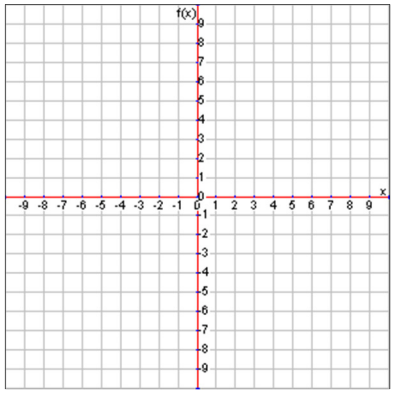
17. $-6x + 3y = -9$



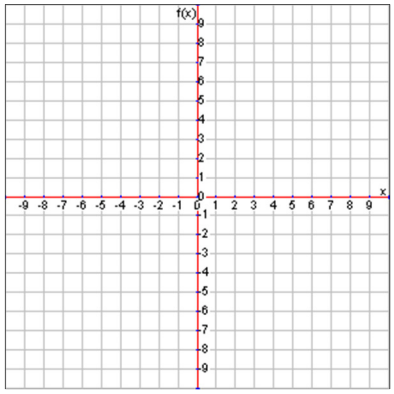
18. $x + 3y = 6$



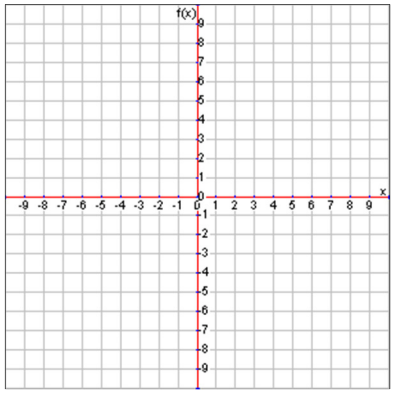
19. $-2x + 3y = 12$



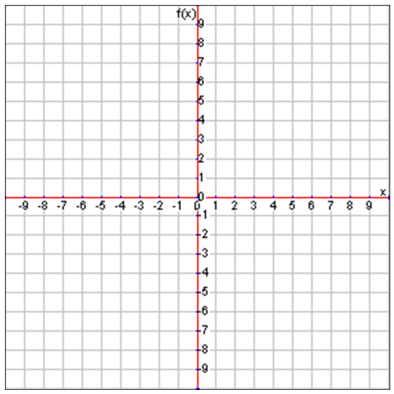
20. $4x - 2y = 8$



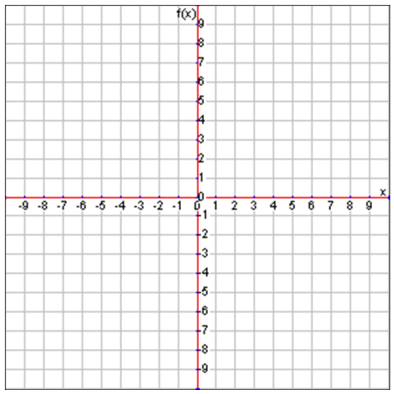
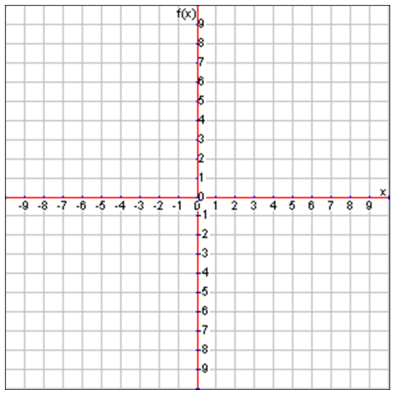
21. $-2x - 3y = -9$



22. $-2x + y = 4$



23. $6x + 2y = -8$



24. $2x - 3y = 9$