

4-2

Graphing Linear Functions

CONTENT STANDARDS

8.EE.6, 8.F.1, 8.F.3, 8.F.4

What You'll Learn

To use tables and equations to graph linear functions

 **New Vocabulary** y-intercept, slope-intercept form, linear function

Notebooks and clickers are needed today.

Why Learn This?

The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. These ordered pairs are the solutions of the equation. A graph of a line may include solutions that do not appear in a table of values of the equation.

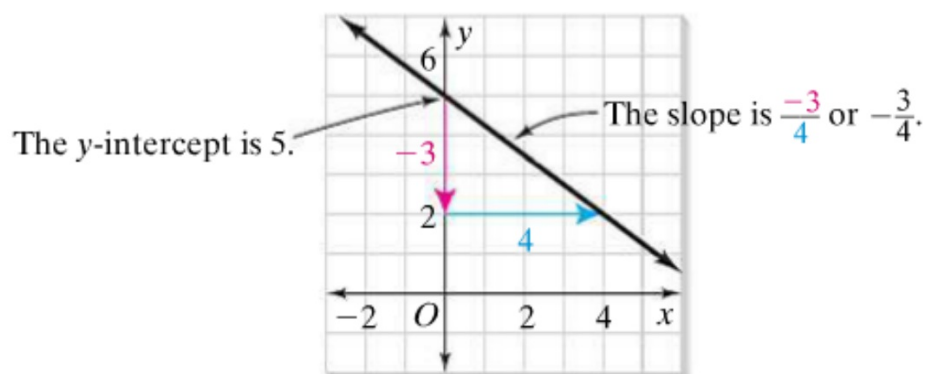
Copy all of this into your notes.

The **y-intercept** is the point where the graph crosses the y-axis.

$$y = -\frac{3}{4}x + 5$$

↑ ↑
slope y-intercept

Below is the graph of $y = -\frac{3}{4}x + 5$.



Notice that the slope and y-intercept may be part of the equation of a line.

An equation written in the form $y = mx + b$ is in **slope-intercept form**. The graph is a line with slope m and y-intercept b .

A **linear function** is a function with points that lie on a line. You can write a linear function in the form $y = mx + b$. Then you can use the slope and y-intercept to graph the function.

EXAMPLE**Finding Slope and y-intercept**

- 1 Find the slope and y-intercept of the graph of the function.

a. $y = 2x + 4$

$$y = \overset{\uparrow}{m}x + \overset{\uparrow}{b} \leftarrow \begin{array}{l} m \text{ represents slope} \\ b \text{ represents the} \\ \text{y-intercept} \end{array}$$

The slope is 2 and the y-intercept is 4.

b. $y = -\frac{5}{6}x - 7$

$$y = \overset{\uparrow}{m}x + \overset{\uparrow}{b} \leftarrow \begin{array}{l} m \text{ represents slope} \\ b \text{ represents the} \\ \text{y-intercept} \end{array}$$

The slope is $-\frac{5}{6}$ and the y-intercept is -7 .

Example

- 1 **Finding Slope and y-intercept** Find the slope and y-intercept of the graph of each function.

a. $y = 3x + 7$

$$y = 3x + 7$$

$$y = \overset{\uparrow}{m}x + \overset{\uparrow}{b} \quad \begin{array}{l} m \text{ represents the } \boxed{\text{slope}}. \\ b \text{ represents the } \boxed{\text{y-intercept}}. \end{array}$$

The slope is $\boxed{3}$ and the y-intercept is $\boxed{7}$.

b. $y = 3x + 7$

$$y = \frac{3}{4}x - 5$$

$$y = \overset{\uparrow}{m}x + \overset{\uparrow}{b}$$

The slope is $\boxed{\frac{3}{4}}$ and the y-intercept is $\boxed{-5}$.

Table talk about this problem.

Quick Check

1. Find the slope and y-intercept of the graph of $y = x - 3$.

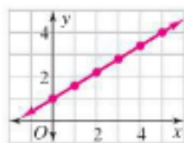
More Than One Way

Graph the function $y = \frac{3}{5}x + 1$.

Kevin's Method

First I will make a table. Then I will graph the points.

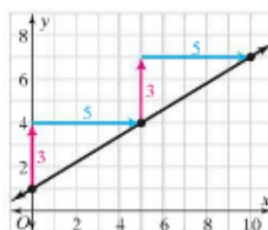
x	0	1	2	3	4	5
y	1	1.6	2.2	2.8	3.4	4



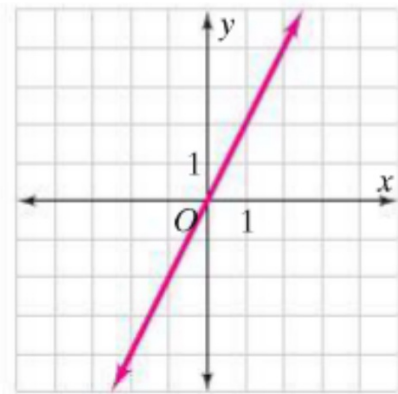
Michelle's Method

I can use slope-intercept form to graph the equation.

The y-intercept is 1 and the slope is $\frac{3}{5}$.



Below is the graph of $y = 2x$.



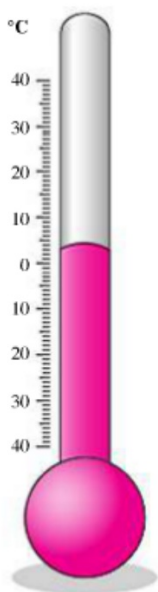
Notice that the slope of the line is $\frac{2}{1}$, or 2. Since the graph passes through the origin, the y-intercept is 0. So the equation of the line in slope-intercept form is $y = 2x + 0$, or $y = 2x$.

Put this in your notes please.

KEY CONCEPTS

Slope-Intercept Form of a Linear Equation

- The slope-intercept form of a line that intersects the y-axis at b is $y = mx + b$.
- The slope-intercept form of a line that intersects the y-axis at the origin is $y = mx$.



EXAMPLE

Graphing Functions of the Form $y = mx$

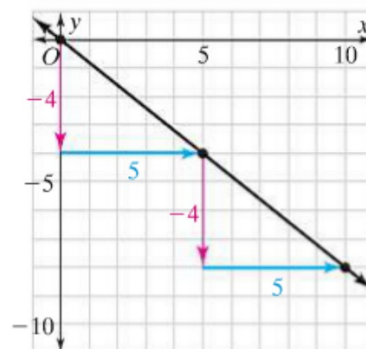
2

Science The temperature of a substance in degrees Celsius before and during an experiment is given by the function $y = -\frac{4}{5}x$ where y represents temperature and x represents time in minutes. Graph $y = -\frac{4}{5}x$.

Step 1 The y -intercept is 0, so plot a point at $(0, 0)$.

Step 2 The slope is $-\frac{4}{5}$. Move down 4 units and right 5 units. Plot another point. Repeat to find another point on the line.

Step 3 Draw a line through the three points.



Example

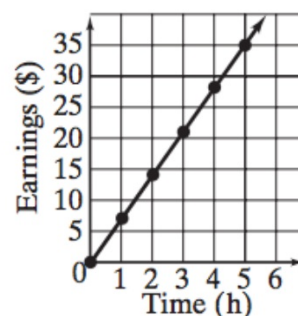
- 2 **Graphing Functions of the Form $y = mx$** The amount that Amber earns from her job is given by the function $y = 7x$, where y represents her earnings and x represents the number of hours she works. Graph $y = 7x$.

Use slope-intercept form.

The y -intercept is and the slope is .

Move units from $(0, 0)$ since the slope is positive and unit Repeat to find more points on the line.

Draw a line through the three points.



RECAP OF BIG IDEAS:

You can graph a function in the coordinate plane. To plot points for the graph, use *input* as x -values (x -axis) and *output* as y -values (y -axis).

output as y -values input as x -values

↓ ↓

$$y = 2x + 4$$

This function has the form of a linear equation and is called a *linear function*. To draw its graph, use

slope and y -intercept:

$$y = 2x + 4$$

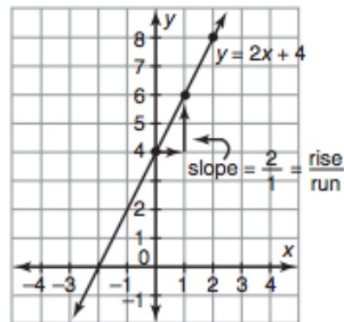
$$\text{slope} = 2$$

$$y\text{-intercept} = 4$$

or

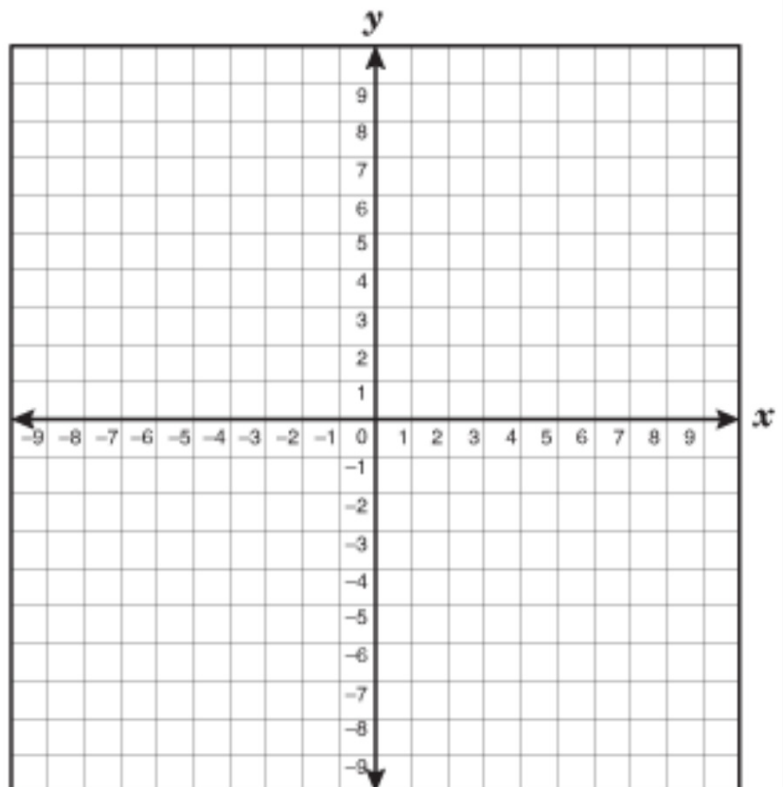
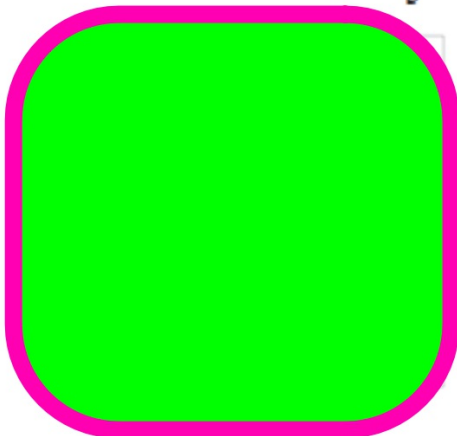
plot points from a table and connect them in a line.

x	y
0	4
1	6
2	8



Quick Check

2. Graph the function $y = \frac{1}{5}x$.





Find the slope: $y=3x-4$
Text in your number answer.



Find the slope: $y = 8x + 2$

Text in your
number answer.



Find the y-intercept:
 $y=4x + 2$

Text in your
number answer



Find the y-intercept: $y=12x$

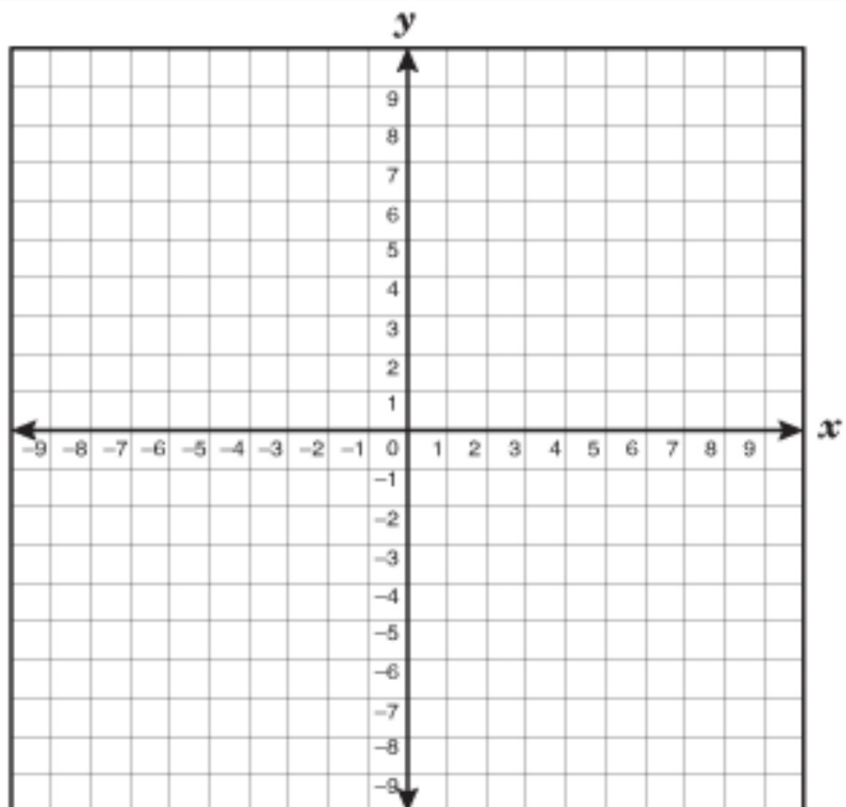
Text in your number answer.

Put your clickers away.

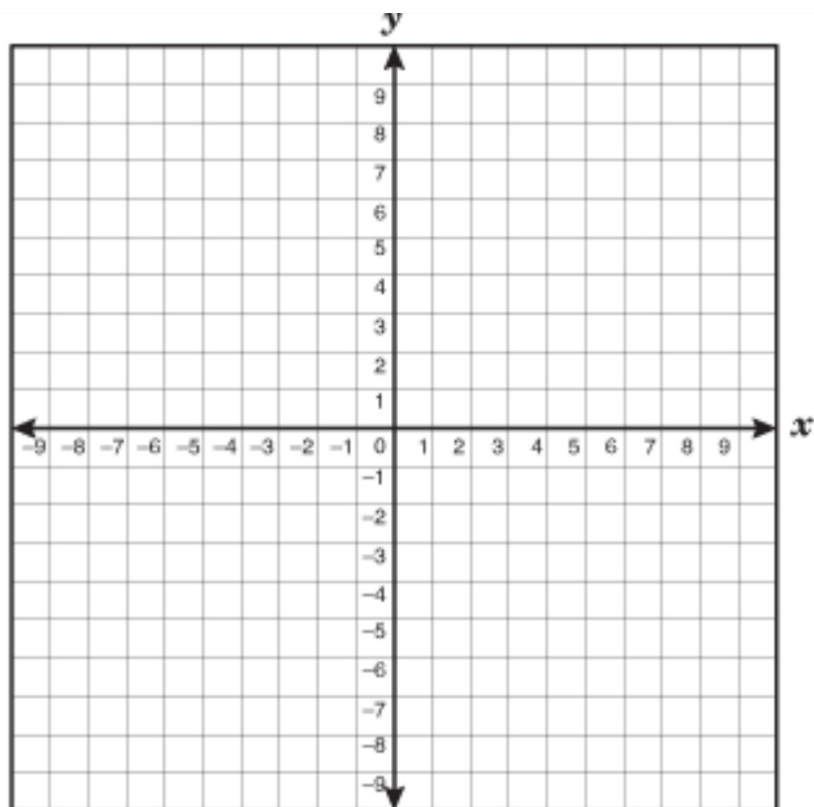
Next we will graph several equations on the whiteboard.

Be prepared to go up to the board and graph the line.

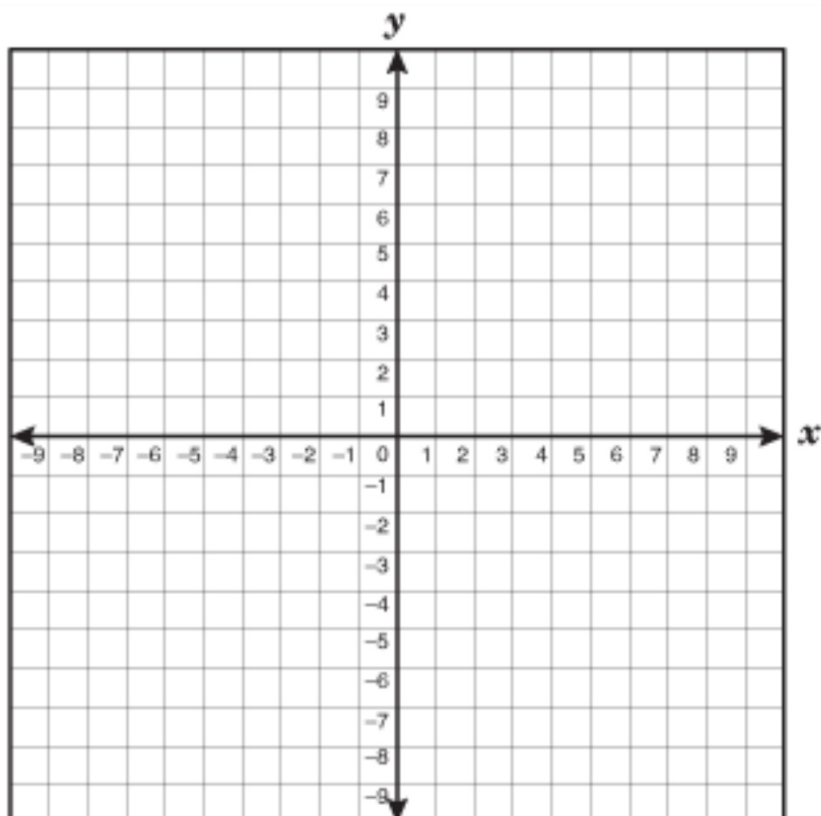
Graph $y = 3x - 4$



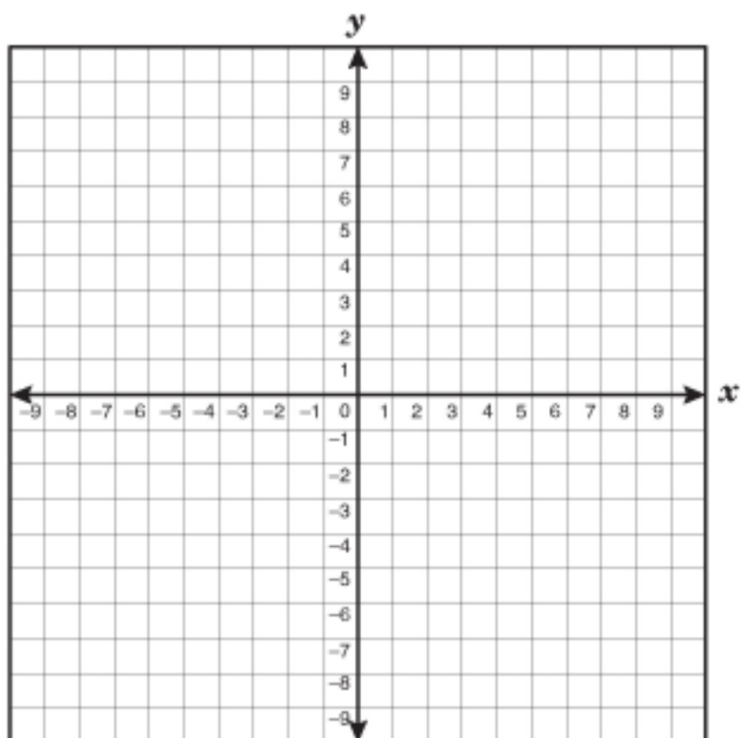
Graph $y = 4x$



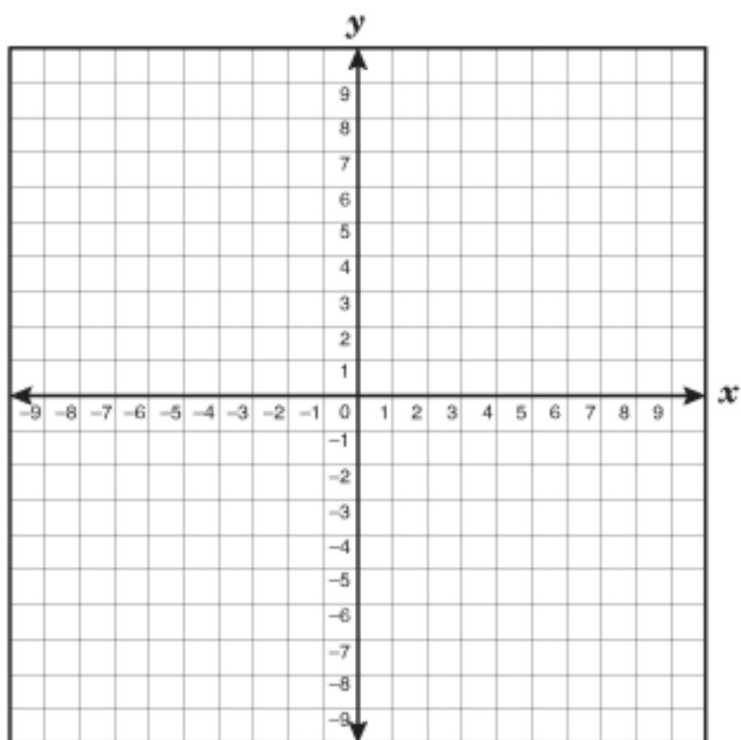
Graph $y = -2x + 5$



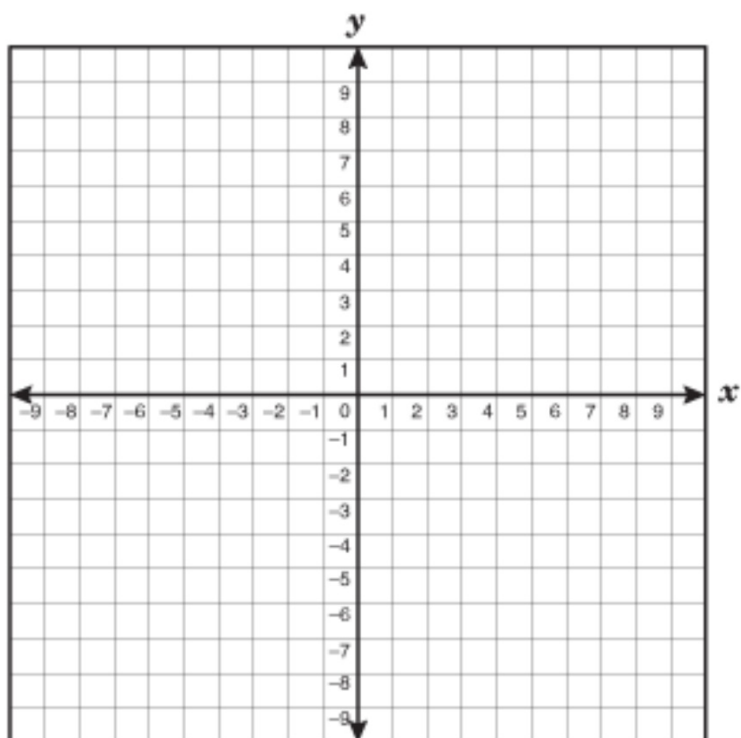
Graph $y = 3x - 7$



Graph $y = x + 4$



Graph $y = \frac{2}{3}x + 1$



No assignment today.