**4.1 Graphing Linear Equations**

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| **Standards**  8.EE.5 | **Learning Objectives (I can…)**   * Understand that lines represent solutions of linear equations * Graph linear equations |

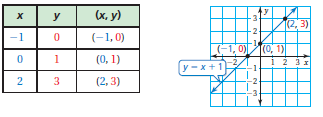
**Key Idea**

**Linear Equations**

A \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ is an equation whose graph is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The points on the line are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of the equation.

You can use a graph to show the solutions of a linear equation. The

graph below is for the equation *y* = *x* + 1.

****

**Example 1:** Graphing a Linear Equation

**Graph**

**Step 1:** Make a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of values.



**Step 2:** Plot the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Step3:** Draw a \_\_\_\_\_\_\_\_\_\_\_\_\_ through the points.

**Key Idea**

**Graphing Horizontal and Vertical Lines**

The graph of *\_\_\_\_\_\_\_\_\_* is a horizontal The graph of *\_\_\_\_\_\_\_\_\_\_\_* is a vertical

line passing through (0, *b*). line passing through (*a*, 0).



**Example 2:** Graphing a Horizontal Line and a Vertical Line

1. **Graph**  b. **Graph**



**On Your Own:** Graph the linear equation. Use a graphing calculator to check your

graph, if possible.

1.  2.
2.  4.

**Example 3:** Real-Life Application

**The wind speed *y* (in miles per hour) of a tropical storm is *y* = 2*x* + 66, where *x* is the number of hours after the storm enters the Gulf of Mexico.**

1. ****Graph the Equation
2. When does the storm become a hurricane?



**On Your Own:**

1. **WHAT IF?** In Example 3, the wind speed of the storm is *y* = 1.5*x* + 62. When does the storm become a hurricane?

**4.2 Slope of a Line**

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| --- | --- |
| **Standards**  8.EE.6 | **Learning Objectives (I can…)**   * Find slopes of lines using two points * Find slopes of lines from tables |

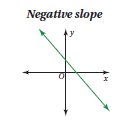
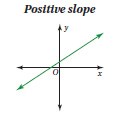
**Key Idea**

**Slope**

**Slope of a line in the Coordinate Plane**

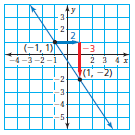
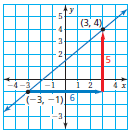
The slope of a line is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the change in \_\_\_\_\_ (the rise) to the change in \_\_\_\_\_\_ (the run) between any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ points, ( , ) and ( , ) on the line.

Slope =

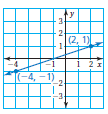
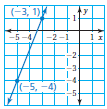


**Example 1:** Finding the Slope of a Line

**Describe the slope of the line. Then find the slope.**

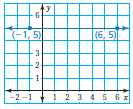
1.  **b)**

**On Your Own:**

**Find the slope of the line.**

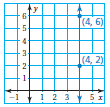
1.  2. 3.

**Example 2:** Finding the Slope of a Horizontal Line

**Find the slope of the line.**

**Example 3:** Finding the Slope of a Vertical Line

**Find the slope of the line.**



**On Your Own:**

**Find the slope of the line through the given points.**

1. 5. 6.
2. How do you know that the slope of every horizontal line is 0? How

do you know that the slope of every vertical line is undefined?

**Example 4:** Finding Slope from a Table

**The points in the table lie on a line. How can you find the slope of the line from the table? What is the slope?**



**On Your Own:**

1.  **9.** 

**Summary:**

**Slope**

*Positive Slope Negative Slope*

*Slope of Zero Undefined Slope*

**4.2 Extension: Slopes of Parallel and Perpendicular Lines**

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| --- | --- |
| **Standards**  8.EE.6 | **Learning Objectives (I can…)**   * Identify parallel and perpendicular lines |

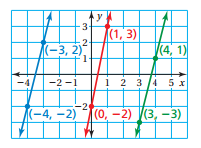
**Key Idea**

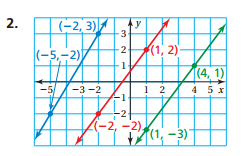
**Parallel Lines and Slopes**

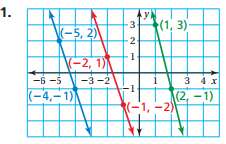
Lines in the same plane that do not \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are parallel lines. Nonvertical parallel lines have the same \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Example 1:** Identifying Parallel Lines

Which two lines are parallel? How do you know?

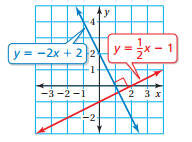


**On Your Own: Which two lines are parallel? How do you know?**

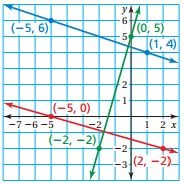


**Key Idea**

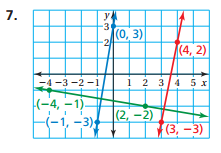
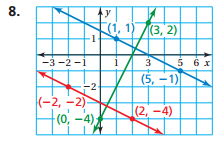
**Perpendicular Lines and Slope**

Lines in the same plane that intersect at \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are perpendicular lines. Two nonvertical lines are perpendicular when the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of their slopes is − 1.

**Example 2:** Identifying Perpendicular Lines

Which two lines are perpendicular? How do you know?

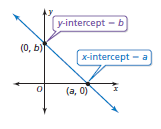
**On Your Own: Which two lines are perpendicular? How do you know?**



**4.4 Graphing Linear Equations in Slope-Intercept Form**

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| --- | --- |
| **Standards**  A.CED.2  A.REI.10  F.IF.4 | **Learning Objectives (I can…)**   * Find slopes and y-intercepts of graphs of linear equations * Graph linear equations written in slope-intercept form |

**Key Idea**

**Intercepts**

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of a line is the *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the point where

the line \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the *x*-axis. It occurs when ***y* = 0**.

The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_of a line is the *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the point where

the line \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the *y*-axis. It occurs when ***x* = 0**.

**Slope-Intercept Form**

A linear equation written in the form *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* is in **slope-intercept form**. The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the line is ***m*** and the *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* of the line is ***b***.

**Example 1:** Identifying Slopes and y-Intercepts

**Find the slope and *y*-intercept of the graph of each linear equation.**

**On Your Own:**

**Find the slope and *y*-intercept of the graph of the linear equation.**

1. 2.

**Example 2:** Graphing a Linear Equation in Slope-Intercept Form

**Graph *y*** = −**3*x*** + **3. Identify the *x*-intercept.**

**Example 3:** Real-Life Application

**The cost *y* (in dollars) of taking a taxi *x* miles is *y*** = **2.5*x*** + **2.**

**(a) Graph the equation. (b) Interpret the *y*-intercept and slope.**

**On Your Own:**

**Graph the linear equation. Identify the *x*-intercept. Use a graphing calculator to check your answer.**

1. 4.
2. In Example 3, the cost *y* (in dollars) of taking a different taxi *x* miles is *y* = 2*x* + 1.5. Interpret the *y*-intercept and slope.

**4.5 Graphing Linear Equations in Standard Form**

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| --- | --- |
| **Standards**  A.CED.2  A.REI.10  F.IF.4 | **Learning Objectives (I can…)**   * Graph linear equations written in standard form. |

**Key Idea**

**Standard Form of a Linear Equation**

The **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** of a linear equation is

where *a* and *b* are not both zero.

**Example 1:** Graphing a Linear Equation in Standard Form

**Graph** −**2*x*** + **3*y*** = −**6.**

**On Your Own:**

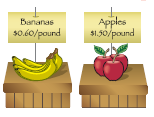
**Graph the linear equation. Use a graphing calculator to check your graph.**

1. 2.

**Example 2:** Graphing a Linear Equation in Standard Form

**Graph *x*** + **3*y*** = −**3 using intercepts.**

**Example 3:** Real-Life Application

**You have $6 to spend on apples and bananas. (a) Graph the equation 1.5*x*** + **0.6*y*** = **6, where *x* is the number of pounds of apples and *y* is the number of pounds of bananas. (b) Interpret the intercepts.**

**On Your Own:**

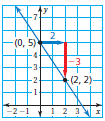
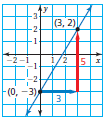
1. **WHAT IF?** In Example 3, you buy *y* pounds of oranges instead of bananas. Oranges cost $1.20 per pound. Graph the equation 1.5*x* + 1.2*y* = 6. Interpret the intercepts.

**4.6 Writing Equations in Slope-Intercept Form**

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| **Standards**  8.F.3  A.CED.2  A.CED.3 | **Learning Objectives (I can…)**   * Write equations of lines in slope-intercept form. |

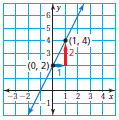
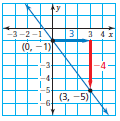
**Example 1:** Writing Equations in Slope-Intercept Form

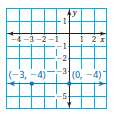
**Write an equation of the line in slope-intercept form.**

1. 
2. 

**On Your Own:**

**Write an equation of the line in slope-intercept form.**

1.  **2.**

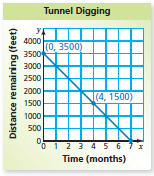
**Example 2:** Writing an Equation



Find the slope and *y*-intercept.

**Example 3:** Real-Life Application

**The graph shows the distance remaining to complete a tunnel. (a) Write an equation that represents the distance *y* (in feet) remaining after *x* months. (b) How much time does it take to complete the tunnel?**



1. Find the slope and *y*-intercept.
2. The tunnel is complete when the distance remaining is 0 feet. So,

find the value of *x* when *y* = 0.

**On Your Own:**

1. Write an equation of the line that passes through (0, 5) and (4, 5).

**4.7 Writing Equations in Point-Slope Form**

|  |  |
| --- | --- |
| **Standards**  A.CED.2  A.REI.10  F.IF.4  F.IF.6 | **Learning Objectives (I can…)**   * Write equations of lines using a slope and a point. * Write equations of lines using two points. |

**Key Idea**

**Point-Slope Form**

A linear equation written in the form *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_* is in **point-slope form.** The line passes through the point \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the slope of the line is *\_\_\_\_\_\_\_*.

**Example 1:** Writing an Equation Using a Slope and a Point

**Write in point-slope form an equation of the line that passes through the point (**−**6, 1) with slope .**

**On Your Own:**

**Write in point-slope form an equation of the line that passes through the given point and has the given slope.**

**1.** (1, 2); *m* = − 4 **2.** (7, 0); *m* = 1 **3.** (− 8, − 5); *m* =

**Example 2:** Writing an Equation Using Two Points

**Write in slope-intercept form an equation of the line that passes through the points (2, 4) and (5,** −**2).**

**Example 3:** Real-Life Application

**You finish parasailing and are being pulled back to the boat. After 2 seconds, you are 25 feet above the boat. (a) Write and graph an equation that represents your height *y* (in feet) above the boat after *x* seconds. (b) At what height were you parasailing?**

1. 

**On Your Own:**

**Write in slope-intercept form an equation of the line that passes through the given points.**

1. (− 2, 1), (3, − 4) **5.** (− 5, − 5), (− 3, 3)
2. (− 8, 6), (− 2, 9)
3. **WHAT IF?** In Example 3, you are 35 feet above the boat after 2 seconds. Write and graph an equation that represents your height *y* (in feet) above the boat after *x* seconds.