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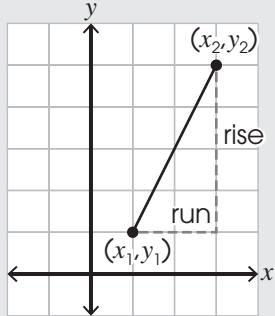
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# Chapter 1

## 1.2 Determining the Slope of a Line

### Key Ideas

The slope is the measure of the steepness of a line. It is the ratio of the vertical distance (also called the rise) and the horizontal distance (also called the run) between two points on the line. The vertical distance is the difference of the two points'  $y$ -values and the horizontal distance is the difference of their  $x$ -values. The slope of a line is commonly denoted by  $m$ .

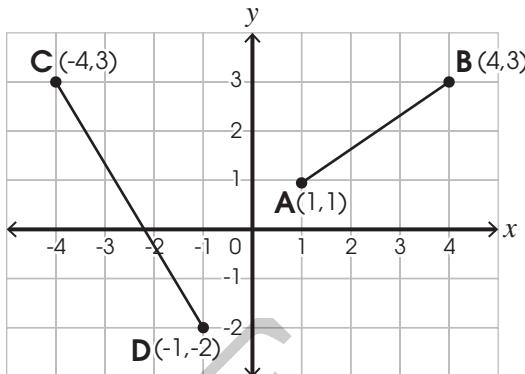


#### Slope of a Line

$$m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$$

### Examples

Find the slopes of the lines.



- Slope of line segment AB:

$$\begin{aligned} m &= \frac{3 - 1}{4 - 1} && \leftarrow y_2 - y_1 \text{ (difference in } y\text{-values)} \\ &= \frac{2}{3} && \leftarrow x_2 - x_1 \text{ (difference in } x\text{-values)} \end{aligned}$$

- Slope of line segment CD:

$$m = \frac{(-2) - 3}{(-1) - (-4)} = -\frac{5}{3}$$

Find the slopes of the line segments.

- ① Line AB

$$\begin{aligned} m &= \frac{7 - \boxed{\phantom{00}}}{1 - \boxed{\phantom{00}}} && \leftarrow y_2 - y_1 \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \end{aligned}$$

- ② Line CD

$$\begin{aligned} m &= \frac{4 - \boxed{\phantom{00}}}{7 - \boxed{\phantom{00}}} \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \end{aligned}$$

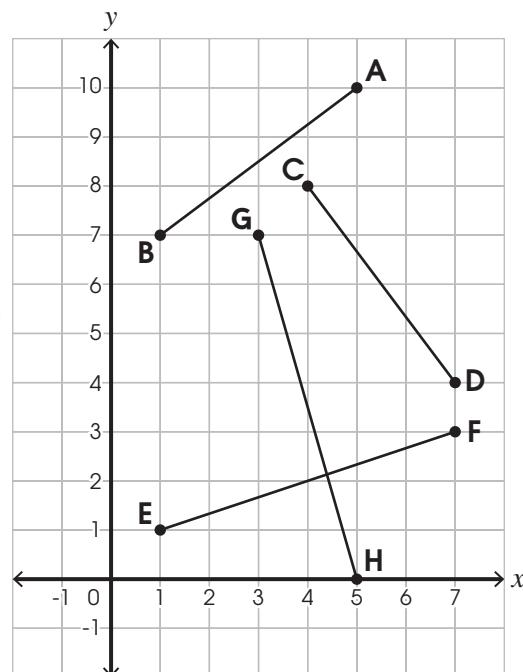
- ③ Line EF

$$\begin{aligned} m &= \frac{3 - \boxed{\phantom{00}}}{\boxed{\phantom{00}} - \boxed{\phantom{00}}} \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \end{aligned}$$

- ④ Line GH

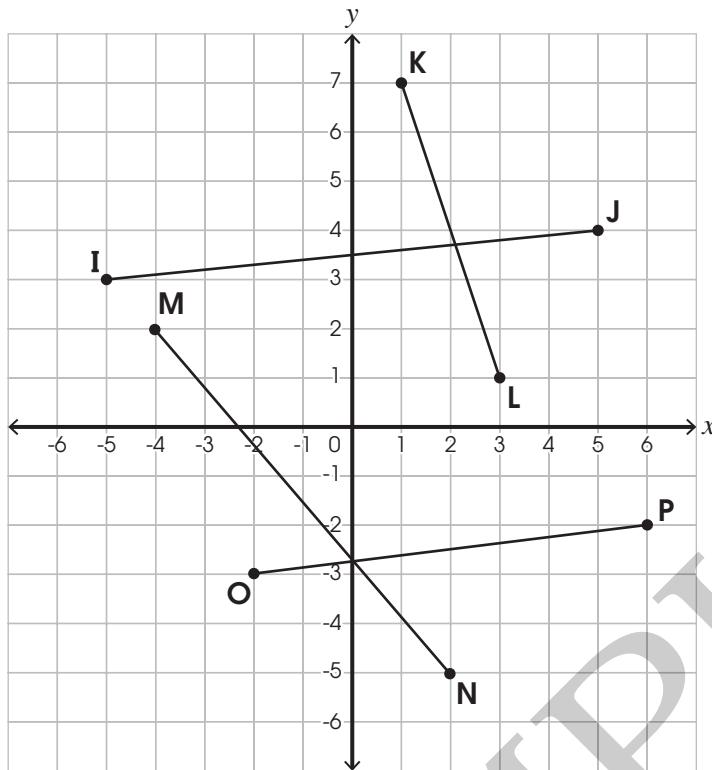
$$\begin{aligned} m &= \frac{0 - \boxed{\phantom{00}}}{\boxed{\phantom{00}} - \boxed{\phantom{00}}} \\ &= \frac{\boxed{\phantom{00}}}{\boxed{\phantom{00}}} \end{aligned}$$

### Try these!



Find the slopes of the line segments with the given points on the grid.

⑤



a. Line IJ

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-1 - 3}{5 - (-5)}$$

$$= \frac{-4}{10}$$

$$= -\frac{2}{5}$$

b. Line KL

c. Line MN

d. Line OP

**Hint**

To find the slope, it does not matter which is the first point and which is the second point, but they must be in the same order in both the numerator and denominator.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{y_1 - y_2}{x_1 - x_2} \quad \begin{matrix} \leftarrow \\ \text{same order} \end{matrix} \checkmark$$

$$m = \frac{y_2 - y_1}{x_1 - x_2} \quad \begin{matrix} \leftarrow \\ \text{different order} \end{matrix} \times$$

Find the slopes of the line segments with the given points. Show your work.

⑥ (2,0) (4,9)

⑦ (-1,3) (4,5)

⑧ (6,-3) (4,-1)

⑨ (-2,-4) (3,-1)

⑩ (4,1) (5,-6)

⑪ (0,-3) (-2,2)

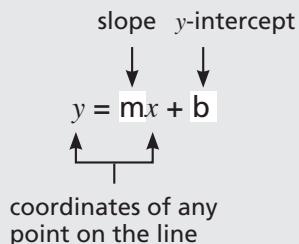
# Chapter 2

## Forms of Linear Equations

### 2.1 Slope-intercept Form: $y = mx + b$ (1)

#### Key Ideas

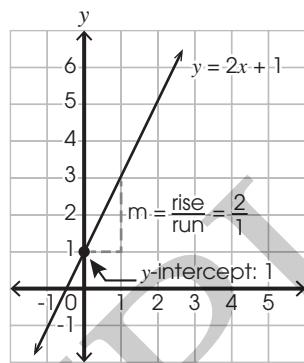
An equation of a line relates the  $x$ -coordinate and  $y$ -coordinate of any point that lies on the line. A linear equation is an equation of a straight line. It can be written in the slope-intercept form:  $y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept of the line.



#### Examples

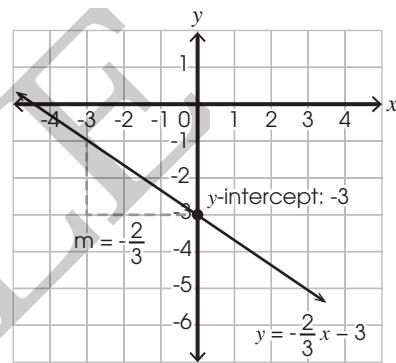
$$y = 2x + 1$$

$m = 2$        $y\text{-intercept} = 1$



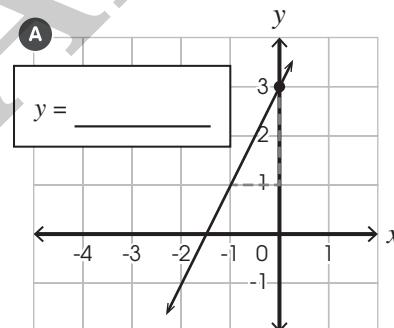
$$y = -\frac{2}{3}x - 3$$

$m = -\frac{2}{3}$        $y\text{-intercept} = -3$

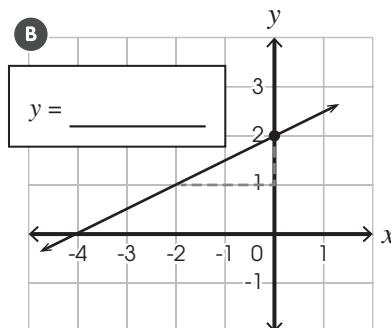


For each linear equation in the slope-intercept form, identify its slope and  $y$ -intercept. Then match it with its graph.

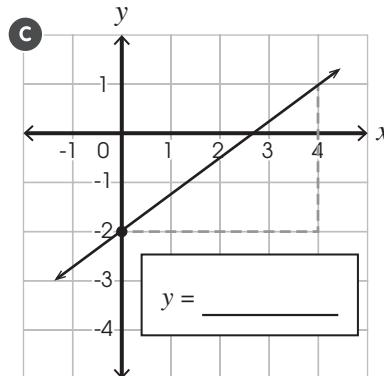
①  $y = 2x + 3$   
 $m =$    $y\text{-intercept} =$



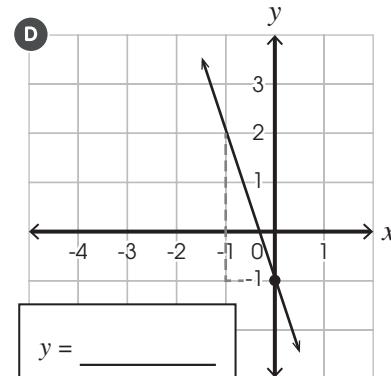
②  $y = \frac{1}{2}x + 2$   
 $m =$    $y\text{-intercept} =$



③  $y = -3x - 1$   
 $m =$    $y\text{-intercept} =$



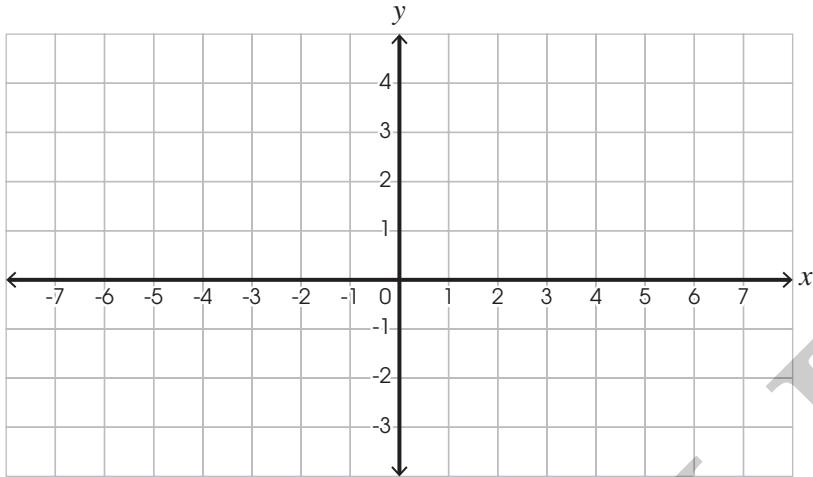
④  $y = \frac{3}{4}x - 2$   
 $m =$    $y\text{-intercept} =$



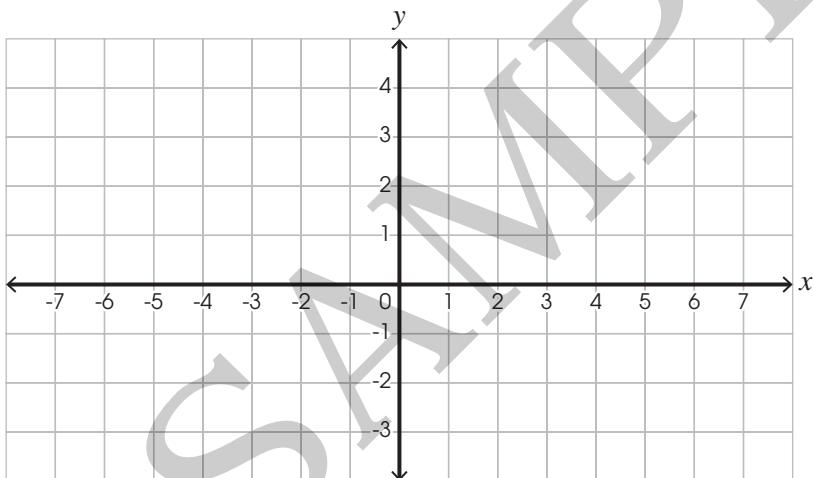
#### Try these!

Use the slope and  $y$ -intercept of each linear equation to graph it.

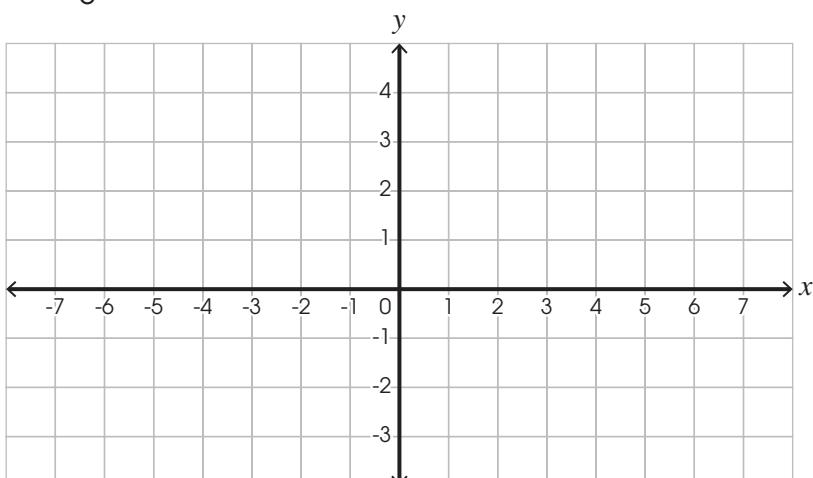
⑤  $y = \frac{1}{3}x + 2$        $m = \underline{\hspace{2cm}}$        $y\text{-intercept} = \underline{\hspace{2cm}}$



⑥  $y = \frac{3}{4}x - 1$        $m = \underline{\hspace{2cm}}$        $y\text{-intercept} = \underline{\hspace{2cm}}$



⑦  $y = -\frac{2}{3}x + 3$        $m = \underline{\hspace{2cm}}$        $y\text{-intercept} = \underline{\hspace{2cm}}$



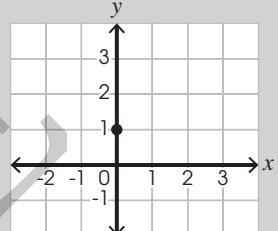
## Hint



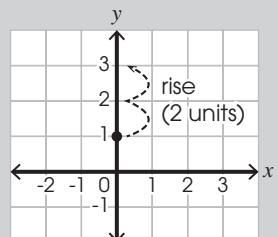
To graph a linear equation, follow the steps below.

e.g.  $y = \frac{2}{3}x + 1$   
 $\uparrow \quad \uparrow$   
 slope       $y$ -intercept

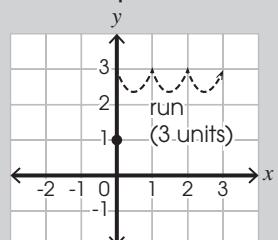
- ① Mark the  $y$ -intercept.



- ② Consider  $m = \frac{\text{rise}}{\text{run}}$ . If  $m > 0$ , move up from the  $y$ -intercept; if  $m < 0$ , move down from it.



Then move to the right.  
Mark the point.



- ③ Connect the  $y$ -intercept and the point to form a line.

