Unit 15
Introduction to Slope Equations of Lines and Graphing

Math Essentials

1

Warm-up

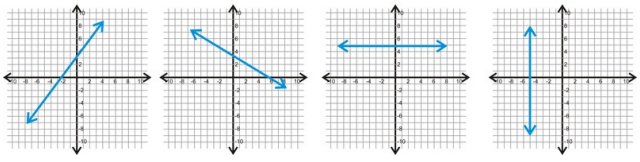
- Solve for y.

$$5x + 4y = 8$$

2

Consider...

How would you describe these different graphs?



3

Slope: "steepness," ratio of vertical change (rise) to horizontal change (run)

4

- A **positive slope** indicates that the line slants **up (rises)** from left to right.
- A **negative slope** indicates that the line slants **down (falls)** from left to right.
- **Parallel** lines have the **SAME** slope.

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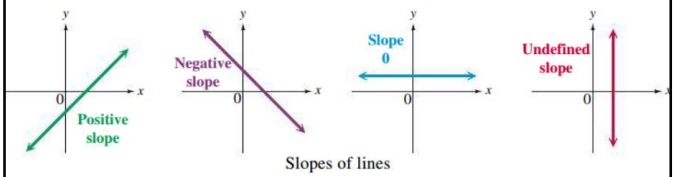

Slopes of lines

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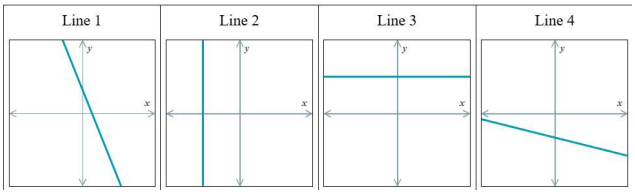
Practice 15.1

For each line, determine whether the slope is positive, negative, zero, or undefined.



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Slope: "steepness," ratio of vertical change (rise) to horizontal change (run)

$$\text{slope} = \text{rise over run} = \frac{\text{rise}}{\text{run}}$$

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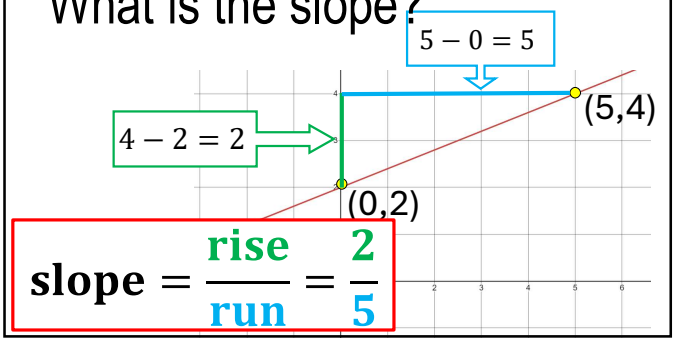
What is the slope?



$$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{2}{5}$$

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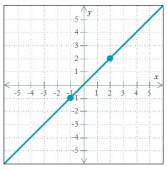
Practice 15.2

Find the slope of the line graphed below.



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Practice 15.3

1. Graph a line passing through $(0, -4)$ with $\text{slope} = \frac{2}{3}$.
2. Graph a line through $(3,1)$ with $\text{m} = -4$.
3. Graph the line with slope 0 passing through the point (-4, 3).

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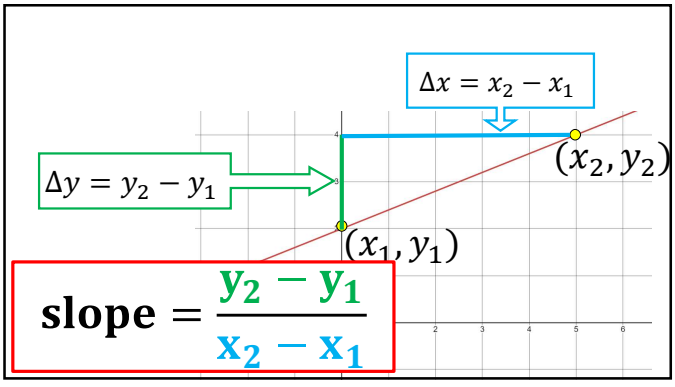

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Practice 15.4

1. Find the slope of the line passing through the points (-9, -6) and (-4, 5).
2. Find the slope of the line that has the points (-1,5) and (4,-3).

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Practice 15.5

1. Find the slope of the line passing through the points (7, -5) and (7, -8).
2. Find the slope of the line passing through the points (1, -6) and (2, -6).

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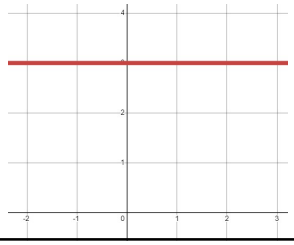
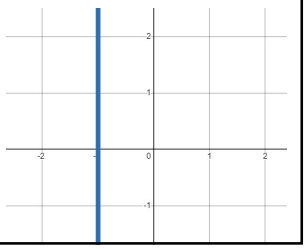
Practice 15.6

Write the equation of the following lines.





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Horizontal Lines

- An equation of the form $y = b$ always intersects the y-axis at the point (0,b).
- A line with this equation is horizontal and has **slope 0**.

Vertical Lines

- An equation of the form $x = a$ always intersects the x-axis at the point (a,0).
- A line with this equation is vertical and has **undefined slope.**

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Practice 15.7

Graph each of the following lines using two points on the line.

1. $y = 2x + 1$
2. $y = 2x + 2$
3. $y = -2x + 1$
4. $y = ½\,x + 1$

Notice anything about the equations and the lines?

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The slope-intercept form of the equation of a line with **slope m** and y-intercept **(0,b)** is

$$y = mx + b$$

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Practice 15.8

Identify the slope and y-intercept of each of the following lines.

1. $y = \frac{3}{2}x$
2. $y = -½x - 1$
3. $y = 4 - 5x$
4. $2x + y = 1$

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Practice 15.9

For each equation below, find the slope and the y-intercept. Then use them to graph the line.

1. $y = 3x - 7$
2. $-4x + y = 7$
3. $8x - 2y = 6$

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Practice 15.10

Write an equation in slope-intercept form for the line with slope $\frac{2}{5}$ and y-intercept -3.

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Practice 15.11

1. Graph the line with slope m=2 through the point (-1,-2). Write an equation for this line.
2. Write an equation for the line with slope m=½ through (4,1) WITHOUT graphing.

Hint: Use the equation for slope.

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- Rearrange the equation for slope to find the "point-slope" form of a line.

Slope

$$y - y_1 = m(x - x_1).$$

Given point

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Practice 15.12

Graph the line.

$$y + 4 = 5(x - 3)$$

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Practice 15.13

Write an equation for the line with slope $m = -2$ through the point $(6, -8)$.

1. Using point-slope form
2. Using slope-intercept form

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Practice 15.14

Write the equation of the line with the given conditions.

1. Through (-3,3) and slope 0.
2. Through (-3,3) and undefined slope.
3. Through (2,5) and slope $m = -4$

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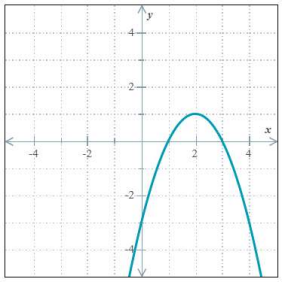
What is a function?



$f(x) = -2x - 5$

x	$h(x)$
-2	3
0	-6
1	9
4	45
7	-199

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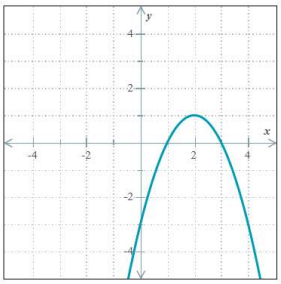
Practice 15.15

The graph of a function is given below.

Give all x-intercepts and y-intercepts shown.



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Practice 15.16

Graph the function

$$g(x) = \frac{3}{5}x - 9$$

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