

## Mini-Lecture 3.3

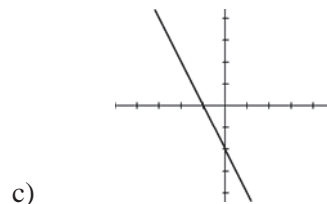
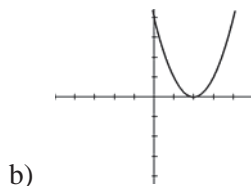
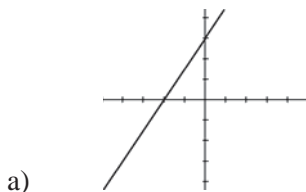
### Intercepts

#### Learning Objectives:

1. Identify intercepts of a graph.
2. Graph a linear equation by finding and plotting intercepts.
3. Identify and graph vertical and horizontal lines.

#### Examples:

1. Identify the intercepts.



2. Graph each linear equation by finding and plotting its intercepts.

a)  $x - y = 2$

b)  $x - y = -3$

c)  $2x + 4y = 8$

d)  $x - 3y = 0$

e)  $y = 3x + 3$

f)  $y = -2x - 4$

3. Identify the type of equation (horizontal or vertical line) and graph the equation.

a)  $x = -3$

b)  $y = 2$

c)  $x + 3 = 5$

#### Teaching Notes:

- Sometimes, students will list the intercepts as a single number; not an ordered pair. For example: x-intercept: 3, y-intercept: 4.
- Remind students that any time  $(0, 0)$  is a point on a graph, then that is both its x- and y-intercept.
- Some students confuse horizontal and vertical lines. For example: if  $x = -5$ , have students mentally graph the line that would intersect the x axis at  $-5$ . This line could only be vertical, not horizontal.
- Each section in the text has 3 worksheets in the Extra Practice featuring differentiated learning.

Answers: 1a)  $(-2, 0), (0, 3)$ ; 1b)  $(2, 0), (0, 4)$ ; 1c)  $(-1, 0), (0, -2)$ ; 2a) – 2f) see mini-lecture graphing answers; 3a) vertical; 3b) horizontal; 3c) vertical.

## Mini-Lecture 3.4

### Slope and Rate of Change

#### Learning Objectives:

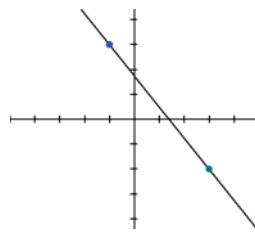
1. Find the slope of a line given two points of the line.
2. Find the slope of a line given its equation.
3. Find the slopes of horizontal and vertical lines.
4. Compare the slopes of parallel and perpendicular lines.
5. Slope as a rate of change.

#### Examples:

1. Find the slope of the line that passes through the given points.

a) (6, 5) and (1, 7)

b)



c) (-5, 0) and (0, -3)

2. Find the slope of each line.

a)  $x + y = 12$

b)  $3x + y = 8$

c)  $11x - 3y = 33$

d)  $9x + y = -12$

e)  $y + 5 = 0$

f)  $2x - 7 = 0$

3. Determine whether each pair of lines is parallel, perpendicular, or neither.

a)  $3x = 2y + 3$   
 $2x + 3y = 2$

b)  $x + 3y = 4$   
 $8x + 2y = 2$

c)  $9x = 16 - 3y$   
 $16 - 4y = 12x$

Find the slope of a line that is (a) parallel and (b) perpendicular to the line passing through each pair of points.

d) (-5, -5) and (-1, -1)

e) (-2, 10) and (5, -4)

4. An inclined ramp leading to a warehouse is to rise 16 inches for each horizontal distance of 17 feet. Write this slope as a grade. (Round to the nearest tenth of a percent, if necessary).

#### Teaching Notes:

- Many students confuse the change in y and change in x in the slope formula. Hint: if you can imagine a picnic table ( $\overline{X} \quad \overline{X}$ ), the x is on the bottom. If the y is on the bottom ( $\overline{Y} \quad \overline{Y}$ ), the picnic table will fall over!
- Remind students to “read” the slope of the line as it moves from left to right.
- Each section in the text has 3 worksheets in the Extra Practice featuring differentiated learning.

Answers: 1a)  $-\frac{2}{5}$ ; 1b)  $\frac{5}{4}$ ; 1c)  $-\frac{3}{5}$ ; 2a) -1, 2b) -3; 2c)  $\frac{11}{3}$ ; 2d) -9; 2e) 0; 2f) undefined;

3a) perpendicular; 3b) neither; 3c) parallel; 3d) a: 1, b: -1; 3e) a: -2, b: 1/2; 4) 4/51 or 7.8%

## Mini-Lecture 3.5

### Equations of Lines

#### Learning Objectives

1. Use the slope-intercept form to write an equation of a line.
2. Use the slope-intercept form to graph a linear equation.
3. Use the point-slope form to find an equation of a line given its slope and a point on the line.
4. Use the point-slope form to find an equation of a line given two points on the line.
5. Find equations of vertical and horizontal lines.
6. Use the point-slope form to solve problems.

#### Examples:

1. Write an equation of the line with each given slope,  $m$ , and  $y$ -intercept,  $(0, b)$ .  
a)  $m = -9; b = 4$       b)  $m = -\frac{2}{3}; b = 7$       c)  $m = 0; b = \frac{1}{2}$       d)  $m = -\frac{5}{2}; b = \frac{31}{2}$
2. Use the slope-intercept form to graph each equation.  
a)  $y = \frac{1}{2}x - 3$       b)  $y = -\frac{1}{4}x + 2$       c)  $y = -4x$       d)  $5x + 2y = 10$
3. Find an equation of each line with the given slope that passes through the given point. Write the equation in the form  $Ax + By = C$ .  
a)  $m = 4; (10, 5)$       b)  $m = -\frac{7}{9}; (5, 2)$       c)  $m = -6; (-8, -10)$       d)  $m = \frac{1}{2}; (-4, 8)$
4. Find an equation of the line passing through each pair of points. Write the equation in the form  $Ax + By = C$ .  
a)  $(-7, -4)$  and  $(0, 5)$       b)  $(3, 7)$  and  $(-2, -6)$   
c)  $(9, -9)$  and  $(6, -5)$       d)  $\left(-\frac{1}{2}, \frac{3}{4}\right)$  and  $\left(-\frac{5}{3}, \frac{1}{3}\right)$
5. Find an equation of each line.  
a) Vertical line through  $(0, 5)$       b) Horizontal line through  $(4, 3)$
6. Solve.  
Assume the following describes a linear relationship. Write an equation in slope-intercept form. A faucet is used to add water to a large bottle that already contains some water. After it has been filling for 3 seconds, the gauge on the bottle indicates that it contains 10 ounces of water. After it has been filling for 20 seconds, the gauge indicates the bottle contains 24 ounces of water. Let  $y$  be the amount of water in the bottle  $x$  seconds after the faucet was turned on. Write a linear equation that models the amount of water in the bottle in terms of  $x$ .

#### Teaching Notes:

- Many students do not understand that you leave “ $x$  and  $y$ ” in the final equation.
- Each section in the text has 3 worksheets in the Extra Practice featuring differentiated learning.

Answers: 1a)  $y = -9x + 4$ ; 1b)  $y = -\frac{2}{3}x + 7$ ; 1c)  $y = \frac{1}{2}$ ; 1d)  $y = -\frac{5}{2}x + \frac{31}{2}$ ; 2a)-2d) see mini-lecture graphing answers; 3a)  $4x - y = 35$ ; 3b)  $7x + 9y = 53$ ; 3c)  $6x + y = -58$ ; 3d)  $x - 2y = -20$ ; 4a)  $9x - 7y = -35$ ; 4b)  $13x - 5y = 4$ ; 4c)  $4x + 3y = 9$ ; 4d)  $5x - 14y = -13$ ; 5a)  $x = 0$ ; 5b)  $y = 3$ ; 6)  $14x - 17y = -128$