

FINAL -

Fri 19 Dec

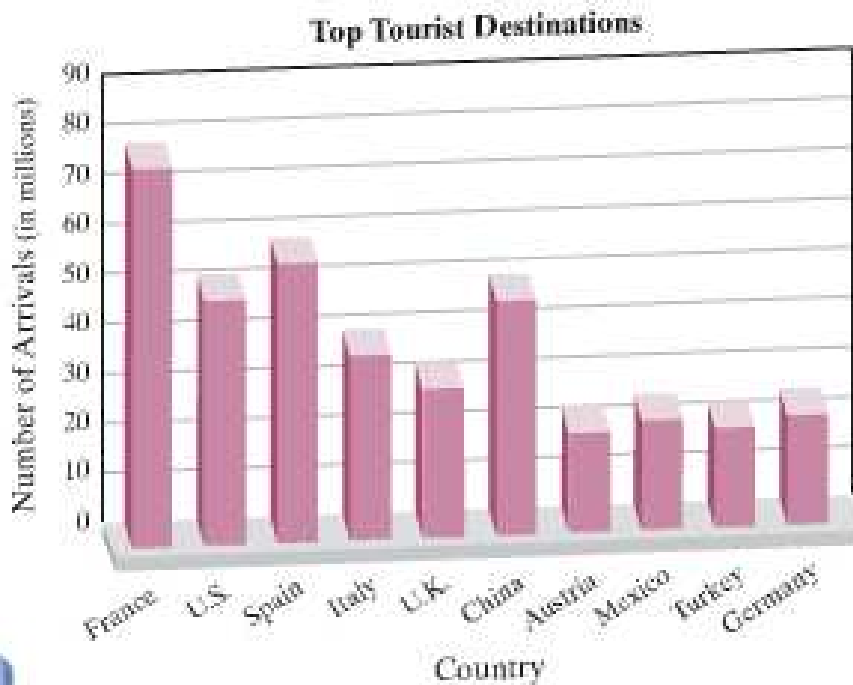
S-101

8-3

Chap 3: Graphing

Bar graph: a series of bars arranged horizontally or vertically.

Ex: (p 180)



Austria

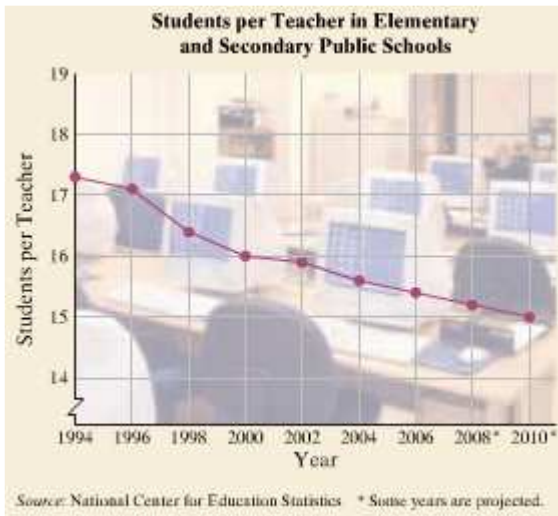
2. Which country is the least popular tourist destination.

4. Which countries have between 40 & 50 million tourists per year?

6. Estimate the number of tourists per year whose destination is Turkey.

Line graph: a series of points connected by line segments.

Ex: (p 180)



12. Approximate the number of students per teacher in 2010.

14. What was the first year shown that the number of students per teacher fell below 17?

Rectangular Co-ordinate System

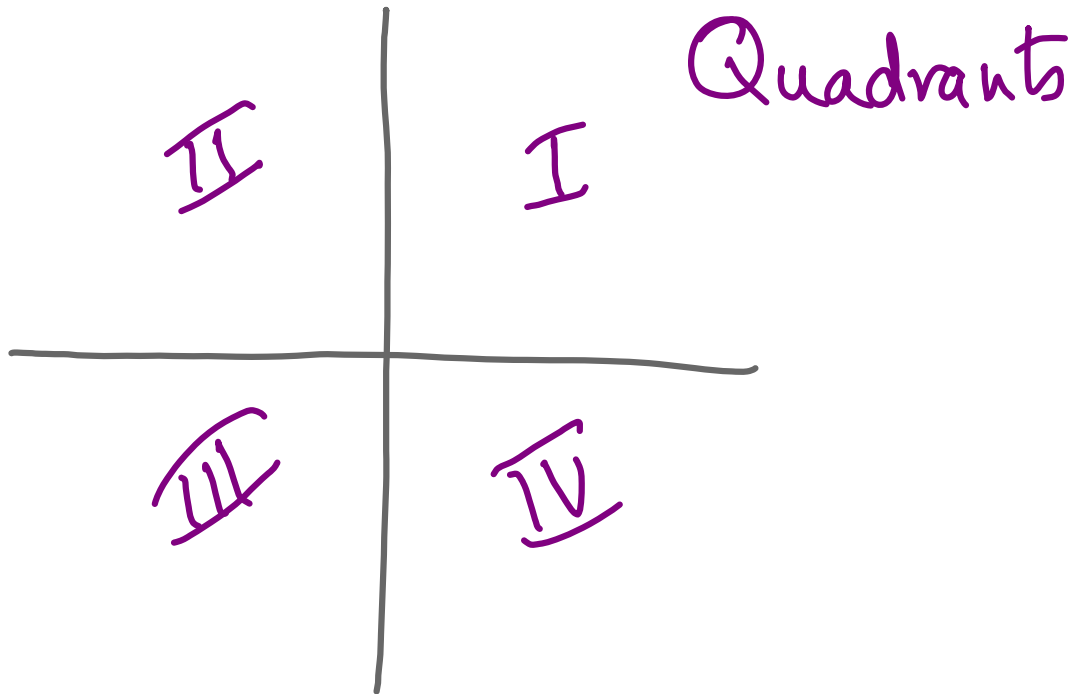
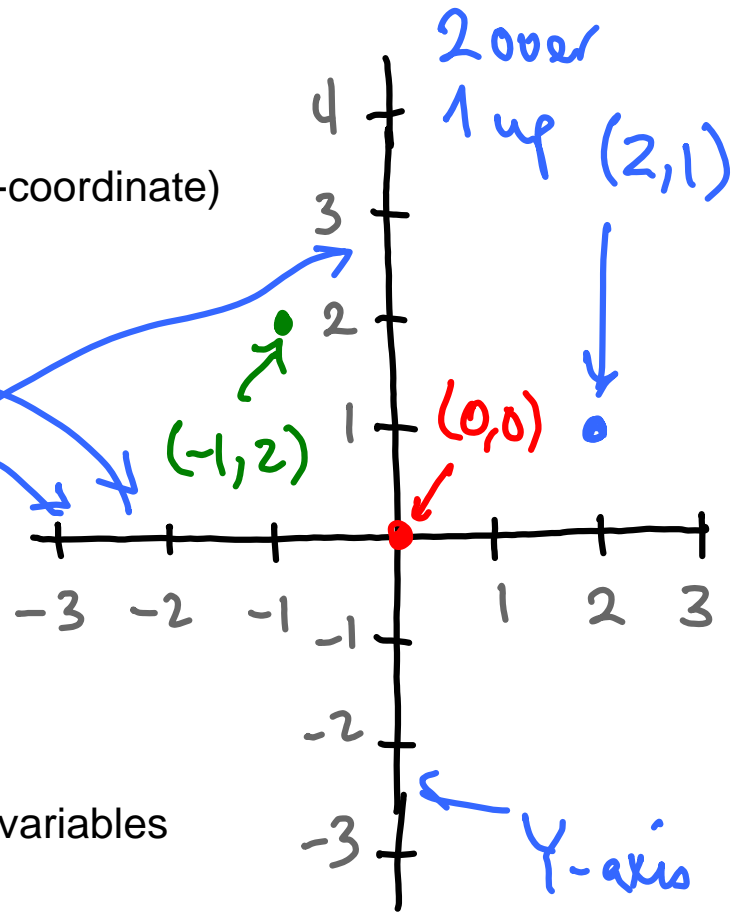
Ordered pair: (x-coordinate, y-coordinate)

Origin:

Quadrants:

Axes:

Solution of an equation in two-variables



Ex: (p182)

Are the following ordered pairs solutions of the equations given?

40. $3x + y = 8$; (2, 3), (0, 8), (8, 0)

$$3(2) + 3 \stackrel{?}{=} 8 \quad \text{NO.}$$

$$3(0) + 8 \stackrel{?}{=} 8 \quad \checkmark$$

44. $y = -2$; (-2, 2), (2, -2), (0, -2)

Complete each ordered pair:

46. $x - 5y = -1$; (, -2), (4,)

$$\begin{array}{rcl} x - 5(-2) & = & -1 \\ x + 10 & = & -1 \\ x & = & -11 \end{array} \quad \Bigg|$$

$$\begin{array}{rcl} 4 - 5y & = & -1 \\ -5y & = & -5 \\ y & = & 1 \end{array}$$

48. $y = \frac{1}{5}x - 2$; (-10,), (, 1)

Complete each table:

50. $y = -9x$

x	y
0	0
-3	27
$-\frac{2}{9}$	2

$$y = -9x$$

$$2 = -9x$$

$$-\frac{2}{9} = x$$

56. $2x + y = 4$

x	y
0	4
2	0
1	2

$$2x + 4 = 4$$

$$2x = 0$$

$$x = 0$$

$$2(2) + y = 4$$

$$4 + y = 4$$

$$y = 0$$

$$2x + 2 = 4$$

$$2x = 2$$

$$x = 1$$

58. $y = 5x + 10$

x	y
	0
	5
0	

$$y = 5(0) + 10$$

$$y = 10$$

$$0 = 5x + 10$$

$$-10 = 5x$$

$$-2 = x$$

$$5 = 5x + 10$$

$$-5 = 5x$$

$$-1 = x$$

60. $x - 6y = 3$

x	y
0	
1	
	-1

Complete each table and plot the points:

62. $y = -3x$

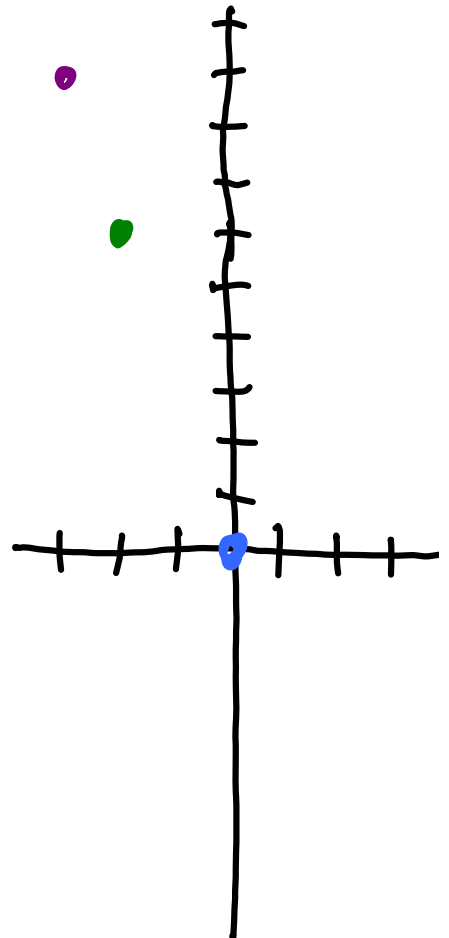
x	y
0	0
-2	6
-3	9

$$y = -3(0)$$

$$y = 0$$

$$y = -3(-2)$$

$$y = 6$$



$$9 = -3x$$

$$-3 = x$$

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

x	y
0	
-4	
	0

66. The hourly wage y of an employee at a certain production company is given by $y = 0.25x + 9$ where x is the number of units produced by the employee in an hour.

a. Complete the table.

x	0	1	5	10
y				

3.2: Graphing Linear Equations

Identifying a linear equation

Graph of an equation

Linear Equation in Two Variables

A linear equation in two variables is an equation that can be written in the form

$$Ax + By = C$$

where A , B , and C are real numbers and A and B are not both 0. **The graph of a linear equation in two variables is a straight line.**

Ex: (p 191)

Determine whether each equation is a linear equations in two variables.

2. $y = x - 15$ ✓

$xy = 1$ ✗

4. $x = y^3$ ✗

$y = x^2 + 3$ ✗

6. $0.01x - 0.2y = 8.8$ ✓

✗ $y = \frac{4}{x} = 4x^{-1}$

8. $x = 25$ ✓

Find three ordered pairs and then graph the equation

10. $x - y = 4$

x	y
0	
	2
-1	

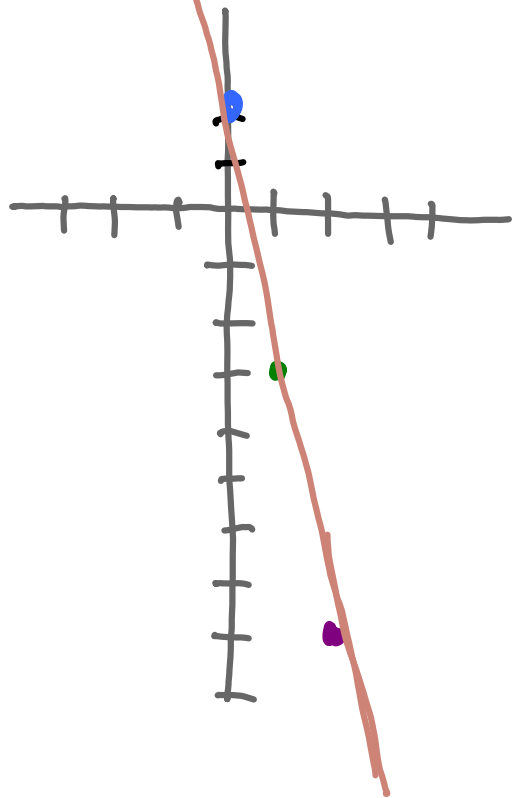
$$y = -\sqrt{}(0) + 2 = 2$$

$$y = -\sqrt{}(1) + 2 \\ = -\sqrt{} + 2 = -3$$

16. $y = -5x + 2$

x	y
0	2
1	-3
2	-8

$$y = -\sqrt{}(2) + 2 \\ = -10 + 2 = -8$$

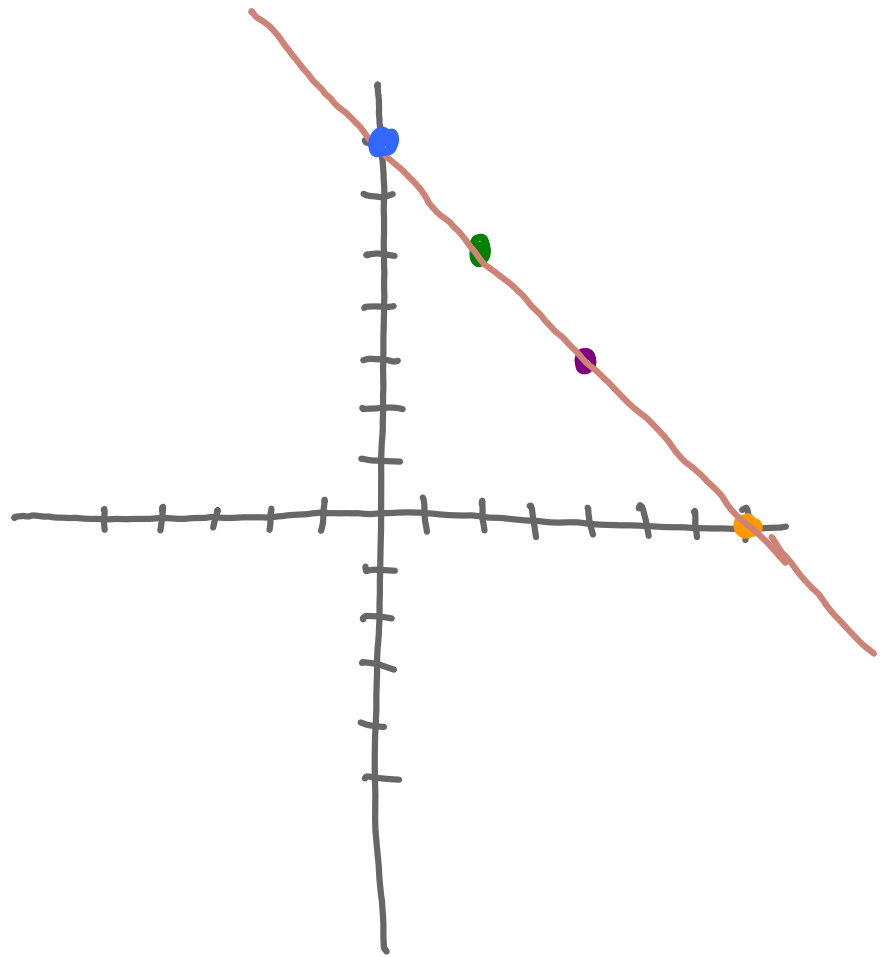


Graph:

18. $x + y = 7$

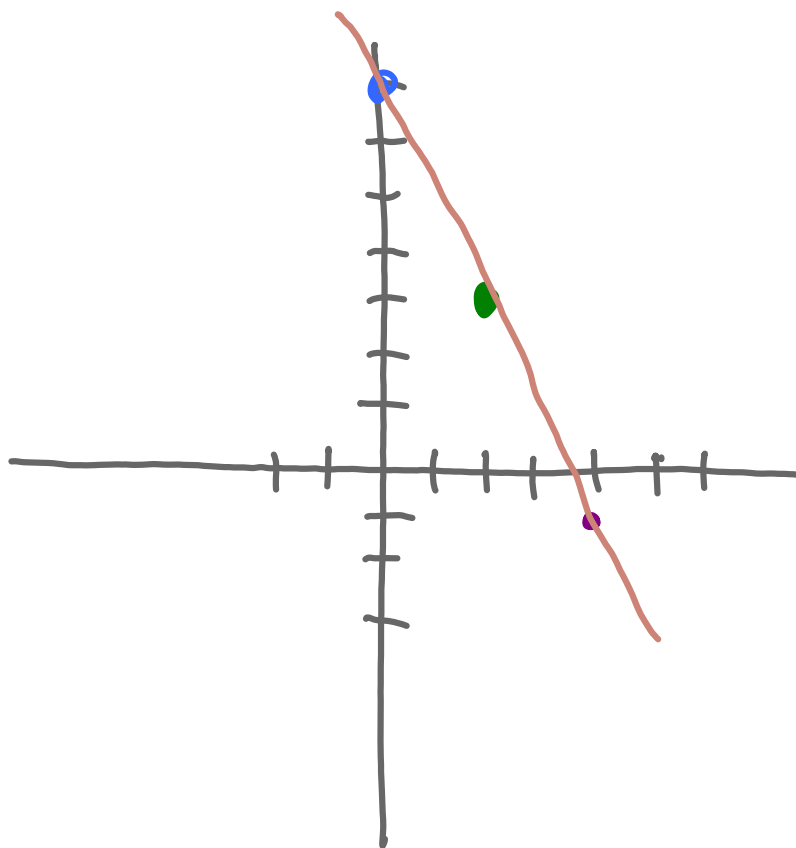
$$y = 7 - x$$

x	y
0	7
2	✓
4	3
7	0



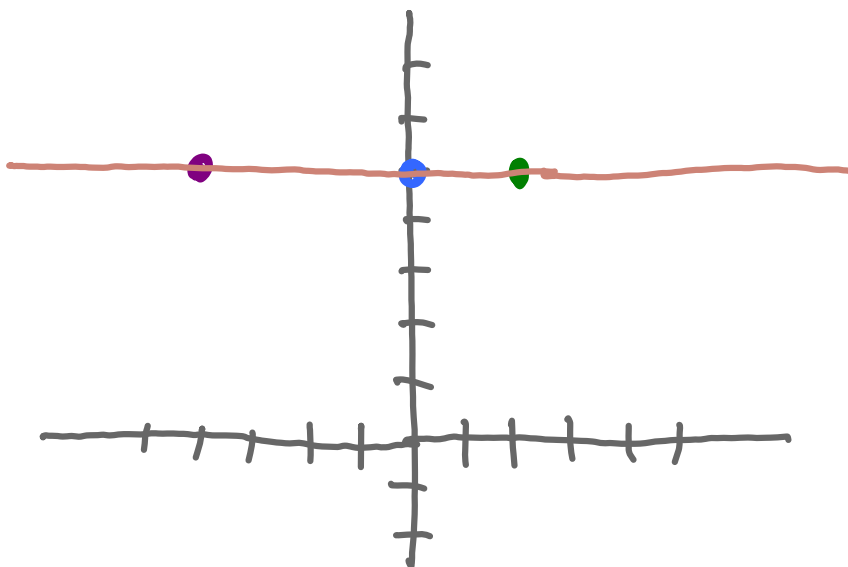
24. $y = -2x + 7$

x	y
0	7
2	3
4	-1



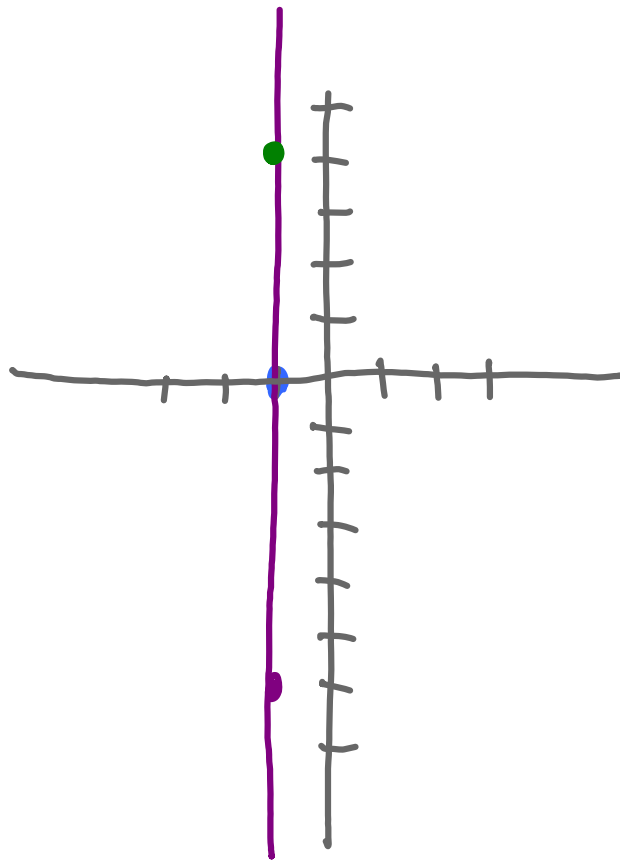
26. $y = 5$

x	y
0	✓
2	✓
-4	✓



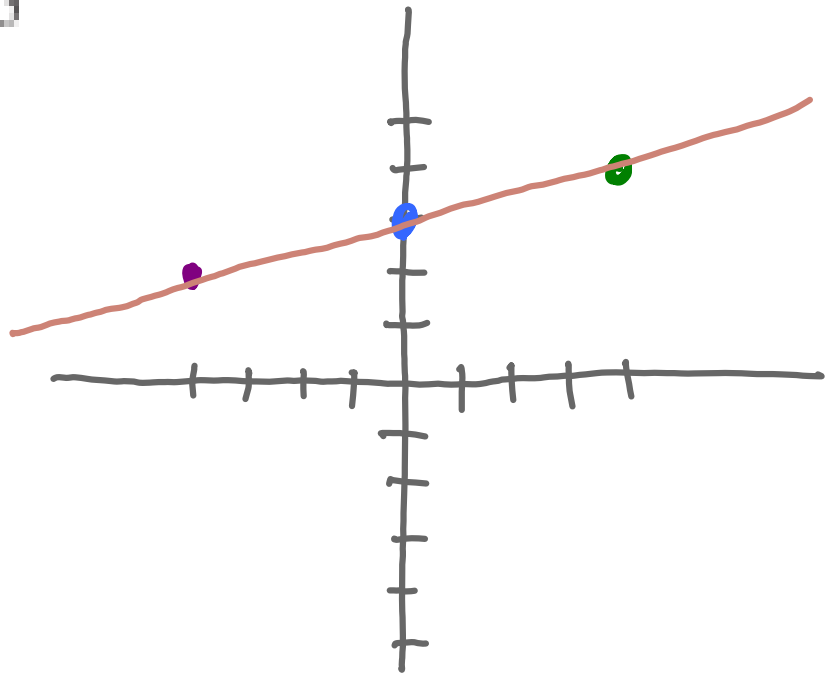
28. $x = -1$

x	y
-1	0
-1	4
-1	-6



36. $y = \frac{1}{4}x + 3$

x	y
0	3
4	4
-4	2



Graph both lines on the same graph.
Do you notice any differences and/or similarities?

42. $y = 2x$; $y = 2x + 5$

44. $y = x$; $y = x - 7$

52. The revenue y (in billions of dollars) for Home Depot stores during the years 2000 through 2005 is given by the equation $y = 7x + 45$, where x is the number of years after 2000. (Source: Based on data from Home Depot stores)

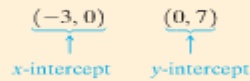


- Use this equation or a graph of it to complete the ordered pair $(5, \quad)$.
 - Write a sentence explaining the meaning of the answer to part (a).
 - If this trend continues, predict the revenue for Home Depot stores for the year 2015.
54. The U.S. silver production (in metric tons) from 2000 to 2004 has been steadily dropping, and can be approximated by the equation $y = -196x + 1904$ where x is the number of years after 2000. If this current trend continues, use the equation to estimate the U.S. silver production in 2009. Write your answer as a sentence. (Source: U.S. Geological Survey)

3.3: Intercepts

► **Helpful Hint**

If a graph crosses the x -axis at $(-3, 0)$ and the y -axis at $(0, 7)$, then



Notice that for the y -intercept, the x -value is 0 and for the x -intercept, the y -value is 0.

Note: Sometimes in mathematics, you may see just the number 7 stated as the y -intercept, and -3 stated as the x -intercept.

Finding x - and y -intercepts

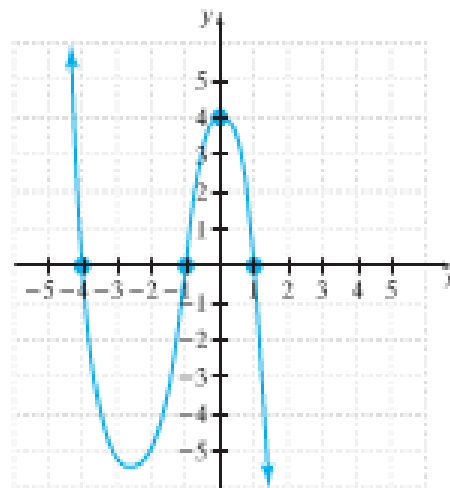
To find the x -intercept, let $y = 0$ and solve for x .

To find the y -intercept, let $x = 0$ and solve for y .

Ex: (p 200)

Find all intercepts:

6.



What are the greatest and least number of intercepts for a line?
x-intercepts?
y-intercepts?

Find the intercepts:

14. $x - y = -4$

20. $2x + 3y = 6$

24. $y = 2x + 10$

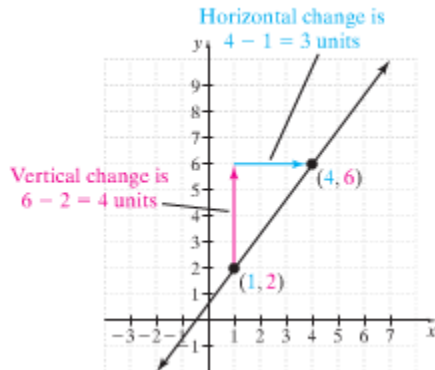
40. $-x + 9y = 10$

42. $x = -1\frac{3}{4}$

44. $y = 2\frac{1}{2}$

3.4: Slope & Rate of Change

$$\text{slope} = \frac{\text{change in } y \text{ (vertical change)}}{\text{change in } x \text{ (horizontal change)}} = \frac{4}{3}$$



Slope of a Line

The slope m of the line containing the points (x_1, y_1) and (x_2, y_2) is given by

$$m = \frac{\text{rise}}{\text{run}} = \frac{\text{change in } y}{\text{change in } x} = \frac{y_2 - y_1}{x_2 - x_1}, \quad \text{as long as } x_2 \neq x_1$$

Ex: (p 213)

Find the slope:

2. (3, 1) and (2, 6)
4. (6, -6) and (6, 2)
6. (4, -3) and (2, 2)
8. (0, 13) and (-4, 13)

26. $y = 4$

28. $x = 2$

30. $y = -11$

32. $x = 0$

34. $y = -2x + 6$

36. $y = -7.6x - 0.1$

38. $-5x + y = 10$

40. $3x - 5y = 1$

42. $y = -2$

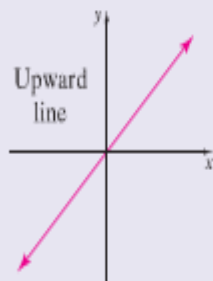
44. $x = -4y$

46. $x = 5$

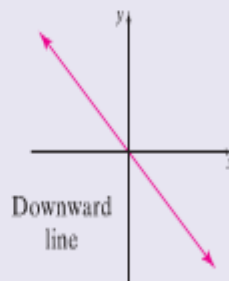
Summary of Slope

Slope m of the line through (x_1, y_1) and (x_2, y_2) is given by the equation

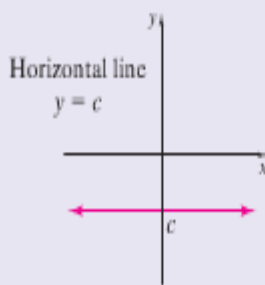
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



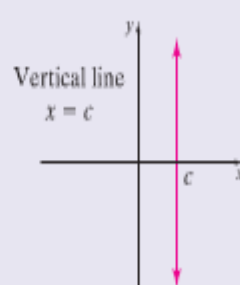
Positive slope: $m > 0$



Negative slope: $m < 0$



Zero slope: $m = 0$



Undefined slope or no slope

Slope-Intercept Form

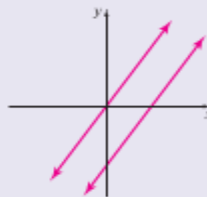
When a linear equation in two variables is written in slope-intercept form,

$$y = mx + b$$

m is the slope of the line and $(0, b)$ is the y -intercept of the line.

Parallel Lines

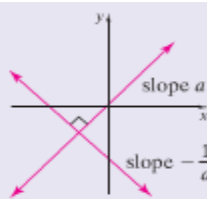
Nonvertical parallel lines have the same slope and different y -intercepts.



Perpendicular Lines

If the product of the slopes of two lines is -1 , then the lines are perpendicular.

(Two nonvertical lines are perpendicular if the slopes of one is the negative reciprocal of the slope of the other.)



Ex: (p 214)

Are the following parallel, perpendicular, or neither.

52. $y = \frac{1}{5}x + 20$

$$y = -\frac{1}{5}x$$

54. $y = 4x - 2$

$$4x + y = 5$$

56. $-x + 2y = -2$

$$2x = 4y + 3$$

58. $10 + 3x = 5y$

$$5x + 3y = 1$$

3.5: Equations of Lines

Slope-Intercept Form

When a linear equation in two variables is written in **slope-intercept form**,

$$y = mx + b$$

↑ ↑
slope $(0, b)$, y-intercept

then m is the slope of the line and $(0, b)$ is the y -intercept of the line.

Forms of Linear Equations

$$Ax + By = C$$

Standard form of a linear equation.

A and B are not both 0.

$$y = mx + b$$

Slope-intercept form of a linear equation.

The slope is m and the y -intercept is $(0, b)$.

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

Point-slope form of a linear equation.

The slope is m and (x_1, y_1) is a point on the line.

$$y = c$$

Horizontal line

The slope is 0 and the y -intercept is $(0, c)$.

$$x = c$$

Vertical line

The slope is undefined and the x -intercept is $(c, 0)$.

Parallel and Perpendicular Lines

Nonvertical parallel lines have the same slope.

The product of the slopes of two nonvertical perpendicular lines is -1 .

Ex: (p 224)

Write an Equation of the Line Given the Info Below

2. $m = -3, b = -3$

6. $m = -\frac{4}{5}, b = 0$

12. $y = -4x - 1$

18. $-3x + y = 2$

20. $3x - 4y = 4$

24. $m = 4; (1, 3)$

28. $m = \frac{2}{3}; (-8, 9)$

32. $(6, 2)$ and $(8, 8)$

36. $(7, 10)$ and $(-1, -1)$

38. $(0, 0)$ and $\left(-\frac{1}{2}, \frac{1}{3}\right)$

40. Horizontal line through $(1, 4)$

42. Vertical line through $(-1, 3)$

46. Perpendicular to $y = 5$, through $(1, 2)$

48. Parallel to $y = -4$, through $(0, -3)$

52. With slope $\frac{5}{7}$, through $(0, -3)$

54. Through $(5, -6)$ and $(-6, 5)$

60. Slope -2 ; y-intercept $(0, -4)$

64. Through $(4, 7)$ and $(0, 0)$