Section 11.R.3 The Cartesian Coordinate System, Scatter Plots, and Linear Equations

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Cartesian Coordinate System

We say that (2,7) is a _____ the equation. The first number, 2, is called the _____ (or _____), and the second number, 7, is called the _____ (or _____).

The Cartesian coordinate system relates algebraic equations and ordered pairs of real numbers to geometry in a plane. In this system, two number lines intersect at a right angle and separate the plane into four _____. The origin, designated by the ordered pair (0,0), is _____. The horizontal number line is called the _____ or _____. The vertical number line is called the _____ or _____.

One-to-One Correspondence

There is a **one-to-one correspondence** between

_____.

Example 1 Graphing Ordered Pairs

Graph the set of ordered pairs $\{A(-3,1), B(-1,-3), C(0,2), D(1,5), E(2,-4)\}$.

Note: The listing of ordered pairs within the braces can be in any order.

Solution

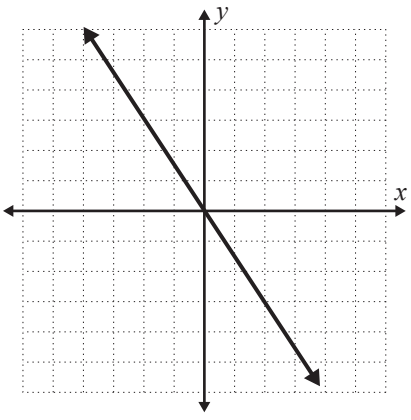
Exercises

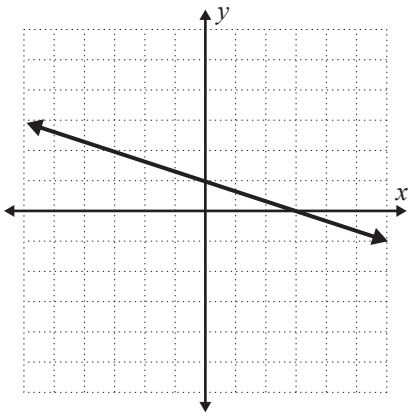
Graph the sets of ordered pairs and label the points.

1. $\{A(-5,1), B(-3,4), C(-1,1), D(2,2), E(2,-2)\}$

2. $\{A(-3,4), B(-2,-1), C(-1,6), D(2,0), E(3,-3)\}$

List any three points on each line. (There is more than one correct answer.)

3. 

4. 

Scatter Plots

In statistics, data is sometimes given in the form of ordered pairs, called _____, where each ordered pair represents two pieces of information about one situation. The ordered pairs are plotted on a graph and the graph is called a _____, or _____.

Example 3 Creating a Scatter Plot

The table gives estimated budget and opening weekend sales of top opening movies.

Budgets of Top Opening Movies and their Opening Sales

Budget (in millions)	Opening Weekend Sales (in millions)
321	257
245	248
150	208
220	207
200	202
250	191
200	182
250	179
160	174
200	174

Source: IMDB

a. Rewrite the data in the table as ordered pairs in the form (Budget, Opening Sales).

b. Use the data to create a scatter plot.

Solution

Exercises

For each data set, **a.** rewrite the data in the table as ordered pairs and **b.** use the data to create a scatter plot.

5. The following table gives the height and weight of NBA players who scored the most points in 2018.

Height and Weight of NBA Players

Height (in inches)	Weight (in pounds)
77	220
82	253
80	250
75	195
83	242
81	240
75	200
75	193
83	260
76	210

Source: ESPN

Finding Ordered Pairs that Satisfy Linear Equations

Solution Set of an Equation in Two Variables

The **solution set** of an equation in two variables, x and y, consists of_____

_____.

Graphing Linear Equations by Plotting Points

Standard Form of a Linear Equation

Any equation of the form

_____.

where A, B, and C are real numbers and A and B are not both equal to 0, is called the **standard form of a linear equation**.

To Graph a Linear Equation in Two Variables

1. Locate any two points that _____.
2. _____.
3. _____.
4. **To check:** Locate a third point that _____

   _____.

Example 6 **Graphing a Linear Equation in Two Variables**

Graph: $x - 2y = 1$

Solution

Exercises

Locate at least two ordered pairs of real numbers that satisfy each linear equation and graph the corresponding line in the Cartesian coordinate system.

6. $x + y = 3$

7. $3y = 2x - 4$

8. $3x + 5y = 6$

9. $\frac{2}{5}x - 3y = 5$

Graphing Linear Equations by Plotting the *x*- and *y*-Intercepts

Intercepts

1. To find the ***y*-intercept** (where the line crosses the *y*-axis),

_____.

2. To find the ***x*-intercept** (where the line crosses the *x*-axis),

_____.

PROCEDURE

Example 8 Using Intercepts to Graph Linear Equations

Graph $3x - 2y = 12$ by locating the *y*-intercept and the *x*-intercept.

Solution

Exercises

Graph each linear equation by locating the *y*-intercept and the *x*-intercept.

10. $x - 2y = 8$

11. $x + y = 6$

12. $4x - y = 10$

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