

## Section P.3 The Cartesian Plane and Graphs of Equations

**Objective:** In this lesson you learned how to plot points in the coordinate plane, use the Distance and Midpoint Formulas, and graph equations.

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

**Rectangular coordinate system**

**Ordered pair**

**Graph of an equation**

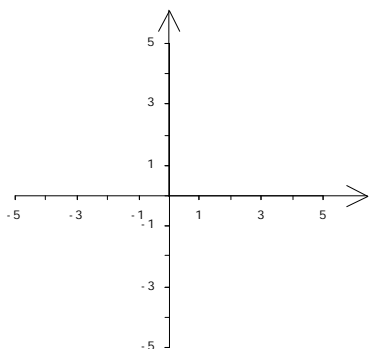
**Intercepts**

**Symmetry**

### I. The Cartesian Plane (Pages 25–26)

On the Cartesian plane, the horizontal real number line is usually called the \_\_\_\_\_, and the vertical real number line is usually called the \_\_\_\_\_. The origin is the \_\_\_\_\_ of these two axes, and the two axes divide the plane into four parts called \_\_\_\_\_.

On the Cartesian plane shown below, label the  $x$ -axis, the  $y$ -axis, the origin, Quadrant I, Quadrant II, Quadrant III, and Quadrant IV.

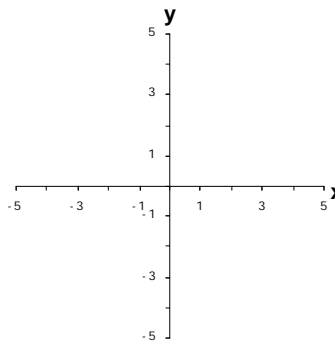


### *What you should learn*

How to plot points in the Cartesian plane

To sketch a **scatter plot** of paired data given in a table, . . .

**Example 1:** Explain how to plot the ordered pair  $(3, -2)$ , and then plot it on the Cartesian plane provided.



## II. The Distance Formula (Page 27)

The **Distance Formula** states that . . .

***What you should learn***  
How to use the Distance Formula to find the distance between two points

**Example 2:** Explain how to use the Distance Formula to find the distance between the points  $(4, 2)$  and  $(5, -1)$ . Then find the distance and round to the nearest hundredth.

## III. The Midpoint Formula (Page 28)

The **midpoint** of a line segment is the point that subdivides the segment into two portions of \_\_\_\_\_ length.

The **Midpoint Formula** gives the midpoint of the segment joining the points  $(x_1, y_1)$  and  $(x_2, y_2)$  as . . .

***What you should learn***  
How to use the Midpoint Formula to find the midpoint of a line segment

**Example 3:** Explain how to find the midpoint of the line segment with endpoints at  $(-8, 2)$  and  $(6, -10)$ . Then find the coordinates of the midpoint.

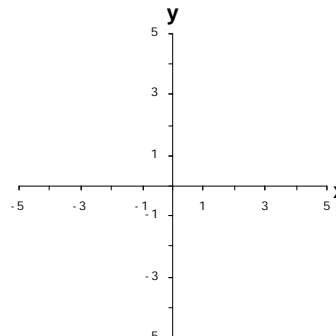
**IV. The Graph of an Equation** (Page 29)

To sketch the graph of an equation in two variables, . . .

**What you should learn**  
How to sketch graphs of equations

**Example 4:** Complete the table. Then use the resulting solution points to sketch the graph of the equation  $y = 3 - 0.5x$ .

$x$	-4	-2	0	2	4
$y$					

**V. Intercepts of a Graph** (Page 30)

An  $x$ -intercept is written as the ordered pair \_\_\_\_\_,  
and a  $y$ -intercept is written as the ordered pair \_\_\_\_\_.

To find  $x$ -intercepts, . . .

To find  $y$ -intercepts, . . .

**What you should learn**  
How to find  $x$ - and  $y$ -intercepts of graphs

**Example 5:** For the equation  $3x - 4y = 12$ , find:  
(a) the  $x$ -intercept(s), and (b) the  $y$ -intercept(s).

**VI. Symmetry** (Pages 31–33)

The three types of symmetry that a graph can exhibit are . . .

Knowing the symmetry of a graph before attempting to sketch it is helpful because . . .

**What you should learn**  
How to use symmetry to sketch graphs of equations

A graph is symmetric with respect to the  $y$ -axis if, whenever  $(x, y)$  is on the graph, \_\_\_\_\_ is also on the graph. A graph is symmetric with respect to the  $x$ -axis if, whenever  $(x, y)$  is on the graph, \_\_\_\_\_ is also on the graph. A graph is

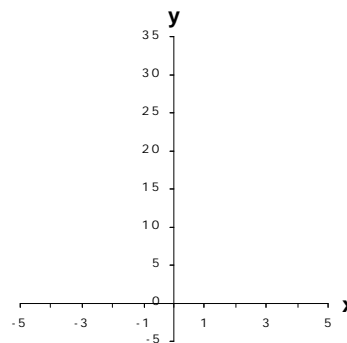
symmetric with respect to the origin if, whenever  $(x, y)$  is on the graph, \_\_\_\_\_ is also on the graph.

The graph of an equation is symmetric with respect to the  $y$ -axis if . . .

The graph of an equation is symmetric with respect to the  $x$ -axis if . . .

The graph of an equation is symmetric with respect to the origin if . . .

**Example 6:** Use intercepts and symmetry to sketch the graph of the equation  $y = 2x^2 + 2$ .

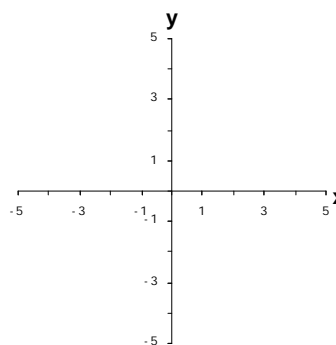


## VII. Circles (Page 33)

The **standard form of the equation of a circle** with center  $(h, k)$  and radius  $r$  is \_\_\_\_\_.

The standard form of the equation of a circle with radius  $r$  and its center at the origin is \_\_\_\_\_.

**Example 7:** For the equation  $(x + 2)^2 + (y - 1)^2 = 4$ , find the center and radius of the circle and then sketch the graph of the equation.



***What you should learn***  
How to find equations and sketch graphs of circles

### Homework Assignment

Page(s)

Exercises