

## Section 10.3 Hyperbolas

**Objective:** In this lesson you learned how to write the standard equation of a hyperbola, and analyze and sketch the graphs of hyperbolas.

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

**Branches**

**Transverse axis**

**Conjugate axis**

### I. Introduction (Pages 713–714)

A **hyperbola** is . . .

#### *What you should learn*

How to write equations of hyperbolas in standard form

The line through a hyperbola's two foci intersects the hyperbola at two points called \_\_\_\_\_.

The midpoint of a hyperbola's transverse axis is the \_\_\_\_\_ of the hyperbola.

The standard form of the equation of a hyperbola centered at  $(h, k)$  and having a horizontal transverse axis is

\_\_\_\_\_

The standard form of the equation of a hyperbola centered at  $(h, k)$  and having a vertical transverse axis is

\_\_\_\_\_

In each case, the vertices and foci are, respectively,  $a$  and  $c$  units from the center. Moreover,  $a$ ,  $b$ , and  $c$  are related by the equation

\_\_\_\_\_.

If the center of the hyperbola is at the origin  $(0, 0)$ , the equation takes one of the following forms: \_\_\_\_\_ or

\_\_\_\_\_.

**II. Asymptotes of a Hyperbola** (Pages 715–717)

The **asymptotes** of a hyperbola with a horizontal transverse axis are \_\_\_\_\_.

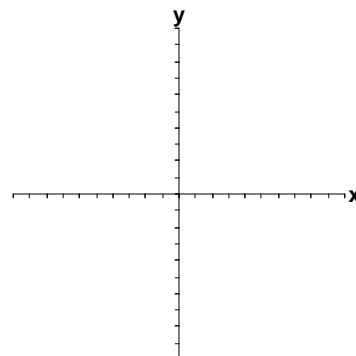
The **asymptotes** of a hyperbola with a vertical transverse axis are \_\_\_\_\_.

**Example 1:** Sketch the graph of the hyperbola given by

$$y^2 - 9x^2 = 9.$$

The **eccentricity** of a hyperbola is  $e =$  \_\_\_\_\_, where the values of  $e$  are \_\_\_\_\_.

**What you should learn**  
How to find asymptotes of hyperbolas

**III. Applications of Hyperbolas** (Page 718–719)

Describe a real-life application in which hyperbolas occur or are used.

The graph of  $Ax^2 + Cy^2 + Dx + Ey + F = 0$  is one of the following:

- 1) Circle if \_\_\_\_\_
- 2) Parabola if \_\_\_\_\_
- 3) Ellipse if \_\_\_\_\_
- 4) Hyperbola if \_\_\_\_\_

**Example 2:** Classify the equation  $9x^2 + y^2 - 18x - 4y + 4 = 0$  as a circle, a parabola, an ellipse, or a hyperbola.

**What you should learn**  
How to use properties of hyperbolas to solve real-life problems and to classify conics from their general equations

**Homework Assignment**

Page(s)

Exercises