

## Section 4.4 Conics

**Objective:** In this lesson you learned how to recognize, graph, and write equations of circles, ellipses, parabolas, and hyperbolas (vertex or center at origin).

Course Number

Instructor

Date

### Important Vocabulary

Define each term or concept.

**Directrix**

**Focus**

**Foci**

**Vertices**

**Major axis**

**Center**

**Minor axis**

**Branches**

**Transverse axis**

**Conjugate axis**

### I. Introduction (Page 350)

A **conic section**, or **conic**, is . . .

#### *What you should learn*

How to recognize the four basic conics

Name the four basic conic sections:

In the formation of the four basic conics, the intersecting plane does not pass through the vertex of the cone. When the plane does pass through the vertex, the resulting figure is a \_\_\_\_\_, such as . . .

**II. Parabolas** (Pages 351–352)

A **parabola** is . . .

The \_\_\_\_\_ of a parabola is the midpoint between the focus and the directrix. The \_\_\_\_\_ of the parabola is the line passing through the focus and the vertex.

The **standard form of the equation of a parabola** with vertex at  $(0, 0)$  and directrix  $y = -p$  is \_\_\_\_\_.

For directrix  $x = -p$ , the equation is \_\_\_\_\_.

**Example 1:** Find an equation of the parabola with vertex at the origin if the parabola has the directrix  $x = -1$ .

***What you should learn***

How to recognize, graph, and write equations of parabolas (vertex at the origin)

**III. Ellipses** (Pages 353–354)

An **ellipse** is . . .

The **standard form of the equation of an ellipse** centered at the origin with major and minor axes of lengths  $2a$  and  $2b$

(where  $0 < b < a$ ) is \_\_\_\_\_ or \_\_\_\_\_ . The vertices and foci lie on the major axis,  $a$  and  $c$  units, respectively, from the center.

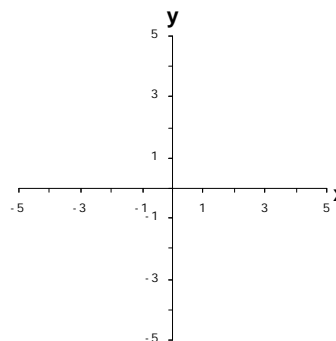
Moreover,  $a$ ,  $b$ , and  $c$  are related by the equation

\_\_\_\_\_.

**Example 2:** Sketch the ellipse given by  $4x^2 + 25y^2 = 100$ .

***What you should learn***

How to recognize, graph, and write equations of ellipses (center at the origin)



**IV. Hyperbolas** (Pages 355–358)

A **hyperbola** is . . .

***What you should learn***

How to recognize, graph, and write equations of hyperbolas (center at the origin)

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.

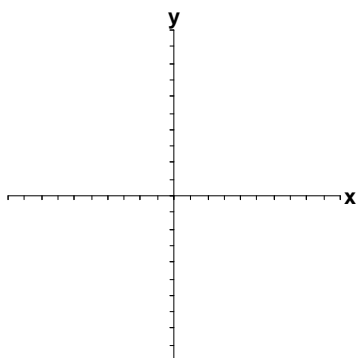
The **standard form of the equation of a hyperbola** with center at the origin (where  $a \neq 0$  and  $b \neq 0$ ) is \_\_\_\_\_ or \_\_\_\_\_. The vertices and foci are, respectively,  $a$  and  $c$  units from the center. Moreover,  $a$ ,  $b$ , and  $c$  are related by the equation \_\_\_\_\_.

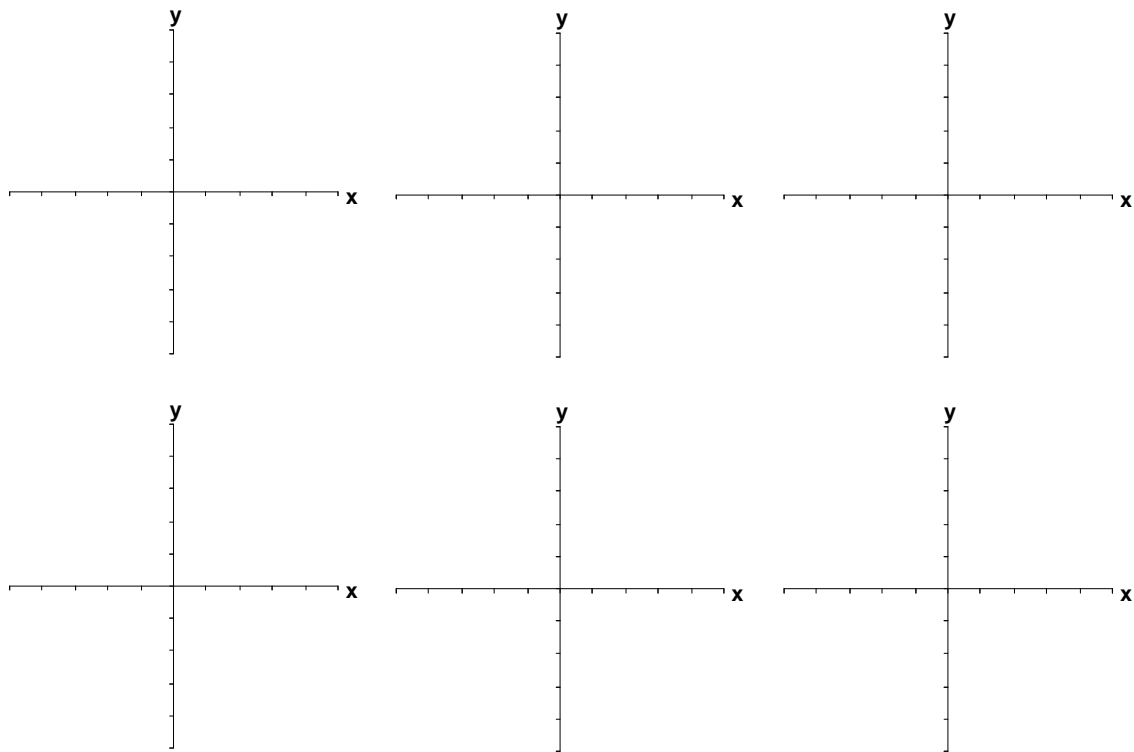
The **asymptotes of a hyperbola** with horizontal transverse axis and center at  $(0, 0)$  are \_\_\_\_\_ and \_\_\_\_\_.

The **asymptotes of a hyperbola** with vertical transverse axis and center at  $(0, 0)$  are \_\_\_\_\_ and \_\_\_\_\_.

**Example 3:** Sketch the graph of the hyperbola given by

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



**Additional notes****Homework Assignment**

Page(s)

Exercises