

# Chapter 8 Conics and Parametric Equations

Course Number

Instructor

Date

## Section 8.1 Conics

**Objective:** In this lesson you learned how to recognize the four basic conics: circles, ellipses, parabolas, and hyperbolas and how to recognize, graph, and write equations of conics with vertex or center at the origin.

### Important Vocabulary

Define each term or concept.

**Directrix**

**Focus of a parabola**

**Foci of an ellipse**

**Vertices of an ellipse**

**Major axis**

**Center of an ellipse**

**Minor axis**

**Foci of a hyperbola**

**Branches**

**Transverse axis**

**Conjugate axis**

### I. Introduction (Page 574)

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 575–576)

A **parabola** is . . .

***What you should learn***  
How to recognize, graph, and write equations of parabolas (vertex at the origin)

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  $x = -1$ .

## III. Ellipses (Pages 577–578)

An **ellipse** is . . .

***What you should learn***  
How to recognize, graph, and write equations of ellipses (center at the origin)

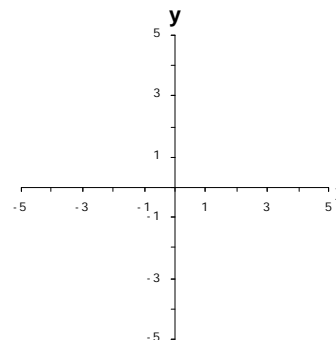
The **standard form of the equation of an ellipse** centered at the origin with major and minor axes of lengths  $2a$  and  $2b$

(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  $4x^2 + 25y^2 = 100$ .



#### IV. Hyperbolas (Pages 579–582)

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 \_\_\_\_\_.

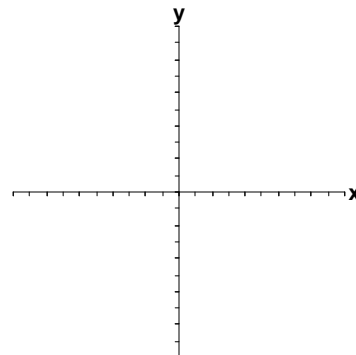
The midpoint of a hyperbola's transverse axis is the \_\_\_\_\_ of the hyperbola.

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 \_\_\_\_\_.

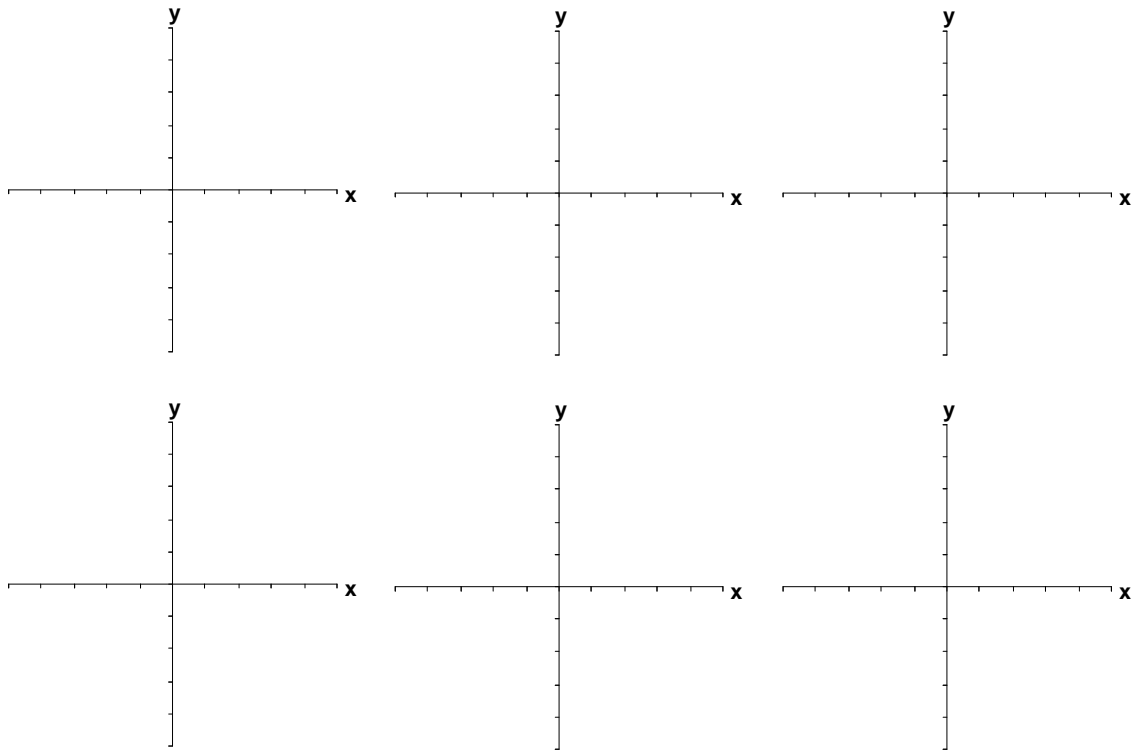
The **asymptotes of a hyperbola** with horizontal transverse axis and center at  $(0, 0)$  are \_\_\_\_\_ and \_\_\_\_\_.

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