

## Exploring Conic Sections

## For the Teacher

### Objectives:

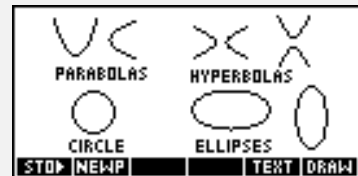
Using the **CONIC PLOTTER** applet, the student will investigate the conic sections in general and in standard form.

### Functionality:

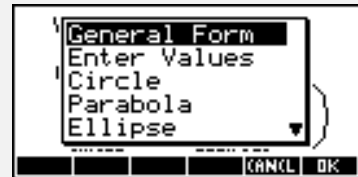
When the student presses **START**, the **CONIC PLOTTER NOTE** will be displayed.



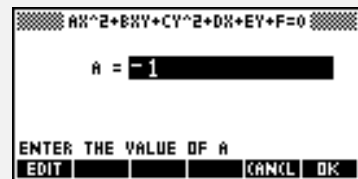
After reading the note, the student should press **SKETCH** for further information.



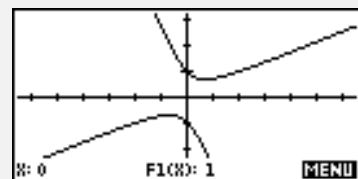
**VIEWS** allows the student to investigate the general form of a conic, or the standard form of a circle, parabola, ellipse, or hyperbola.



**General Form** prompt the student to enter values for the coefficients and constant of a conic in the general form:  $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$ . In the example to the right,  $A=-1$ ,  $B=2$ ,  $C=1$ ,  $D=0$ ,  $E=0$ , and  $F=-1$ .



After the series of input forms, the corresponding graph will be displayed.



**See Equation** in the **VIEWS** menu will display the general form of the conic that has been graphed.

$$-x^2 + 2xy + y^2 - 1 = 0$$

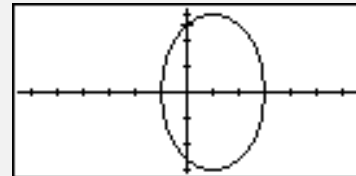
**Ellipse** will prompt the student to select the direction of the major axis.

The standard form of the conic will then be displayed.

$$\frac{(X-H)^2}{B^2} + \frac{(Y-K)^2}{A^2} = 1$$

**Enter Values** will prompt the student to enter the necessary values.

After the series of input forms, the corresponding graph will be displayed.



**See Equation** in the **VIEWS** menu will display the general form of the conic that has been graphed.

$$\frac{(X-1)^2}{4} + \frac{Y^2}{9} = 1$$

Ideas can be applied to:

Algebra II, Precalculus, Calculus

Programs associated with this applet:

.CON.EV, .CON.CIR, .CON.PAR, .CON.ELL, .CON.HYP, .CON.SF,  
.CON.ST, .CON.SV

## Exploring Conic Sections

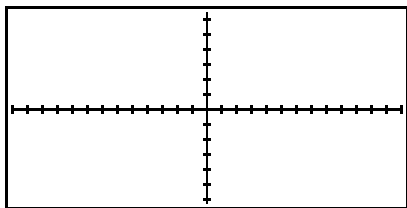
Standard Form

Name \_\_\_\_\_

Date \_\_\_\_\_

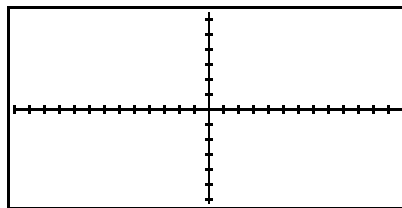
I. *Graph. Identify the vertex and the axis of symmetry of each parabola.*

1.  $y = \frac{1}{2}(x - 3)^2 + 2$



vertex:  
axis of symmetry:

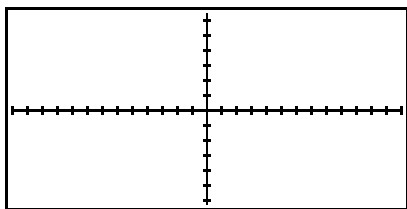
2.  $x = 2(y - 1)^2 - 2$



vertex:  
axis of symmetry:

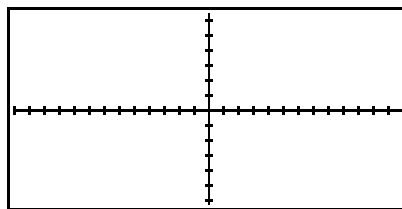
II. *Graph. Identify the center and the radius of each circle.*

3.  $x^2 + y^2 = 36$



center:  
radius:

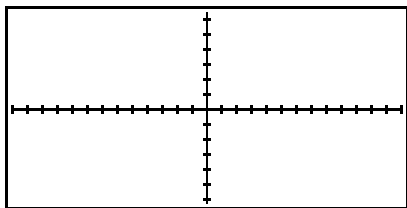
4.  $(x - 2)^2 + (y + 1)^2 = 25$



center:  
radius:

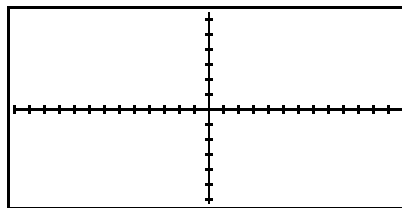
III. *Graph. Find the center and the endpoints of the major and minor axes of each ellipse.*

5.  $\frac{x^2}{4} + \frac{y^2}{9} = 1$



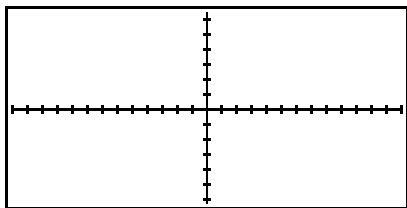
center:  
major:

6.  $\frac{x^2}{25} + \frac{y^2}{16} = 1$



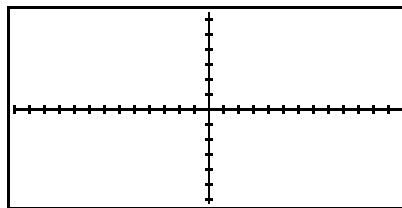
center:  
major:

7. minor:  $\frac{(x+1)^2}{36} + \frac{y^2}{4} = 1$



center:  
major:  
minor:

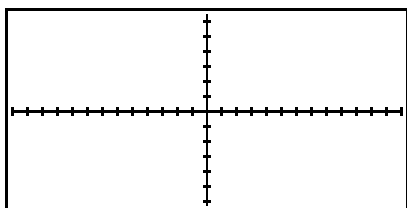
8. minor:  $x^2 + 4y^2 = 16$



center:  
major:  
minor:

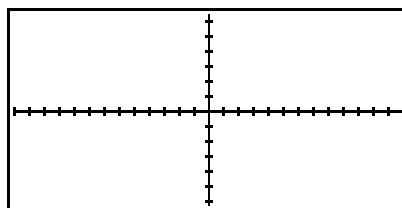
VI. Graph. Find the center and the vertices of each hyperbola.

9.  $\frac{x^2}{4} - \frac{y^2}{16} = 1$



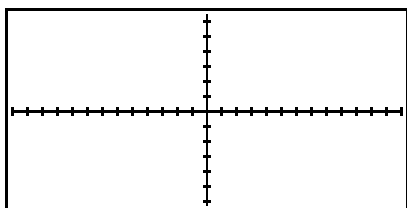
center:  
vertices:

10.  $\frac{x^2}{25} - \frac{y^2}{9} = 1$



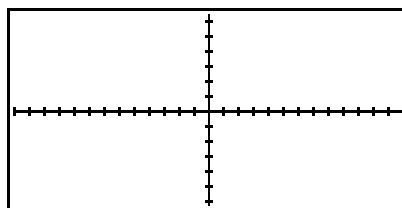
center:  
vertices:

11.  $(x-1)^2 - \frac{y^2}{4} = 1$



center:  
vertices:

12.  $4x^2 - 25y^2 = 100$



center:  
vertices:

V. Identify each of the following as a circle, ellipse, hyperbola, or parabola.

\_\_\_\_\_ 13.  $9x^2 - 25y^2 = 1$

\_\_\_\_\_ 14.  $x^2 + 2x - y = 3$

\_\_\_\_\_ 15.  $x^2 + 2y^2 + 2y = 18$

\_\_\_\_\_ 16.  $x^2 + 3x + y^2 - 2y = 15$

# Exploring Conic Sections

General Form

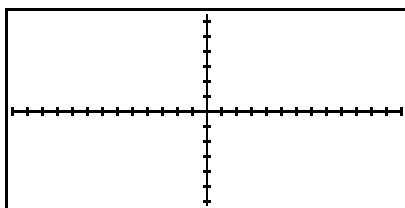
Name \_\_\_\_\_

Date \_\_\_\_\_

I. Identify each conic. Rewrite in standard form and graph.

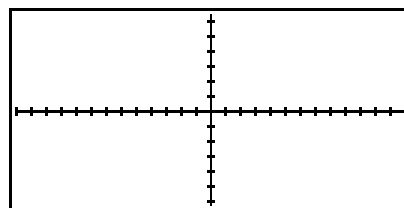
1.  $9x^2 - 25y^2 = 1$

type:  
Standard  
Form:



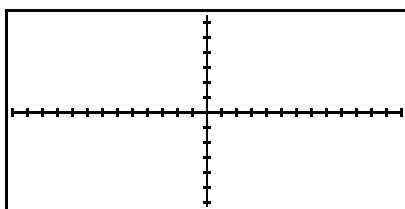
3.  $x^2 + 2x - y = 3$

type:  
Standard  
Form:



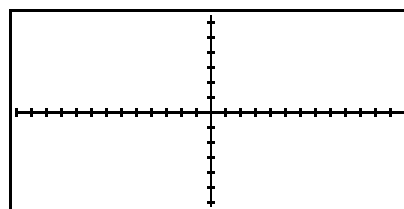
2.  $4x^2 + 2y^2 + 2y = 14$

type:  
Standard  
Form:



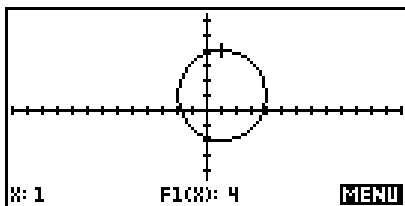
4.  $x^2 + 3x + y^2 - 2y = 15$

type:  
Standard  
Form:



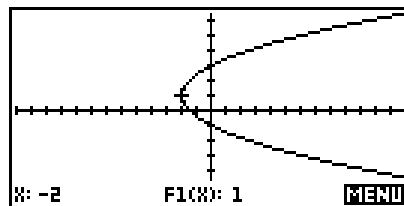
II. Write an equation for each of the following.

5.



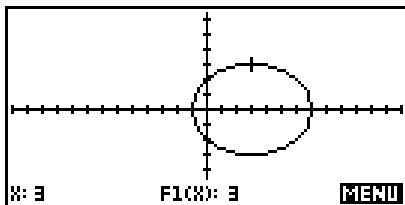
eq:

6.



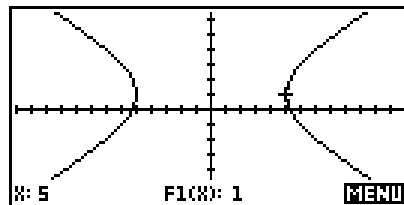
eq:

7.



eq:

8.



eq:

