

# 7-2 Study Guide and Intervention

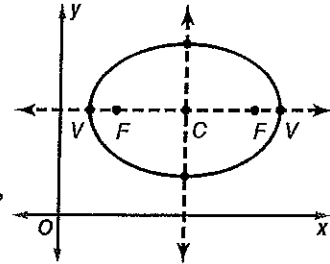
## Ellipses and Circles

**Analyze and Graph Ellipses and Circles** An ellipse is the locus of points in a plane such that the sum of the distances from two fixed points, called **foci**, is constant.

The standard form of the equation of an ellipse is

$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$  when the **major axis** is horizontal. In this case,  $a^2$  is in the denominator of the  $x$ -term. The standard form is

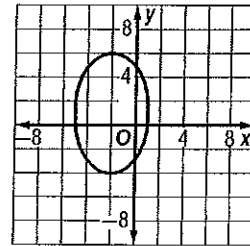
$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$  when the major axis is vertical. In this case,  $a^2$  is in the denominator of the  $y$ -term. In both cases,  $c^2 = a^2 - b^2$ .



**Example**

Graph the ellipse given by the equation  $\frac{(y-1)^2}{25} + \frac{(x+2)^2}{9} = 1$ .

The equation is in standard form. Use the values of  $h$ ,  $k$ ,  $a$ , and  $b$  to determine the vertices and axes of the ellipse. Since  $a^2 > b^2$ ,  $a^2 = 25$  and  $b^2 = 9$ , or  $a = 5$  and  $b = 3$ . Since  $a^2$  is the denominator of the  $y$ -term, the major axis is parallel to the  $y$ -axis.



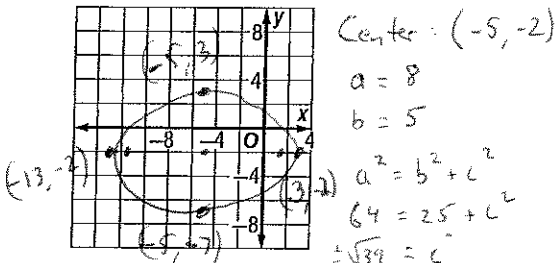
- orientation: vertical
- center:  $(-2, 1)$   $(h, k)$
- vertices:  $(-2, 6), (-2, -4)$   $(h, k \pm a)$
- co-vertices:  $(-5, 1), (1, 1)$   $(h \pm b, k)$
- major axis:  $x = -2$   $x = h$
- minor axis:  $y = 1$   $y = k$

- Foci
- 1)  $(-5 \pm \sqrt{39}, -2)$
  - 2)  $(-6, -1), (2, -1)$
  - 3)  $(-3, 1 \pm \sqrt{7})$
  - 4)  $(2, -3 \pm \sqrt{39})$

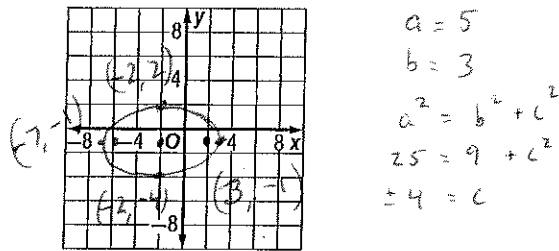
### Exercises

Graph the ellipse given by each equation.

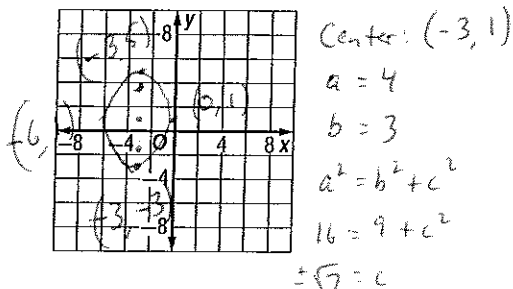
1.  $\frac{(x+5)^2}{64} + \frac{(y+2)^2}{25} = 1$



2.  $\frac{(x+2)^2}{25} + \frac{(y+1)^2}{9} = 1$  Center:  $(-2, -1)$



3.  $\frac{(y-1)^2}{16} + \frac{(x+3)^2}{9} = 1$



4.  $\frac{(y+3)^2}{64} + \frac{(x-2)^2}{25} = 1$  Center:  $(2, -3)$

