7-4

NAME _____ DATE _____

Study Guide

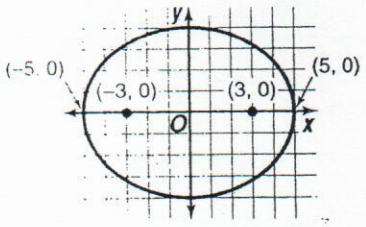
Student Edition
Pages 431–439

Ellipses

An ellipse is the set of all points in a plane such that the sum of the distances from two given points in the plane, called the **foci,** is constant. An ellipse has two axes of symmetry. The intersection of the two axes is the **center of the ellipse.** The ellipse intersects the axes to define two segments whose endpoints lie on the ellipse. The longer segment is called the **major axis,** and the shorter segment is called the **minor axis.**

Standard Equations for Ellipses with Center at (h, k)		
Horizontal Major Axis:	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$	$(a^2 > b^2)$
Vertical Major Axis:	$\frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$	$(a^2 > b^2)$

Example:



Write the equation of the ellipse.

First find the length of the major axis. The distance between $(-5, 0)$ and $(5, 0)$ is 10 units.

$2a = 10$

$a = 5$ so $a^2 = 25$

Since the foci are at $(-3, 0)$ and $(3, 0)$, $c = 3$.

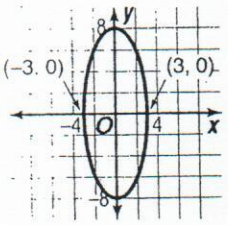
$b^2 = a^2 - c^2$

$b^2 = 5^2 - 3^2$ so $b^2 = 16$

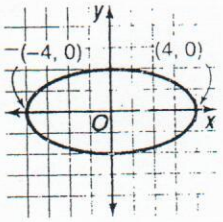
The equation is $\frac{x^2}{25} + \frac{y^2}{16} = 1$.

Write an equation for each ellipse.

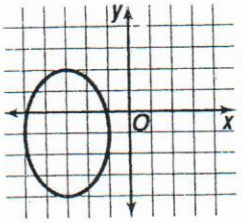
1.



2.

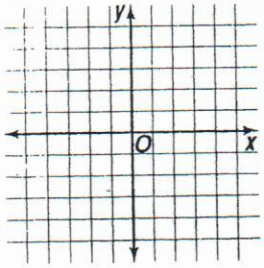


3.

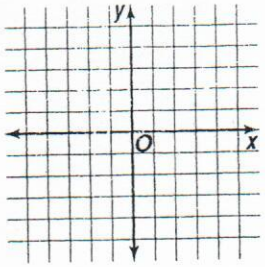


Find the coordinates of the center and foci, and the lengths of the major axis and minor axis for each ellipse whose equation is given. Then draw the graph.

4. $\frac{x^2}{4} + \frac{y^2}{25} = 1$



5. $9x^2 + 16y^2 = 144$



6. $x^2 + 4y^2 + 24y = -32$