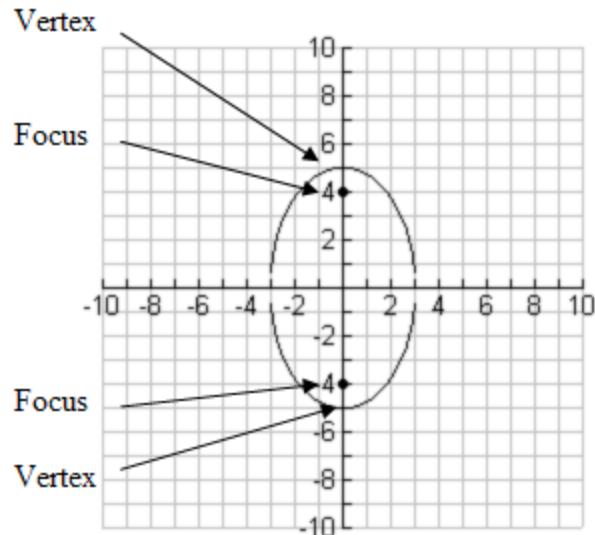
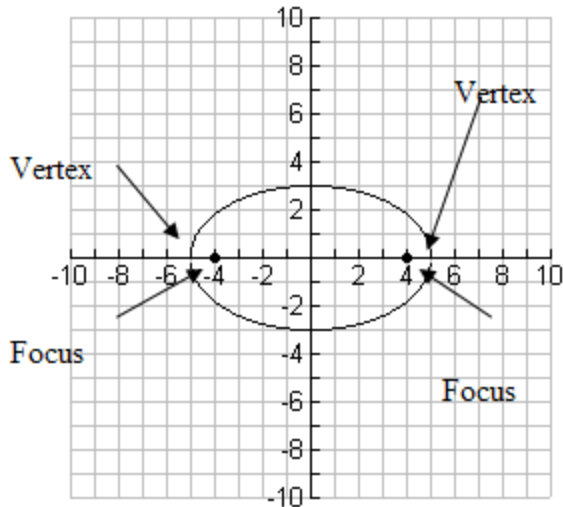


An **ellipse** is the set of all points (x, y) in a plane, the sum of whose distances from two distinct fixed points (foci) is constant.



The line through the foci intersects the ellipse at the vertices. The chord joining the vertices is the **major axis**. The chord perpendicular to the major axis at the center is the **minor axis**.

Standard Equation of an Ellipse

The standard form of the equation of an ellipse, with center (h, k) and major and minor axes of lengths $2a$ and $2b$, respectively, where $0 < b < a$, is

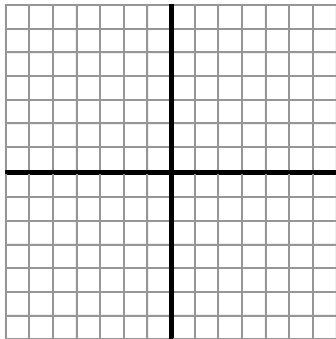
$$\text{Horizontal Major Axis} \quad \frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

$$\text{Vertical Major Axis} \quad \frac{(x-h)^2}{b^2} + \frac{(y-k)^2}{a^2} = 1$$

The foci lie on the major axis, c units from the center, with $c^2 = a^2 - b^2$.

Example 1: Find the standard form of the equation of the ellipse having foci at $(-2, 2)$ and $(4, 2)$ and a major axis of length 10.

Example 2: Sketch the graph of the ellipse given by $9x^2 + 4y^2 + 36x - 8y + 4 = 0$.



** You must complete the square for both variables when writing the equation in standard form.

Example 3: Find the center, vertices, and foci of the ellipse given by the formula.

$$16x^2 + 25y^2 - 32x - 50y + 16 = 0$$

Homework: Pages 748 #5 – 10 all, 11-23 odd