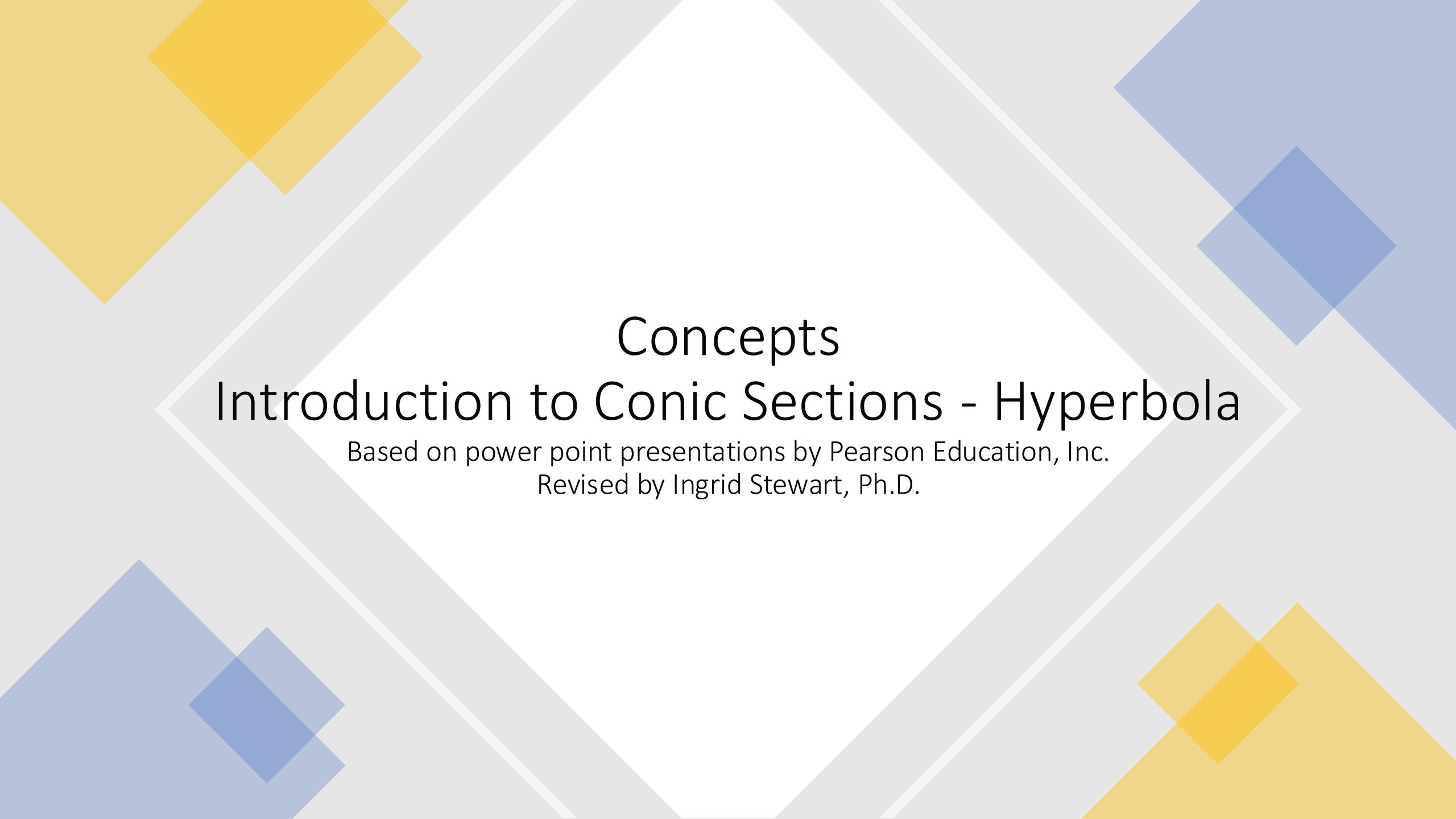




Concepts

Introduction to Conic Sections - Hyperbola

Based on power point presentations by Pearson Education, Inc.
Revised by Ingrid Stewart, Ph.D.

Learning Objectives

1. Memorize which standard equation pertains to what graphs of conic hyperbolas (vertical transverse axis, horizontal transverse axis).
2. Memorize the characteristics of the vertices, the center, the foci, the transverse axis, the conjugate axis, the asymptotes.
3. Change given equations of conic hyperbolas to their standard form.

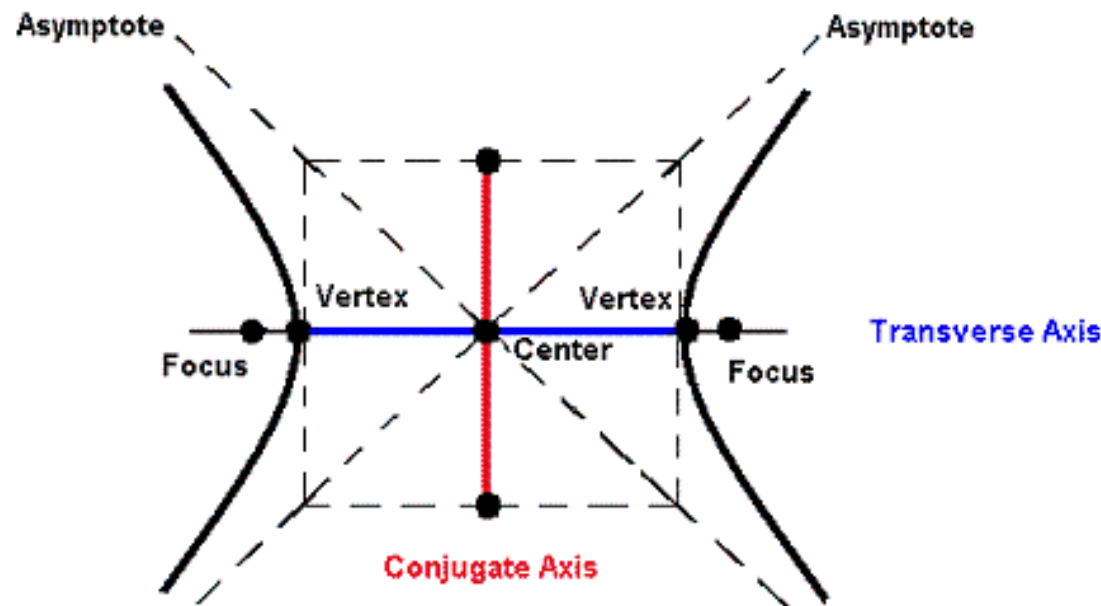
NOTE: This lesson only contains pictures and standard equations of hyperbolas. It contains NO examples.

Our task will be to change given equations of hyperbolas to standard form.

You can find examples in the “Examples” document also located in the appropriate MOM Learning Materials folder.

The Hyperbola (1 of 3)

Hyperbolas resulting from conic sections can have a **horizontal or a vertical transverse axis**. Following is a picture of a hyperbola with a **horizontal transverse axis**.

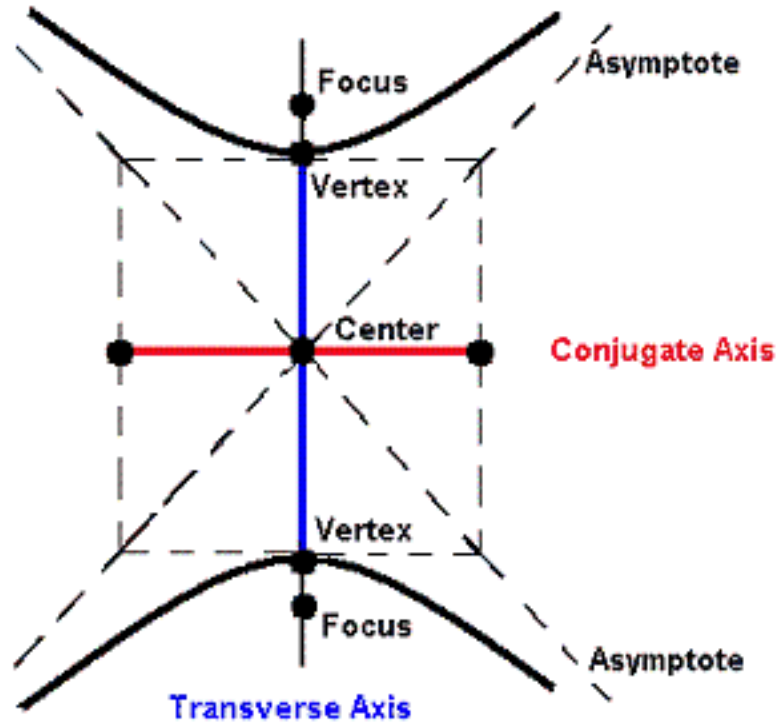


Geometrically, the standard equation of a hyperbola with a horizontal transverse axis is $\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$ where $a = b$ or $a \neq b$.

This equation must be memorized. The coordinates of the Center are (h, k) .

The Hyperbola (2 of 3)

Following is the picture of a hyperbola with a **vertical transverse axis**.



Geometrically, the standard equation of a hyperbola with a vertical transverse axis is $\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$ where $a = b$ or $a \neq b$.

This equation must be memorized. The coordinates of the Center are (h, k) .

The Hyperbola (3 of 3)

Some Vocabulary

Please refer to the pictures in the previous two slides!

Foci (singular: foci) – Two points that lie on the transverse axis above/below or to the right/left of the vertex.

Vertices (singular: verte) – Two points where the line through the two foci intersects with the two branches of the hyperbola.

Transverse Axis – It is a line segment that joins the two vertices.

Center – The midpoint of the transverse axis.

Conjugate Axis – Often a rectangle is drawn through the vertices with corners at the asymptotes. **The line segment perpendicular to the transverse axis intersecting it at its midpoint and ending at the rectangle is the conjugate axis.**

Asymptotes – Two invisible lines that the two branches of the hyperbola approach but never touch.