Pre-Calculus

Unit 2: Conics

References

Textbook Connection: Glencoe PreCalculus Text: Chapter 7

Every student will receive a text copy and access to the online textbook resource**:** **http://my.hrw.com/**

Helpful Links:

GA Virtual:
http://cms.gavirtualschool.org/Shared/Math/GSEPrecalculus/Conics/index.html

Conics Introduction:
http://math.about.com/library/blconic.htm

Conic Sections:
http://www.sparknotes.com/math/precalc/conicsections/

Linear & Quadratic Systems:
http://tutorial.math.lamar.edu/Classes/Alg/NonLinearSystems.aspx

Dear Parents,

In this unit, students will build on standards from previous courses, students will derive the equations of conic sections (parabolas, ellipses, and hyperbolas). Students will solve systems of a linear and quadratic equation in two variables.

Concepts Students will Use & Understand

- Derive the equation of a parabola, ellipse, and hyperbola.
- Solve a linear and quadratic system in two variables.

Vocabulary

- **Cone**: A three dimensional figure with a circular or elliptical base and one vertex.
- **Coplanar**: Set of points, lines, rays, line segments, etc., that lie in the same plane.
- **Ellipse:** A curved line forming a closed loop, where the sum of the distances from two points (foci) to every point on the line is constant.
- **Focus:** one of the fixed points from which the distances to any point of a given curve, such as an ellipse or parabola, are connected by a linear relation.
- **Hyperbola:** A plane curve having two branches, formed by the intersection of a plane with both halves of a right circular cone at an angle parallel to the axis of the cone. It is the locus of points for which the difference of the distances from two given points is a constant.
- **Locus of Points:** A group of points that share a property.
  Plane: One of the basic undefined terms of geometry. A plane goes on forever in all directions (in two-dimensions) and is "flat" (i.e., it has no thickness).For further help:
    http://www.teachers.ash.org.au/jeather/maths/dictionary.html
    http://intermath.coe.uga.edu/dictnary/homepg.asp
    http://www.amathsdictionaryforkids.com/

Sample Practice Problems

1. Write the standard equation of a parabola with a vertex at the origin and with the directrix $y = 4$.

2. A parabola defined by the equations $4x + y^2 - 6y = 9$ is translated 2 units up and 4 units to the left. Write the standard equation of the resulting parabola.

3. Mars orbits the Sun in an elliptical path whose minimum distance from the Sun is 129.5 million miles and whose maximum distance from the Sun is 154.4 million miles. The Sun represents one focus of the ellipse. Write the standard equation for the elliptical orbit of Mars around the Sun, where the center of the ellipse is at the origin.

4. Write the standard equation for the hyperbola with vertices at (0, -4) and (0, 4) and co-vertices at (-3, 0) and (3, 0)

5. Find the equations of the asymptotes and the coordinates of the vertices for the graph of $\frac{y^2}{16} - \frac{x^2}{36} = 1$

Answers to Sample Practice Problems

1. $y = \frac{1}{4(-4)}x^2$ OR $y = -\frac{1}{16}x^2$

2. $x - \frac{1}{2} = -\frac{1}{4}(y - 5)^2$

3. $\frac{x^2}{20{,}149.8} + \frac{y^2}{19{,}994.8} = 1$

4. $y = \pm\sqrt{16\left(1 + \frac{x^2}{9}\right)}$

5. The asymptotes are $y = \pm\frac{2}{3}x$.
   The vertices are (0, -4) and (0, 4)