Course Number

Instructor

Date

Section 10.2 Introduction to Conics: Parabolas

Objective: In this lesson you learned how to write the standard form of the equation of a parabola.

Important Vocabulary Define each term or concept.

Directrix A fixed line in the plane from which each point on a parabola is the same distance as the distance from the point to a fixed point in the plane.
Focus A fixed point in the plane from which each point on a parabola is the same distance as the distance from the point to a fixed line in the plane.
Focal chord A line segment that passes through the focus of a parabola and has endpoints on the parabola.
Latus rectum The specific focal chord perpendicular to the axis of a parabola.

Tangent A line is tangent to a parabola at a point on the parabola if the line intersects, but does not cross, the parabola at the point.

I. Conics (Page 733)

What you should learn
How to recognize a conic as the intersection of a plane and a double-napped cone

A **conic section,** or **conic,** is the intersection of a plane and a double-napped cone.

Name the four basic conic sections: circle, ellipse, parabola, and hyperbola.

In the formation of the four basic conics, the intersecting plane does not pass through the vertex of the cone. When the plane does pass through the vertex, the resulting figure is a(n) degenerate conic, such as a point, a line, or a pair of intersecting lines.

II. Parabolas (Pages 734–736)

What you should learn
How to write equations of parabolas in standard form and graph parabolas.

A **parabola** is the set of all points (x, y) in a plane that are equidistant from a fixed line, the directrix, and a fixed point, the focus, not on the line.

The vertex of a parabola is the midpoint between the focus and the directrix. The axis of the parabola is the line passing through the focus and the vertex.

The standard form of the equation of a parabola with a vertical axis having a vertex at (h, k) and directrix $y = k - p$ is

$(x - h)^2 = 4p(y - k), \quad p \neq 0$

The standard form of the equation of a parabola with a horizontal axis having a vertex at (h, k) and directrix $x = h - p$ is

$(y - k)^2 = 4p(x - h), \quad p \neq 0$

The focus lies on the axis p units (directed distance) from the vertex. If the vertex is at the origin (0, 0), the equation takes on one of the following forms:

$x^2 = 4py, \quad p \neq 0$ or $y^2 = 4px, \quad p \neq 0$

Example 1: Find the standard form of the equation of the parabola with vertex at the origin and focus (1, 0).

$y^2 = 4x$

III. Applications of Parabolas (Pages 736–737)

What you should learn
How to use the reflective property of parabolas to solve real-life problems

Describe a real-life situation in which parabolas are used.

Answers will vary.

The reflective property of a parabola states that the tangent line to a parabola at a point P makes equal angles with the following two lines:

1) The line passing through P and the focus

2) The axis of the parabola

Homework Assignment

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Exercises