Name: _____ **Precalculus Unit 11, Lesson 1**

Aim: Introduction to Conic Sections; Parabolas

I. Do Now:

1. If $x^2 = 9$, then $x =$ ___ or ___.

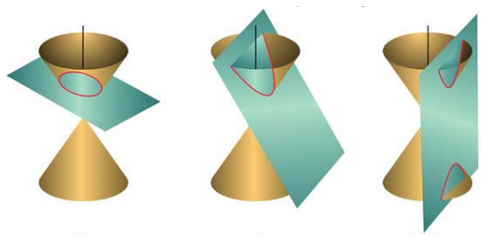
2. If $(x-3)^2 = 9$, then $x =$ ___ or ___.

3. Solve by completing the square:

(a) $x^2 - 8x = -7$ (b) $x^2 - 8x = 5$ (c) $x^2 - 8x = -20$

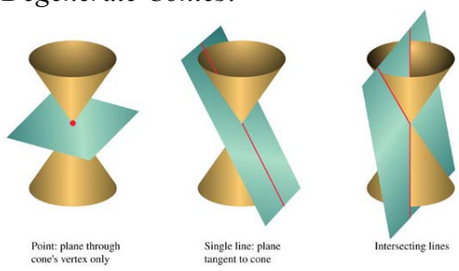
II. Motivation: What geometrical or mathematical figures can be created by slicing a double-napped cone?

Name each conic section:



_____ _____ _____

Degenerate Conics:



Conic Sections: The graphs of second-degree (quadratic) equations in two variables $Ax^2 + By^2 + Cx + Dy + E = 0$ where A, B, and C are not all zero.

State the name of the figure in each case:

(i) A or B is zero, but *not both*. _____

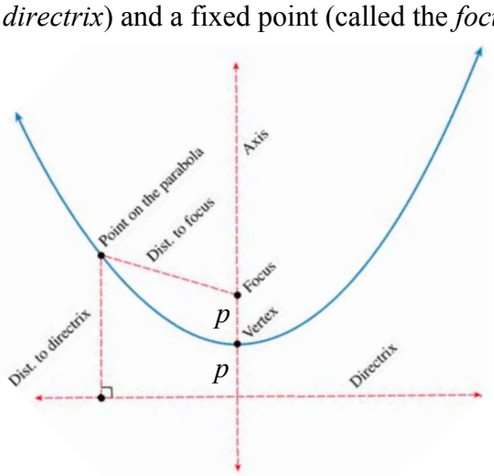
(ii) $A = B$ $(A \neq 0, B \neq 0)$ _____

(iii) $A \neq B$ $(A \neq 0, B \neq 0)$ and A and B have the same signs: _____

(iv) $A \neq B$ $(A \neq 0, B \neq 0)$ and A and B have opposite signs: _____

III. Parabolas

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



Use the above definition to derive the standard form of the equation of a parabola with vertex at (h, k).

Standard Form of the Equation of a Parabola with Vertex at (h,k)

Standard Form:	$(x-h)^2 = 4p(y-k)$	$(y-k)^2 = 4p(x-h)$
Opens		
Focus		
Directrix		
Axis of Symmetry		

IV. Applications

4. Find the standard form of the equation of the parabola with vertex (2, 1) and focus (2, 4).

5. Find the focus of the parabola given by $y = -\frac{1}{2}x^2 - x + \frac{1}{2}$

6. Find the equation of the parabola with vertex at the origin and focus (2, 0).

7. Find the vertex, focus, and directrix of the parabola $x^2 - 6x - 8y + 1 = 0$.

8. Find the vertex, focus, and directrix of the parabola $y^2 - 12x - 8y - 8 = 0$.

HW43
- Read pages 754 – 757.
- p. 759: 1 – 6, 7, 13, 18, 34, 49
- p. 516: 84, 86, 89