

**Aim: Introduction to Conic Sections; Parabolas**

**I. Do Now:**

1. If  $x^2 = 9$ , then  
 $x = \underline{\hspace{1cm}}$  or  $\underline{\hspace{1cm}}$ .

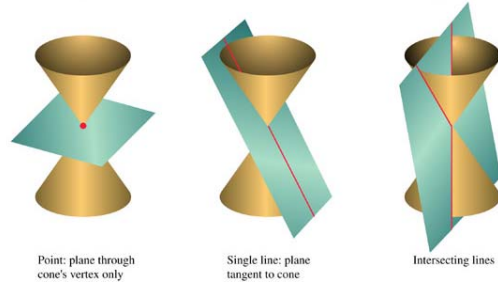
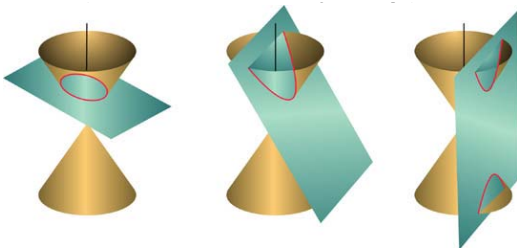
2. If  $(x - 3)^2 = 9$ , then  
 $x = \underline{\hspace{1cm}}$  or  $\underline{\hspace{1cm}}$ .

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

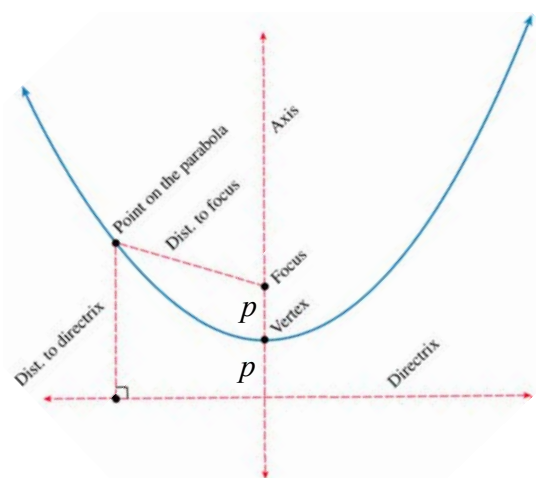
$Ax^2 + By^2 + Cx + Dy + E = 0$  where  $A, B,$  and  $C$  are not all zero.

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  $y^2 - 12x - 8y - 8 = 0$ .

HW42

- Read pages 639 – 642.
- p. 644: 43 – 48, 53, 61, 67, 74, 87
- p. 460: 110, 115ab, 118ab