WEEK 10

CHAPTER FOCUS

- Conic Sections and Loci Relations

OUTLINE

- Hyperbola
- Ellipse

PARABOLA: is the set of all points (x,y) in a plane that are equidistant from a fixed line, **DIRECTRIX** and a fixed point **FOCUS**

p = distance from the focus to the vertex

p = distance from the directrix to the vertex

A.) STANDARD EQUATION OF A PARABOLA

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

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

(h,k) = vertex

p = distance from the focus to the vertex

p = distance from the directrix to the vertex

$(h, k+p)$ = focus

$y = k-p$ = directrix

$(h-p, k)$ = focus

$x = h-p$ = directrix

VERTEX AT ORIGIN

find the standard eqn of the parabola w/ vertex at the origin and focus $(0,2)$

$x^2 = 4(2)y$

$x^2 = 8y$

$(0,0)$

$(0,2)$

$y = -2$

$x^2 = 4py$

$(0,p)$

$y = -p$

FINDING THE FOCUS OF A PARABOLA

find the focus of the parabola given by $y = 2x^2 + 4x$

$y = 2x^2 + 4x$

$y = 2(x^2 + 2x)$

$y = 2(x^2 + 2x + 1) - 2$

$y = 2(x+1)^2 - 2$

$y + 2 = 2(x+1)^2$

$\frac{1}{2}(y+2) = (x+1)^2$

$(x+1)^2 = \frac{1}{2}(y+2)$

$(h,k) = (-1,-2)$ $p = \frac{1}{8}$

$(h, k+p) = (-1, -2 + \frac{1}{8})$

$= (-1, -\frac{15}{8})$

FINDING THE STANDARD EQUATION OF A PARABOLA

the focus and vertex of a parabola are $(-1,-2)$ and $(-1,-\frac{15}{8})$

$(x-h)^2 = 4p(y-k)$

$(x+1)^2 = 4(\frac{1}{8})(y+2)$

$(x+1)^2 = \frac{1}{2}(y+2)$

$y = \frac{1}{2}(x+1)^2 - 2$

APPLICATION

Real World: the tunnel front prior does the form of a parabola and the arch is 20 feet wide and the parabola is 10 feet tall. Find the equation of the parabola.

Lesson Activity: Example: the equation of a parabola is $y = \frac{1}{2}x^2$

$(0,0)$

$(0,10)$

$(0,-10)$

$(0,-10)$

$(0,10)$

$(0,0)$

$(0,-10)$

$(0,10)$

$(0,0)$

$(0,-10)$

$(0,10)$

$(0,0