Alg 2B Parabola Summary Fall 2017

Parabola The set of all points P in a plane that are the same distance from a fixed line and a fixed point not on the line.

Focus: The fixed point. Located "inside" the parabola, c units away from the vertex.

Directrix: The fixed line. Located "outside" the parabola, c units away from the vertex. Perpendicular to the Line of Symmetry.

Vertex: Point exactly midway between the Focus and the Directrix.

Line of Symmetry: Line perpendicular to the Directrix containing the Focus and the Vertex.

Equation of a Parabola with vertex at $(0,0)$:

Opens Up	Opens Down	Opens Right	Opens Left
$y = ax^2 \quad a > 0$	$y = ax^2 \quad a < 0$	$x = ay^2 \quad a > 0$	$x = ay^2 \quad x < 0$
Focus: $(0, c)$	Focus: $(0, -c)$	Focus: $(c, 0)$	Focus: $(-c, 0)$
Directrix: $y = -c$	Directrix: $y = c$	Directrix: $x = -c$	Directrix: $x = c$

Equation of a Parabola with vertex at (h,k):

Opens Up $a > 0$

$y - k = a(x-h)^2$ or

$y = a(x-h)^2 + k$

Focus: $(h, k+c)$

Directrix: $y = k - c$

Opens Down $a < 0$

$y - k = a(x-h)^2$ or

$y = a(x-h)^2 + k$

Focus: $(h, k-c)$

Directrix: $y = k + c$

Opens Right $a > 0$

$x - h = a(y-k)^2$ or

$x = a(y-k)^2 + h$

Focus: $(h+c, k)$

Directrix: $x = h - c$

Opens Left $a < 0$

$x - h = a(y-k)^2$ or

$x = a(y-k)^2 + h$

Focus: $(h-c, k)$

Directrix: $x = h + c$

$|a| = \frac{1}{4c}$ and $c = \frac{1}{4|a|}$

c: distance from the Vertex to the Focus and from the Vertex to the Directrix.

a is the coefficient of x^2 or y^2

The bigger the value of $|a|$: the more narrow the parabola & the closer the Focus is to the Vertex.

The smaller the value of $|a|$: the wider the parabola and the farther the Focus is from the Vertex.