Quadratic Function Summary

Key Features	Factored Form	Vertex Form	Standard Form
Form	$f(x) = a(x-m)(x-n)$	$f(x) = a(x-h)^2 + k$	$f(x) = ax^2 + bx + c$
Axis of symmetry	Put in vertex form by completing the square or put in standard form by distributing. Follow rules for new forms.	$x = h$	$x = -\dfrac{b}{2a}$
Vertex	Put in vertex form by completing the square or put in standard form by distributing. Follow rules for new forms.	(h,k)	$\left(-\dfrac{b}{2a}, f\left(-\dfrac{b}{2a}\right)\right)$
Opens up/down	If $a > 0$, parabola opens up (making vertex a minimum). If $a < 0$, parabola opens down (making vertex a maximum).		
Y-intercept	$(0, f(0))$	$(0, f(0))$	$(0, c)$
Zeros/Roots	Set each factor equal to 0. $x = m$, $x = n$	Set $f(x) = 0$ and solve by isolating the perfect square binomial and square rooting.	Set $f(x) = 0$ and solve by factoring, completing the square, or the quadratic formula.
Two real zeros if	$m \neq n$	k and a have opposite signs	$b^2 - 4ac > 0$
One real zero if	$m = n$	$k = 0$	$b^2 - 4ac = 0$
No real zeros if	A quadratic function with no real zeros cannot be written in factored form with real coefficients	k and a have same signs	$b^2 - 4ac < 0$
Range	If $a > 0$ and the vertex occurs at (h,k), range is $f(x) \geq k$. If $a < 0$ and the vertex occurs at (h,k), range is $f(x) \leq k$.		