Quadratics: there is Factoring, and the Quadratic Formula (all math 8-19-08)

Step 1 – Put it into standard form: $ax^2 + bx + c = 0$ (with $a > 0$)

"solve/solution, x-intercepts, roots, zeroes" mean find the values of x that make it true

Checklist – drop through this list looking for things that might work:

Greatest Common Factor: if there is one, factor it out (may or may not contain an x)

Grouping: do for 2 or more "things" and 4 terms, typically. Repeated group & GCF

Special Patterns:

Difference of 2 perfect squares $a^2 - b^2 = (a + b)(a - b)$

Sum/Difference of 2 perfect cubes $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$
$a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

Perfect Square Trinomial $(a + b)^2 = a^2 + 2ab + b^2$
$(a - b)^2 = a^2 - 2ab + b^2$

Square Root Solution – direct $b = 0$ solve $ax^2 - c = 0$ as $x = +/-\sqrt{(c/a)}$

Square Root Solution – by completing the square (divide through by a if $a \neq 1$)

$ax^2 + bx + c = 0$ becomes	$x^2 + px + q = 0$ where $p = b/a$ and $q = c/a$
move q to the RHS	$x^2 + px = -q$
add $(p/2)^2$ to both sides	$x^2 + px + (p/2)^2 = (p/2)^2 - q$
use perf sq tri pattern	$(x + p/2)^2 = (p/2)^2 - q$
go for the x in square root	$x = -p/2 +/- \sqrt{((p/2)^2 - q)}$

General Trinomial Factoring:

For a = 1 use "third term procedure": $ax^2 + bx + c = 0$ becomes
$(x - m)(x - n) = 0$
where m and n are factors of c
(check them all to see which pair adds to b)

For $a \neq 1$ use trial and error or "the Box" (which is well-organized trial and error)
$ax^2 + bx + c = 0$ becomes $(px - m)(qx - n) = 0$
where p and q are factors of a, m and n are factors of c, and
we must have $-mqx - npx = bx$

Quadratic Formula: for $ax^2 + bx + c = 0$ find $x = \dfrac{-b +/- \sqrt{(b^2 - 4ac)}}{2a} = \dfrac{-b}{2a} +/- \dfrac{\sqrt{D}}{2a}$

(x's might not be real!) where $D = b^2 - 4ac$