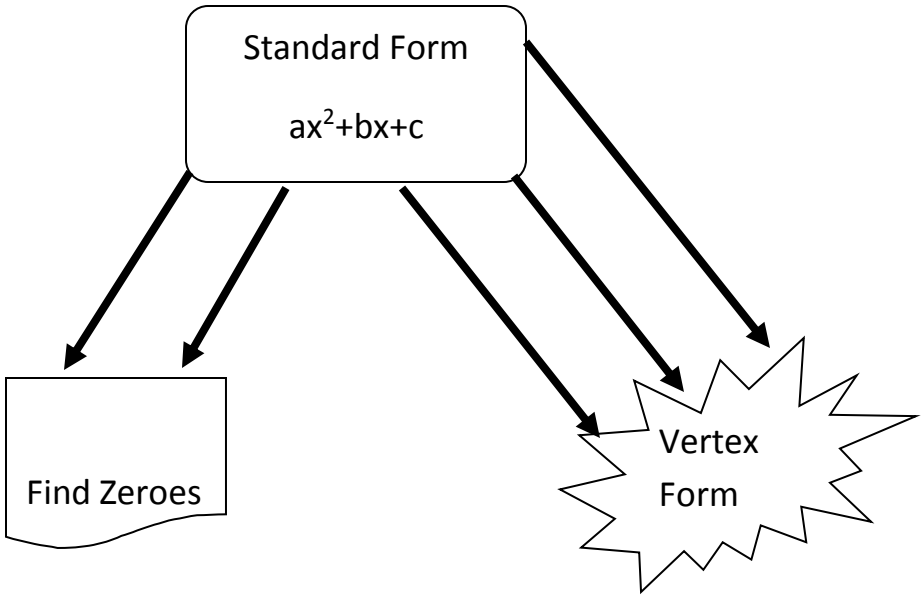
A. Lesson Context

BIG PICTURE of this UNIT:	• How & why do we build NEW knowledge in Mathematics? • What NEW IDEAS & NEW CONCEPTS can we now explore with specific references to QUADRATIC FUNCTIONS? • How can we extend our knowledge of FUNCTIONS, given our BASIC understanding of Functions?		
CONTEXT of this LESSON:	Where we've been In Lesson 1, you reviewed one method for solving quadratic equations - factoring	Where we are NOW we will focus on addressing the idea of quadratic equations that DON'T factor … what algebra methods can we now use?	Where we are heading How do we extend our knowledge & skills of the algebra of quadratic functions, and build in new ideas & concepts involving functions.

B. Lesson Objectives

a. Understand the completing the square method as a strategies that can be applied to solving quadratic equations in standard form.
b. Extend this method to converting standard form equation into vertex form

C. OVERVIEW



D. FAST FIVE: Skills Review (Demo with Algebra Tiles – as needed)

Expand $(x + 3)^2$ Expand $(x – 2)^2$ Expand $(x + 5)^2$ Expand $(x + h)^2$

Factor $x^2 + 8x + 16$ Factor $x^2 – 6x + 9$ Factor $x^2 + 14x + 49$ Factor $x^2 + 2cx + c^2$

(a) What do we MEAN when we use the term "perfect square trinomial?

(b) Graph several "perfect square trinomials. What do you notice?

(c) What value does c have so that the trinomial is a "perfect square trinomial"?

$x^2 + 4x + \boldsymbol{c}$ $x^2 + 8x + \boldsymbol{c}$ $x^2 – 20x + \boldsymbol{c}$

(d) For what value of b (where $b > 0$) is the trinomial a "perfect square trinomial"?

$x^2 + \boldsymbol{b}x + 64$ $x^2 + \boldsymbol{b}x + 81$ $x^2 + \boldsymbol{b}x + 1$

E. Algebraic Strategies & Skills: Solving by square roots ➔ guided examples

(a) Solve $x^2 – 9 = 0$

(b) Solve $2x^2 – 50 = 0$

(c) Solve $3x^2 – 24 = -3$

(d) Solve $(2x + 5)^2 – 9 = 0$

F. Algebraic Strategies & Skills: Solving by completing the square ➔ guided examples

(a) Solve $x^2 – 6x + 8 = 0$ by c/s

(b) Solve $x^2 – 6x + 2 = 0$ by c/s

(c) Solve $x^2 + 8x – 3 = 0$ by c/s

(d) Solve $x^2 + 4x + 1 = 0$ by c/s

(e) Solve $x^2 + 7x + 6 = 0$ by c/s

(f) Solve $2x^2 – 6x + 3 = 0$ by c/s

(g) Solve $-4.9t^2 + 11.76t + 1.4 = 0$ by c/s

(h) Solve $x^2 – 6x + 10 = 2(3x + 10)$

G. Skill Application – Completing the Square ➔ a = 1

Example #1: Convert the equation $f(x) = x^2 + 8x + 15$ from standard form to vertex form.	**Why Did I Do That????**
$f(x) = x^2 + 8x + 15$	STEP 1A ➔ Why is there a +16 here now?
STEP 1: $f(x) = (x^2 + 8x + 16 - 16) + 15$ **1A** **1B**	STEP 1B ➔ Why is there a – 16 also included?
STEP 2: $f(x) = (x + 4)^2 - 16 + 15$ **2A**	STEP 2A ➔ Where did the $(x + 4)^2$ come from?
STEP 3: $f(x) = (x + 4)^2 - 1$ **3A**	STEP 3A ➔ Where did the – 1 come from?
Practice #1: Convert the equation $f(x) = x^2 - 10x + 15$ from standard form to vertex form.	Practice #2: Identify the transformations of $f(x) = x^2$ if the "new" equation is $f(x) = x^2 - 7x + 2$.
EXTENSION: Are there another ways that I can work out the vertex form of an equation if I am given the standard form (i.e ways that DON'T involve the completing the square method?	

H. Skill Application – Completing the Square ➔ a ≠ 1

Example #1: Convert the equation $f(x) = 2x^2 + 24x + 15$ from standard form to vertex form.	**Why Did I Do That????**
STEP 1: $f(x) = 2(x^2 + 12x) + 15$ **1A**	STEP 1A ➔ Where did the 2 & 12 come from?
STEP 2: $f(x) = 2(x^2 + 12x + 36 - 36) + 15$ **2A** **2B**	STEP 2A ➔ Why is there a +36 here now? STEP 2B ➔ Why is there a –36 also included?
STEP 3: $f(x) = 2(x^2 + 12x + 36) - 72 + 15$ **3A**	STEP 3A ➔ Where did the –72 come from?
STEP 3: $f(x) = 2(x + 6)^2 - 57$ **4A** **4B**	STEP 4A ➔ Where did the $(x + 6)^2$ come from? STEP 4B ➔ Where did the – 57 come from?
Practice #1: Convert the equation $f(x) = \frac{1}{2}x^2 - 2x + 3$ from standard form to vertex form.	

Extra Practice: http://www.cpm.org/pdfs/skillBuilders/AC/AC_Extra_Practice_Section24.pdf