(A) Lesson Context

BIG PICTURE of this UNIT:	• How do we analyze and then work with a data set that shows both increase and decrease • What is a parabola and what key features do they have that makes them useful in modeling applications • How do I use graphs, data tables and algebra to analyze quadratic equations?		
CONTEXT of this LESSON:	Where we've been In Lesson 6, you were factoring quadratics in order to find the zeroes and other key features of a parabola	Where we are We will now solve quadratic equations, wherein we ultimately need to use the process of factoring	Where we are heading How can I use EQUATIONS to make predictions about parabolas and quadratic data sets & quadratic models

(B) Lesson Objectives:

a. Review & practice the algebraic skills of expanding and factoring
b. Use the skills of factoring and expanding in solving equations and contextual problems

(C) Solving Quadratic Equations

Example 1: Given the quadratic relation $y = x^2 - 8x + 12$;

a. Sketch a graph of this parabola and label all key points/features.

b. Solve $0 = x^2 - 8x + 12$. What does your solution mean?

c. Solve $-3 = x^2 - 8x + 12$. What does your solution mean?

d. Solve $5 + 8x = x^2 + 12$. What does your solution mean?

Example 2: Given the quadratic relation $y = 6x^2 + x - 15$

a. Factor $y = 6x^2 + x - 15$

b. Solve $0 = 6x^2 + x - 15$

c. Solve $36 = 6x^2 + x - 15$

d. Graph $y = 6x^2 + x - 15$ and determine the zeroes. How does your GRAPH verify that your algebra in parts a,b,c has been done correctly?

e. Using your graphing calculator to find the vertex and then rewrite the equation in VERTEX FORM.

Example 3: Given the quadratic relation $y = 6x^2 + 5x - 4$

    a.   Factor $y = 6x^2 + 5x - 4$

    b.   Solve $0 = 6x^2 + 5x - 4$

    c.   Solve $65 = 6x^2 + 5x - 4$

    d.   Graph $y = 6x^2 + 5x - 4$ and determine the zeroes. How does your GRAPH verify that your algebra in parts a,b,c has been done correctly?

    e.   Using your graphing calculator to find the vertex and then rewrite the equation in VERTEX FORM.

Example 4: Given the quadratic relation $y = 2x^2 - 20x + 50$

    a.   Factor $y = 2x^2 - 20x + 50$

    b.   Solve $0 = 2x^2 - 20x + 50$

    c.   Solve $72 = 2x^2 - 20x + 50$

    d.   Graph $y = 2x^2 - 20x + 50$ and determine the zeroes. How does your GRAPH verify that your algebra in parts a,b,c has been done correctly?

    e.   Using your graphing calculator to find the vertex and then rewrite the equation in VERTEX FORM.

(D) Key to SOLVING EQUATIONS:

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(E) Modeling with Quadratic Equations

Mr Santowski runs a clothing business and models how his revenues on sales of denim jeans are related to price changes. He uses the quadratic equation $R = 300 + 20x - x^2$, where R represents his daily revenue in dollars and x represents an increase or decrease in price. (So x = +1 represents a price increase of 1 dollar and x = -2 represents a price decrease of 2 dollars)

    a.   Determine the price change that will result in maximum revenues. What is the maximum revenue

    b.   Factor the equation $R = 300 + 20x - x^2$.

    c.   Solve the equation $0 = 300 + 20x - x^2$ and interpret what the answers mean, given the context.

    d.   Solve the equation $300 = 300 + 20x - x^2$ and interpret what the answers mean, given the context.

    e.   Make a sketch of the relation.

    f.   Solve the equation $375 = 300 + 20x - x^2$ and interpret what the answers mean, given the context

    g.   Solve the equation $144 = 300 + 20x - x^2$ and interpret what the answers mean, given the context

Now work through Q4,8,12,13 in Nelson 10, Chapter 3.