(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 5, you looked at the three forms of quadratic equations and how the equation communicates key features of the parabolas	Where we are We can easily switch between forms using simple algebra ➔ today we will expand and factor	Where we are heading How can I use graphs and equations to make predictions from quadratic data sets & quadratic models and quadratic equations

(B) Lesson Objectives:

a. Review & practice the algebraic skills of expanding and factoring
b. Understand the graphic & function connection of the algebra
c. Use the skills of factoring and expanding in application problems

(C) Review of Skills:

Analyze & sketch	Evaluate f(2)	Axis of Symmetry	Max/min point
$f(x)=(x+1)(x+3)$			
$f(x)=-3(x+5)(x-1)$			
$f(x)=2x^2+6x-20$			
$f(x)=-x^2++3x+10$			

(C) Changing from Factored Form to Standard Form – Expanding: Practice with Expanding

1. Expand and simplify.

$a)(x+7)(x-1)$

$b)(x+3)(x+4)$

$c)(2x-1)(x+3)$

$d)(4x+5)(6x+2)$

$e)(3x-2)(3x+1)$

2. Expand and simplify.

$a)(x-11)(x+11)$

$b)(x-6)(x+6)$

$c)(3-8x)(3+8x)$

$d(4x+9)(4x-9)$

$e)(7x+2)(7x-2)$

2. Expand and simplify.

$a)4(x-5)(x+5)$

$b)7(x+1)(x-6)$

$c)3(2x-1)(3x+4)$

$d)2(x+4)(x+2)$

$e)5(x-9)(x-5)$

4. Expand and simplify

$a)(x-8)^2$

$b)(5x-3)^2$

$c)(9x+2)^2$

$d)(6x+12)^2$

$e)(x+7)^2$

3. Expand and simplify.

$a)(x+1)(x+2)+3(x-2)$

$b)(x-6)^2+(x+2)^2$

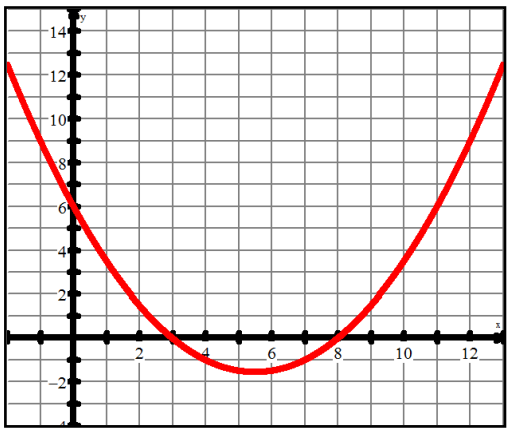
$c)(x-7)(x+7)-(x-4)(x+4)$

$d)(x+5)(x+3)+2(x-1)^2$

$e)3(x-9)^2-2(x-3)(x+6)$

(D) Changing from Factored Form to Standard Form – Expanding

Connect to the Graph ➔ Determine the equation of the parabola graphed. Write its equation, first in factored form and then in standard form



Apply to Problems ➔ Mr. S. can sell 500 apples per week when he charges 50 cents per apple. Through market research, his wife (being smarter than Mr. S of course) knows that for every price increase of 2 cents per apple, he will sell 10 less apples.

i. Determine an equation that can you used to model Mr. S.'s expected revenues.

ii. What price should he charge to maximize his revenues?

iii. What is his maximum revenue?

(E) Standard Form to Factored Form – Factoring

Practice the Algebra ➔ Determine the zeroes of the following parabolas.

$y = x^2 - x - 6$

$y = x^2 - 4x - 32$

$y = x^2 + x - 12$

$y = x^2 - 10x + 25$

$y = x^2 + 5x + 4$

$y = x^2 + 8x + 15$

$y = 2x^2 - 2x - 12$

$y = x^2 - 6x$

$y = 3x^2 + 24x + 45$

$y = x^2 - 25$

$y = 2x^2 - x - 6$

$y = 9x^2 - 6x + 1$

(F) Practice – Factoring Quadratic Trinomials

Part A

Directions: USE A SEPARATE SHEET OF PAPER. Please factor the following expressions. If any of the following expressions cannot be factored, please indicate so by stating "prime".

1. x^2+5x+4
2. $x^2+12x+32$
3. $x^2+15x+50$
4. $a^2-5a-24$
5. $a^2+5a-24$
6. $r^2+2r-48$
7. $x^2+6x-72$
8. $d^2+2d+80$
9. $2x^2-12x+18$
10. $3m^2+45m+162$
11. $x^2-33x+32$
12. $-3x^2+36x-60$
13. b^2+b-72
14. $d^2-25d+156$
15. $5b^2-50b+120$
16. $-2f^2+22f+52$

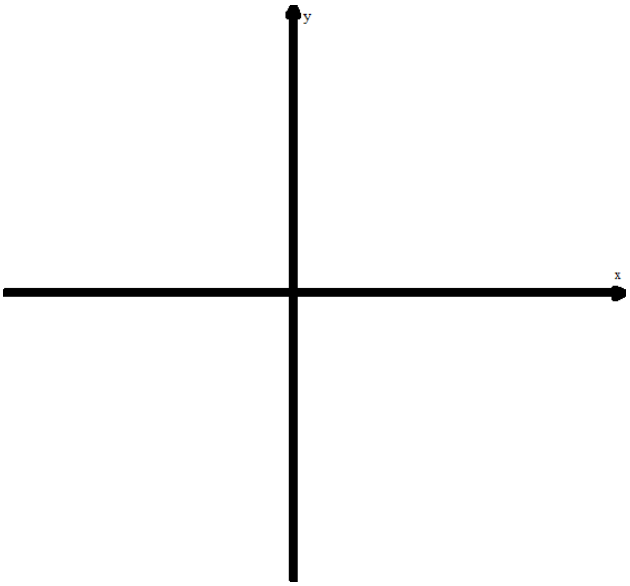
Part B

Directions: USE A SEPARATE SHEET OF PAPER. Please factor the following expressions. If any of the following expressions cannot be factored, please indicate so by stating "prime".

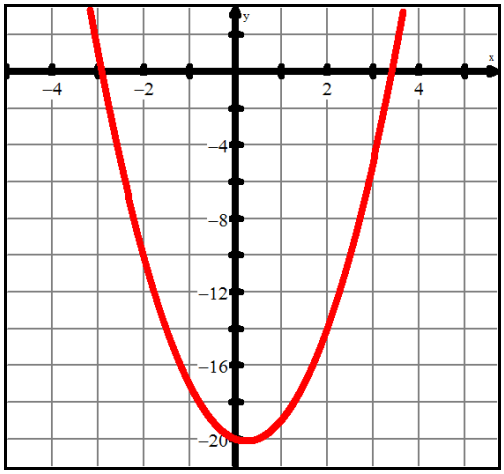
1. $6x^2-13x-5$
2. $3x^2+10x-25$
3. $10x^2+17x+3$
4. $6x^2-7x-3$
5. $12x^2-28x-5$
6. $3x^2-32x+45$
7. $14x^2-9x+1$
8. $12x^2-8x-15$
9. $11x^2+35x+6$

(G)Practice – Graphing & Word Problem Context

Given the quadratic function $f(x) = -x^2 + 3x + 18$, determine the zeroes, y-intercept & vertex & sketch the parabola



Given the quadratic function $f(x) = 2x^2 - x - 20$ (pictured below), use the TI-84 somehow…… and write the equation of $f(x) = 2x^2 - x - 20$ in factored form. **(T)**



Apply to Problems ➔ The profits of a company in its first 13 months of operations are modelled by the quadratic function $P(m) = -0.25m^2 + 3m - 5$ where m is the number of months (and m = 1 represents January) and P(m) is measured in billions of pesos. (CALC INACTIVE)

a. Determine when the company "breaks even".
b. Determine in which month the company maximizes its profits.
c. What are the company's maximum profits?
d. Solve and interpret P(m) < 0 given that the domain is $D: \{m \in Z \mid 0 \le m \le 13\}$
e. For what values of m are the profits DECREASING? Explain how you determined your answer.
f. Solve P(m) = -12 and interpret