(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 1, you looked for number patterns & graphed in data from a variety of activities	Where we are How can we use the graphing calculator to graph scatter plots and use the GDC to determine the quadratic equations	Where we are heading How can I use graphs of quadratic relations to make predictions from quadratic data sets & quadratic models and quadratic equations

(B) Lesson Objectives:

a. Prepare scatter plots of quadratic data on the graphing calculator
b. Use the graphing calculator to determine the regression equations of the data sets
c. Introduce key features of the graphs of quadratic relations (the graphs are called parabolas)

(C) Example #1 – Number Patterns from Lesson 1

Given the number pattern .....2,4,8,14,22,32,44, ..., we will create a data table as:

The quadratic equation from the TI-84 is:

X	*0*	*1*	*2*	*3*	*4*	*5*	*6*
y	2	4	8	14	22	32	44

Given the number pattern .....16,15,12,7,0,-9,-20 .....

we will create a data table as:

The quadratic equation from the TI-84 is:

X	*4*	*5*	*6*	*7*	*8*	*9*	*10*
y	16	15	12	7	0	-9	-20

(D) Example #2 – Contextual Data Sets from Lesson #1 & Contextual Analysis

(A) This data set shows the relationship between the profit, P, in millions of Euros and the number of cars, c, of a specific type (say a Toyota Land Cruiser) that are produced every year since 2000.

c	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
p(c)	-40	-18	0	14	24	30	32	30	24	14	0	-18

(a) What was the equation from the TI-84?

(b) Why might the profits be decreasing after year 6 (2006)?

(c) When should Toyota stop producing Land Cruisers? Explain why.

(d) What TOTAL profit did Toyota make from its Land Cruisers in the first 10 years of production?

(B) This data set shows the relationship between the cost, C in millions of dollars, for a large dairy farm and the month, m, of the year since January (where January is m = 0)

m	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*
C(m)	150	117	90	69	54	45	42	45	54	69	90	117	150

(a) What was the equation from the TI-84?

(b) Why would there be a relationship between costs and months in the first place?

(c) Why might costs for the dairy farm be lowest in July (m = 6)?

(d) The manager of the dairy farm adds some new farm equipment in an effort to control her costs. The new equation that models the relationship between costs and months is given by $C = 2m^2 - 24m + 122$. Explain why you believe that her efforts to control costs were good or not good (explanation must be based upon the graphs you draw.)

(E) Example #3 – Contextual Data Sets from Lesson #1

The Paymore Shoe company introduced a new line of neon green high heel running shoes. The table below shows the number of pairs of shoes sold at one store over an 11 month period.

Month	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Shoes sold	56	60	62	62	60	56	50	42	32	20	6

(a) Determine the equation using the TI-84 that can be used to model the relationship between the sales of shoes and the month.

(F) Example #4 – Contextual Data Sets from Lesson #1

A ball is tossed straight up in the air. Its height is recorded every quarter second and the data set is recorded below

Time (s)	*0*	*0.25*	*0.50*	*0.75*	*1.00*	*1.25*	*1.50*	*1.75*	*2.00*
Height (m)	1.5	3.5	4.9	5.7	5.7	5.2	4.1	2.4	0.1

(a) Draw a scatter plot on your calculator.

(b) Determine the equation that models the relationship between the height of the ball, in meters, and the time in flight, seconds.

(c) Determine the maximum height of the ball and state at what time the maximum height is reached.

(d) How long is the ball in flight?

(e) State the domain and range for this relationship.