Name Key Date _____ Pd _____

2.4 Quadratic Regression DAY THREE CYU

☑ Use when you get it right all by yourself

S Use when you did it all by yourself, but made a silly mistake

H Use when you could do it alone with a little help from teacher or peer

G Use when you completed the problem in a group

X Use when a question was attempted but wrong (get help)

N Use when a question was not even attempted

CONCEPTS	BASIC	INTERMEDIATE	ADVANCED
Finite Differences	1a		
Graphing Quadratics	1b	2a	
Labeling a Graph	1b	2a	
Writing a Quadratic Model (calculator)	1c	2b	
Finding the Maximum Height	1d		
Finding when an object hits the ground	1e		
Finding Initial Height	1f		
Prediction		2c	

1) The data in this table represent the height of an object (in meters) at different times (in seconds) during flight.

Object

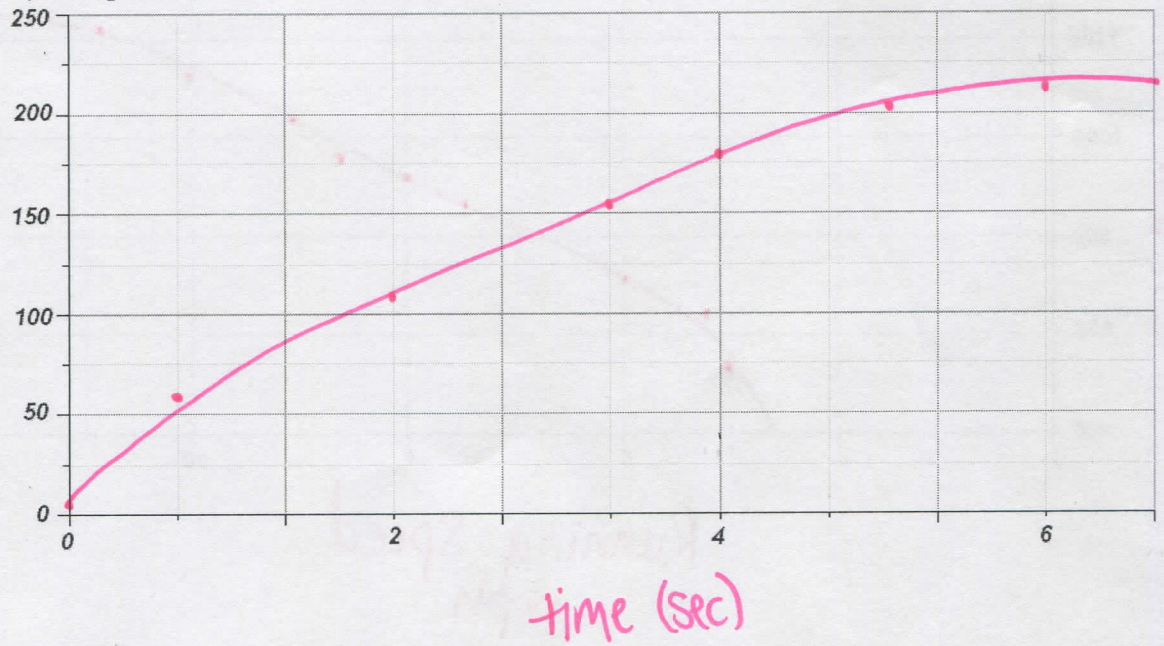
Time (s) t	0	1	2	3	4	5	6
Height (m) h	4	63.1	112.4	151.9	181.6	201.5	211.6

-59.1 -49.3 -39.5 -29.7 -19.9 -10.1

-9.8 -9.8 -9.8 -9.8 -9.8

a) Calculate the finite differences for the data. What degree polynomial function would you use to model the data set? (first difference: linear, second difference: quadratic)

b) Graph the data. Be sure to label the axes.



c) Write a polynomial function to model the data set. Check your polynomial by checking it against the given data set. (Do quadratic regression on your calculator.)

$f(x) =$ $-4.9x^2 + 64x + 4$

a = -4.9 b = 64 c = 4

d) What is the maximum height of the object? ≈ 213 m

(6.531, 212.98)

e) When did the object hit the ground? ≈ 13 secs

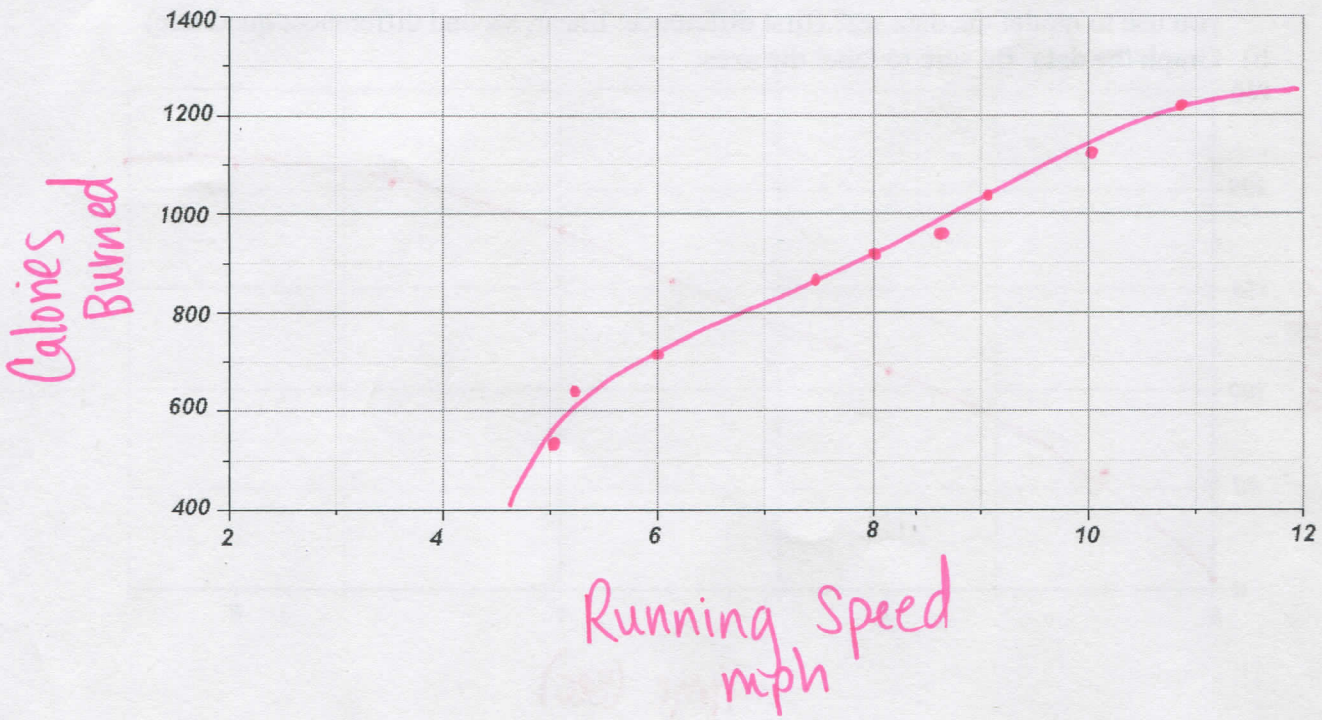
(13.123, 0)

f) What is the initial height of the object? 4m

2) The table below shows the number of calories burned in 1 hour when running at various speeds.

Running Speed (mph)	Calories Burned
10	1126
10.9	1267
5	563
5.2	633
6	704
6.7	774
7	809
8	950
8.6	985
9	1056
7.5	880

a) Plot the data below. Be sure to label the axes.



b) Write a quadratic function to model the data set. Check your polynomial by checking it against the given data set.

$f(x) =$ $-0.713x^2 + 124.47x - 19.455$

a = -0.713 b = 124.470 c = -19.455

c) How many calories does this model predict a person who runs at 9.5 mph for 1 hour will burn? Round to the nearest calorie. $f(9.5) = 1098.662$

$f(9.5) = -0.713(9.5)^2 + 124.47(9.5) - 19.455$

$= 1098.662$

≈ 1099 Calories

3) The fuel efficiency, in miles per gallon, for a certain midsize car at various speeds, in miles per hour, is given in the table below.

Fuel Efficiency of a Midsize Car

mph	mpg
25	29
30	32
35	33
40	35
45	34
50	33
55	31
60	28
65	24
70	19
75	17

a) Find a quadratic model for these data.

$f(x) =$ $-0.017x^2 + 1.367x + 5.685$

a = -0.017 b = 1.367 c = 5.685

b) Use the model to predict the fuel efficiency of this car when it is traveling at a speed of 57 mph. $f(57) = 28.371$

Ans. 28.371 mpg

c) Use the model to predict the fuel efficiency of this car when it is traveling at a speed of 78 mph. $f(78) = 8.883$

Ans. 8.883 mpg

CYU Reflection: *How far can you go: basic, intermediate, or advanced?*

Rate your mastery level!

How confident are you with the skills this CYU covered? Circle the score you would give yourself.