

## Objectives

- 2. Dereceden denklem ve fonksiyonlarla modellenebilen denklem ve problemleri çözer.
- Öğrencilerin var olan verileri ya da deneylerden elde edilen verileri kullanarak grafik çizmeleri, bunları yorumlamaları ve çizilen grafikler arasında dönüşüm yapmalar beklenir.

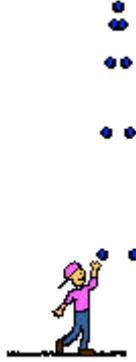
## Materials:

- TI-84 plus
- Computer
- Excel program

Grade Level: 12

Time: 60 minute

Dear my students;



Ali is throwing the stone upwards from ground vertically. The height of the stone is found by the relationship  $h = 36t - 3t^2$ , where “t” is the time in seconds after throwing. Now take your graphic calculator in hand and help Ali to prevent the crash of stone into his head. The answer of the questions are going to be your guidances.

1.

- a. Hit “STAT → EDIT” and “ENTER”. Before press “ENTER”, be careful  “1:Edit” is chosen.

L1	L2	L3	1
████████	-----	-----	
L1() =			

Hit “1” and “ENTER”; “2” and “ENTER”. Repeat this step from 1 to 5 respectively. Fill “LIST 1” with the values of “t” and fill “LIST 2” with the values of “h” which corresponds to the values of “t” in the equation given in the question.

L1	L2	L3	Z
1	█	---	
2			
3			
4			
5			
6			
7			
8			
9			
0			
---			
L2(t)=█			

Press “STAT → CALC. → 5: Quadreg”. Highlight the cursor in front of the “Store RegEQ:” by hitting down key.

```

QuadReg
Xlist:L1
Ylist:L2
FreqList:
Store RegEQ:█
Calculate
    
```

Press “VARS”, highlight “Y-VARS” and hit “ENTER”. Before press, watch out  “1: Function” mode is selected. The screen below disappears.

```

FUNCTION
1:Y1
2:Y2
3:Y3
4:Y4
5:Y5
6:Y6
7:Y7
↓
    
```

Again press “ENTER” and then move the cursor down to highlight “Calculate” and hit “ENTER”.

Fill in the blanks with what you found on the screen.

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*b.* Substitute the values and rewrite “y”.

.....

*c.* If you sketch the graph of “y”, what shape will result? Write your guess.

.....

d. Press “Y=” and write below what equals to “Y<sub>1</sub>”.

.....

e. Hit the graph. Does it match with your guess?

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2.



a. Now, let check this answer by using Excel. Remember Polya’s 5th

step. In cell A1 type “-10” and in cell A2 type “-9”. Click your mouse in cell A1. While holding the left mouse button down click, drag your mouse to cell A2.. You should see a black box around cell A1 and cell A2. Drag mouse to the lower right corner of the box. The cursor should change to a black cursor. Hold the left button of the mouse and drag the cursor down. Drag, until you see “14”. Suppose that these are values given to “t”. Fill the cells under B with values of “h”.

b. Stop ! You do not have to spend so much time for this. Press “2ND and

GRAPH”. This will direct you to the whole value of “h” which corresponds to the whole value of “t”. One screenshot is shown below among these values.

X	Y <sub>1</sub>
-3	-135
-2	-84
-1	-39
0	0
1	33
2	84
3	135

X=0

Using this table you can fill the cells under B on Excel.

c. Click on “Insert”, drag mouse on “scatter” and choose the upper and left graph. Click on one of the points in the box with the left mouse button and choose “Add Trendline”. Choose “Polynomial” and close the window.

d. Does it match with the graph that you found on TI 84?

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3.

a. The graphs on TI 84 are seen by using a standard window on  $10 \times 10$ . It

denotes that it sketches the graphics for  $-10 \leq y \leq 10$  for  $-10 \leq x \leq 10$ . You have to change the intervals to see whole graphic. For this firstly hit "window".

```
WINDOW
Xmin=-10
Xmax=10
Xscl=1
Ymin=-10
Ymax=10
Yscl=1
↓Xres=1
```

Change the minimum and maximum values of "X" and "Y". Notice how the graph changes according to the intervals of "X" and "Y". Until you see the whole graph, determine an interval for "X" and "Y". Write them to the blank below.

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b. What is the minimum height that the stone would reach?

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c. What is the maximum height that the stone would reach?

.....

d. How long would take the stone to reach its maximum height?

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4.

a. Do not forget that "X" represents "t" and "Y<sub>1</sub>" represents "h". Can you

find the height of the stone on -1th second?

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If you can, calculate and write your answer. If you cannot find, skip to the next question.

b. You are reading this question. I think you could not find. Do not worry. Ignore negative value of "t" and go on with positive value of "t". Find a range for "X". Write below this range.

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c. When the height of the ball is going to be -108m.?

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If you can find write your answer above but if you cannot, go on with d.

d. Do not be bad and try to draw graph with positive value of "h" by using TI 84. So arrange a new range for "Y" and write this range in the blank below.

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e.



Find a range for "X" and "Y" on TI 84 to get the screen capture above. Write this range in the blank.

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f. Anymore you are equipped enough to help Ali. How many second at most can Ali stand where he is before the stone touch his head? If you write your answer down, Ali is going to be able to know when he should move.

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5. For which value of "X" " $Y_1$ " is bigger than "0"?

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6. Find a real life problem which can be represented by " $(3x-0)(x-12)$ ". Search for the different representations of the graph of this quadratic equation and take the screenshot of them.

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7. Which problem gave you the most trouble? What made it difficult for you. Please answer these questions briefly.