

# Chapter 10

## Free Fall Function Data

### 10.1 Free Fall Data

Can you think about how the height of an object varies over time when the object is dropped from a location like a window or bridge or even from your hand? If performing an experiment like dropping a ball in a classroom, the CBL™ (Calculator Based Laboratory) can be used. Instructions for using the CBL™ will be shared with you by your instructor or you can contact the WEB site: <http://www.ti.com>

**Note:** Be sure to review Chapter 5.1.1 Receiving Data.

The text comes with a free fall data program that can be transferred from calculator to calculator. Once the data is in your calculator either by experiment or from the program, do the following.

1. Plot the data.
2. Determine a quadratic regression equation for the data.

Figures 10.1 to 10.6 represent the calculator steps you need to perform.

**Note:** Remember to execute the program before you set up your plot. Press **PRGM** ; select FREEFALL **ENTER** . The program stores data to L1 - L2 (see Fig. 10.2)

You can also type the FREEFALL program (see below) into your calculator. Press **PRGM** <NEW> **ENTER** ; type the program

name; **ENTER** ; and then type each line of the program. Refer to your manual for more specifics. (See also the subsequent table)

```
PROGRAM:FREEFALL
:ClrList L1,L1,L0,L0,L0,L0
: {0.0000,0.0167,0.0333,0.0500,0.0667,0.0833,0.1000,0.1167,
0.1333,0.1500,0.1667,0.1833,0.2000,0.2167,0.2333,0.2500,0.
2667,0.2833,0.3000,0.3167,0.3333} Æ L1
: {0.00,1.72,3.75,6.10,8.67,11.58,14.71,18.10,21.77,25.71,29.
90,34.45,39.22,44.22,49.58,55.15,60.99,67.11,73.48,80.10,87.
05} Æ L2
: {87.05,85.33,83.30,80.95,78.38,75.47,72.34,68.95,65.28,61.
34,57.15,52.60,47.83,42.83,37.47,31.90,26.06,19.94,13.57,6.
95,0.00} Æ L0
```



Figure 10. 1

L1	L2	L3
0	0	87.05
.0167	1.72	85.33
.0333	3.75	83.3
.05	6.1	80.95
.0667	8.67	78.38
.0833	11.58	75.47
.1	14.71	72.34

L3(1)=87.05

Figure 10. 2



Figure 10. 3

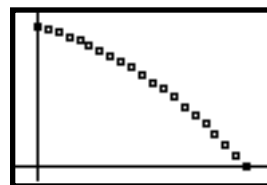


Figure 10. 4



Figure 10. 5

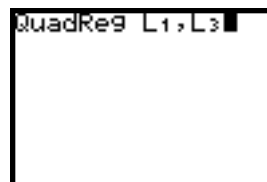


Figure 10. 6

<b>Distance fallen over time by an object in free fall</b>			
<b>Time</b>	<b>Distance fallen</b>	<b>Distance from Ground</b>	
<b>(sec)</b>	<b>(cm)</b>	<b>(cm)</b>	
0.0000	0.00	87.05	
0.0167	1.72	85.33	
0.0333	3.75	83.30	
0.0500	6.10	80.95	
0.0667	8.67	78.38	
0.0833	11.58	75.47	
0.1000	14.71	72.34	
0.1167	18.10	68.95	
0.1333	21.77	65.28	
0.1500	25.71	61.34	
0.1667	29.90	57.15	
0.1833	34.45	52.60	
0.2000	39.22	47.83	
0.2167	44.22	42.83	
0.2333	49.58	37.47	
0.2500	55.15	31.90	
0.2667	60.99	26.06	
0.2833	67.11	19.94	
0.3000	73.48	13.57	
0.3167	80.10	6.95	
0.3333	87.05	0.00	