4-8

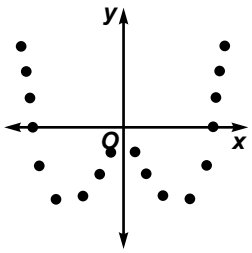
Study Guide

Modeling Real-World Data with Polynomial Functions

In order to model real-world data using polynomial functions, you must be able to identify the general shape of the graph of each type of polynomial function.

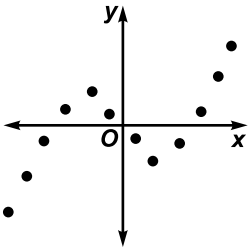
Example 1 **Determine the type of polynomial function that could be used to represent the data in each scatter plot.**

a.



The scatter plot seems to change direction three times, so a quartic function would best fit the scatter plot.

b.

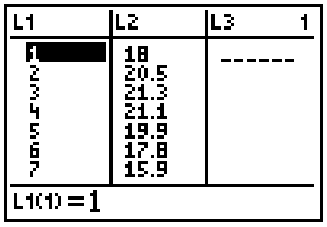


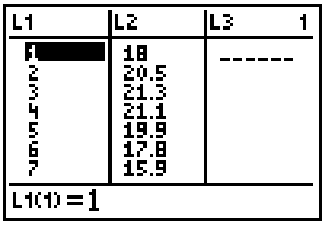
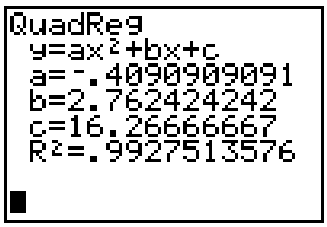
The scatter plot seems to change direction two times, so a cubic function would best fit the scatter plot.

Example 2 **An oil tanker collides with another ship and starts leaking oil. The Coast Guard measures the rate of flow of oil from the tanker and obtains the data shown in the table. Use a graphing calculator to write a polynomial function to model the set of data.**

Time (hours)	Flow rate (100s of liters per hour)
1	18.0
2	20.5
3	21.3
4	21.1
5	19.9
6	17.8
7	15.9
8	11.3
9	7.6
10	3.7

Clear the statistical memory and input the data. Adjust the window to an appropriate setting and graph the statistical data. The data appear to change direction one time, so a quadratic function will fit the scatter plot. Press [STAT], highlight **CALC**, and choose **5:QuadReg**. Then enter [2nd] **[L1]** [,] [2nd] **[L2]** [ENTER]. Rounding the coefficients to the nearest tenth, $f(x) = -0.4x^2 + 2.8x + 16.3$ models the data. Since the value of the coefficient of determination r^2 is very close to 1, the polynomial is an excellent fit.





[0, 10] scl: 1 by [0.25] scl: 5