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Graphing Calculator Lab

Modeling Using Quadratic Functions

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ACTIVITY

FALLING WATER Water drains from a hole made in a 2-liter bottle. The table shows the level of the water y measured in centimeters from the bottom of the bottle after x seconds. Find and graph a linear regression equation and a quadratic regression equation. Determine which equation is a better fit for the data.

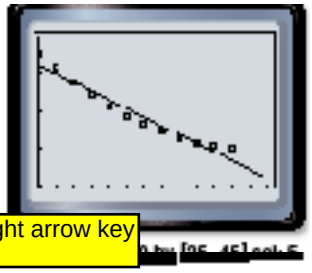
Time (s)	0	20	40	60	80	100	120	140	160	180	200	220
Water level (cm)	42.6	40.7	38.9	37.2	35.8	34.3	33.3	32.3	31.5	30.8	30.4	30.1

Step 1 Find a linear regression equation.

- Enter the times in L1 and the water levels in L2. Then find a linear regression equation. Graph a scatter plot and the equation.

KEYSTROKES: Review lists and findin ar regression equation on page 92.

replace 5 with 6



replace STAT key with 2nd key [STAT] key right arrow key right arrow key

Step 2 Find a quadrati

- Find the quadratic regression equation. Then copy to the Y= list and graph.

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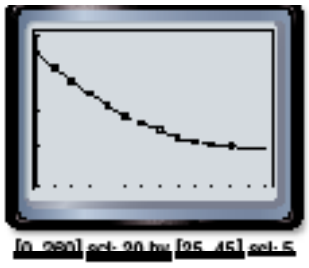
KEYSTROKES: STAT ▶ 5 ENTER Y= VARS 5 ▶ ▶ ENTER GRAPH

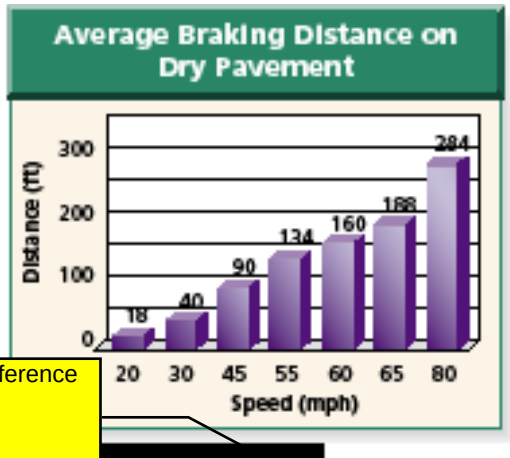
replace 5 with 3



The graph of the linear regression equation appears to p just two data points. However, the graph of the quadratic regression equation fits the data very well.

EXERCISES

For Exercises 1–4, use the graph of the braking distances for dry pavement.



1. Find and graph a linear regression equation and a quadratic regression equation for the data. Determine which equation is a better fit for the data.
2. Use the CALC menu with each regression equation to estimate the braking distance at speeds of 100 and 150 miles per hour.
3. How do the estimates found in Exercise 2 compare?
4. How might choosing a regression equation that does not fit the data well affect predictions made by using the equation?

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