

# Assignment

## Write

Describe the mathematical modeling process in your own words.

## Remember

Determining and using a regression equation is sometimes a step in the process of solving a more complex mathematical problem, rather than the final solution.

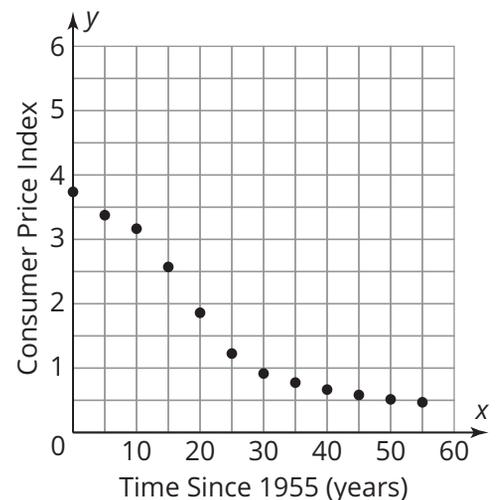
## Practice

The table shows the purchasing value of the dollar, or the consumer price index, for consumers in the United States from 1955 to 2010. The table uses the year 1982 as a base period, so the consumer price index written in dollars and cents in 1982 is 1.00. For instance, in 1955 the consumer price index was 3.73. This means that a dollar in 1955 was worth 3.73 times what it was worth in 1982. Similarly, a dollar in 2010 was worth 0.46 times what it was worth in 1982.

Year	Consumer Price Index	Year	Consumer Price Index
1955	3.73	1985	0.93
1960	3.37	1990	0.77
1965	3.17	1995	0.66
1970	2.57	2000	0.58
1975	1.86	2005	0.51
1980	1.22	2010	0.46

The scatter plot shows the data in the table where  $x$  represents the number of years since 1955 and  $y$  represents the consumer price index.

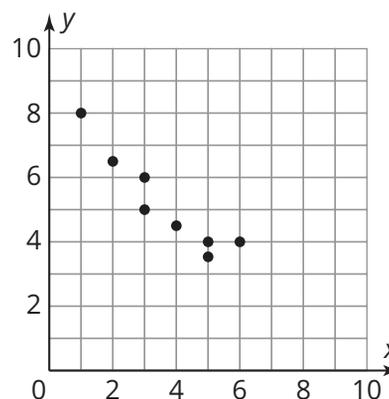
1. Describe how the consumer price index changes over time.
2. What type(s) of function(s) model this situation?  
Explain your reasoning.



3. Analyze the data and scatter plot.
  - a. Determine the regression equation for the model that best represents the data. Explain how you determined your answer. Then, graph the model on the same grid as the scatter plot.
  - b. Predict the consumer price index in 2025. Explain what your answer means in terms of the problem situation.
  - c. Mr. Kratzer asks his students to calculate what the consumer price index was in 1950. Melina says that you must evaluate the function at  $x = 5$  to determine the consumer price index in 1950. Dominique argues you must evaluate the function at  $x = -5$  to determine the consumer price index in 1950. Who is correct? Explain your reasoning.
  - d. Calculate the consumer price index for 1950. Show your work.
  - e. The consumer price index in 1950 was actually 4.15. Compare this to the answer you calculated in part (d). Explain why these answers differ.

## Stretch

1. Analyze the scatter plot shown.
  - a. Determine the function that best models the graph.
  - b. Plot the point  $(8, 6)$  on the graph. Does your answer to part (a) change? Why or why not?
  - c. If you were doing research and a situation arose in which a data point that gets added to the graph changes the model, what is one thing you might do to investigate further?



## Review

1. A home recently experienced an infestation of insects. The insect population over time is shown in the table. Write the function that represents the insect population over time.

Insect Population	
Day	Number of Insects
1	240
2	360
3	540
4	810

2. Solve each system of linear equations.

a. 
$$\begin{cases} 2x - 3y = 4 \\ 4x + y = 8 \end{cases}$$

b. 
$$\begin{cases} -5x + 6y = 10 \\ 2x - 3y = 15 \end{cases}$$

3. Solve each equation for  $x$ .

a.  $8^{3x} = 262,144$

b.  $2^{-x} = 1,048,576$