LESSON 5.2 Skills Practice

Name _____ Date _____

America's Next Top Polynomial Model
Modeling with Polynomials

Vocabulary

Explain each key term in your own words.

1. regression equation

2. coefficient of determination

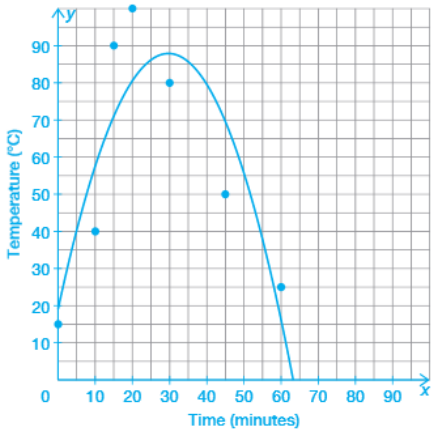
Problem Set

Create a scatter plot of the data. Predict the type of polynomial that best fits the data. Explain your reasoning.

1. The table of values represents the temperature of 2 liters of water in a teakettle over time as it is set to boil and then cools down.

   The data increases, then decreases. So, the data could be represented by a quadratic equation.

Time (minutes)	Temperature (°C)
0	15
10	40
15	90
20	100
30	80
45	50
60	25



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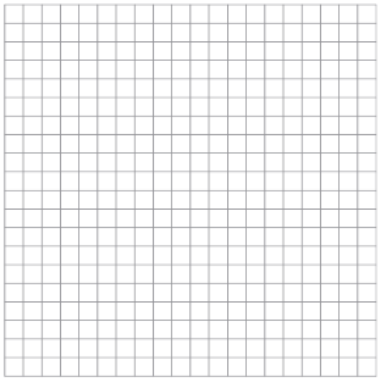
2. The table of values represents the number of work hours for which Jay was hired throughout the year.

Time Since December (months)	Work Time (hours)
1	40
3	100
5	160
7	140
9	160
11	60



3. The table of values represents the download speed in kilobytes per second (kBps) of Sue's Internet connection throughout the day.

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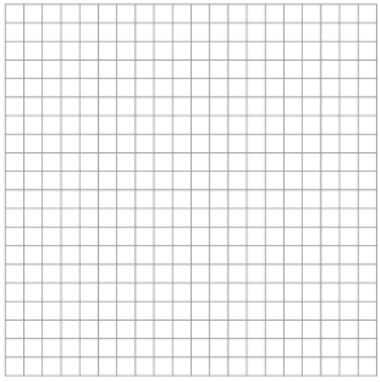
Time Since 7:00 AM (hours)	Download Speed (kBps)
1	5775
3	7000
5	4505
7	6855
9	6540
11	5020
13	3780
15	4250



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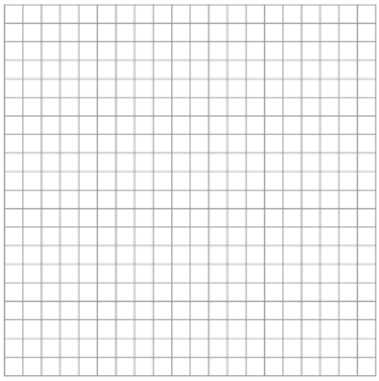
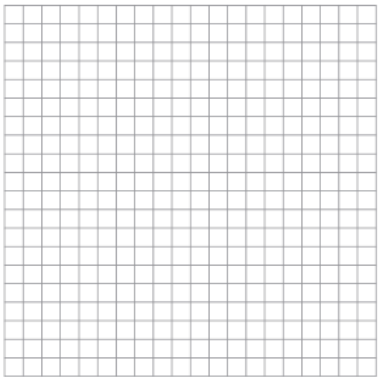
4. The table of values represents the annual attendance in hundred thousands at a theme park.

Time Since 1998 (years)	Attendance (hundred thousands)
0	13.4
1	17.9
2	19.2
3	22.1
4	18.3
5	16.8
6	11.2



5. The table of values represents the natural gas usage in quadrillion BTU in the US over several decades.

Time Since 1960 (years)	Gas Usage (quadrillion BTU)
0	12.4
10	21.8
20	20.4
30	19.3
37	22.6
50	24.6



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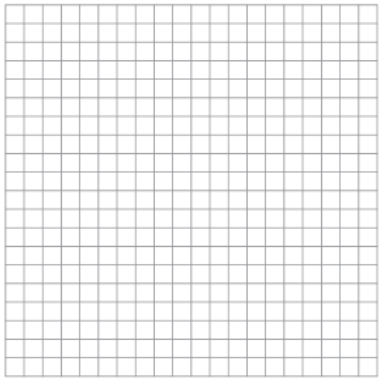
6. The table of values represents the number of US $20 bills produced each year.

Time Since 2005 (years)	Number of U.S. $20 Bills Produced (hundred thousands)
0	30.6
1	8.9
2	19.7
3	6.3
4	7.2
5	22.7
6	9.0
7	15.7



Use a graphing calculator to determine the regression equations for the data from Problems 1 through 6. Round decimals to the nearest thousandth. Sketch each regression equation on the coordinate plane with the corresponding scatter plot. How well does each regression equation model the data? Explain your reasoning.

7. Regression equation for Problem 1: The regression equation is approximately $f(x) = -0.078x^2 + 4.632x + 19.100$ with a coefficient of determination of 0.760. The equation is an acceptable fit for the data.
See graph.

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8. Regression equation for Problem 2:

9. Regression equation for Problem 3:

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10. Regression equation for Problem 4:

11. Regression equation for Problem 5:

12. Regression equation for Problem 6:

Use the data and regression equations from Problems 1 through 12 to make predictions for each problem situation. Explain your reasoning.

13. Charlotte wants to make sure the hot chocolate is not too hot for her daughter. She wants to pour the water at about 60°C. Use the regression equation for Problem 1 to predict after how many minutes she should pour the water from the kettle.

Using the regression equation, I solved $f(x) = 60$ to predict when the water is about 60°C.

Charlotte should pour the water after approximately 11 minutes or 48 minutes.

14. Use the regression equation for Problem 2 to predict how many hours of work Jay will be hired for in October.

15. Sue gets off work at 7:00 PM and wants to download some music. Use the graph from Problem 3 to predict the download speed she should expect at that time.

16. If the theme park in Problem 4 opened in 1995, explain why the regression equation would not give an accurate prediction of attendance that year.

17. Use the graph from Problem 1 to predict the temperature of the water be after 64 minutes. Is this likely? Explain your reasoning.

18. Use the regression equation from Problem 5 to predict the amount of natural gas the US used in 2000.

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19. Use the regression equation from Problem 5 to predict the amount of natural gas the US will use in 2020.

20. Use the regression equation from Problem 6 to predict the number of $20 bills made in 2004. Is this likely? Do you think the regression equation is a good match for the data? Explain your reasoning.