

**Yearly Production** The table shows the yearly production  $a_n$  (in thousands of barrels) of an oil well over a period of 36 years.

|   | Year | Production, $a_n$ | Year | Production, $a_n$ |
|---|------|-------------------|------|-------------------|
| DATA<br>Spreadsheet at<br>LarsonPrecalculus.com | 1    | 91                | 19   | 24                |
|   | 2    | 85                | 20   | 22                |
|   | 3    | 78                | 21   | 21                |
|   | 4    | 74                | 22   | 19                |
|   | 5    | 68                | 23   | 18                |
|   | 6    | 63                | 24   | 16                |
|   | 7    | 58                | 25   | 15                |
|   | 8    | 54                | 26   | 14                |
|   | 9    | 50                | 27   | 14                |
|   | 10   | 46                | 28   | 12                |
|   | 11   | 43                | 29   | 12                |
|   | 12   | 40                | 30   | 11                |
|   | 13   | 37                | 31   | 11                |
|   | 14   | 34                | 32   | 10                |
|   | 15   | 32                | 33   | 9                 |
|   | 16   | 30                | 34   | 9                 |
|   | 17   | 27                | 35   | 8                 |
|   | 18   | 26                | 36   | 8                 |

- Use the *regression* feature of a graphing utility to find an arithmetic sequence, a geometric sequence, and a quadratic sequence to model the data. Let  $n$  represent the year.
- Create a table that compares the actual data values with the values given by each sequence.
- Which sequence do you think best fits the data? Explain your reasoning.
- Use each sequence to predict the yearly production after 40 years.
- Which sequence do you think is the best one to use to predict the yearly production of the oil well in the future? Explain your reasoning.
- Use summation notation and the sequence you chose in part (c) to write and evaluate the sum of the yearly production amounts over the period of 36 years.