

## Exercise 46

In 2003, a town's population was 1,431. By 2007 the population had grown to 2,134. Assume the population is changing linearly.

- How much did the population grow between the year 2003 and 2007?
- How long did it take the population to grow from 1,431 people to 2,134 people?
- What is the average population growth per year?
- What was the population in the year 2000?
- Find an equation for the population,  $P$  of the town  $t$  years after 2000.
- Using your equation, predict the population of the town in 2014.

[**TYPO: There needs to be a comma after “ $P$ ” just like in the previous exercise.**]

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### Solution

The population grew by  $2134 - 1431 = 703$  between 2003 and 2007, a time interval of four years. The average population growth per year is the slope,

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2134 - 1431}{2007 - 2003} = \frac{703}{4} = 175.75.$$

In order to predict the population in 2000 and 2014, an equation of a line is needed. Let  $t$  be the number of years after 2000, and use the two points,  $(3, 1431)$  and  $(7, 2134)$ . Use the point-slope formula with either of these points to get the equation of the line.

$$y - 1431 = 175.75(t - 3)$$

$$y - 1431 = 175.75t - 527.25$$

$$y = 175.75t + 903.75$$

To get the population in 2000, plug in  $t = 0$ .

$$y = 175.75(0) + 903.75 = 903.75 \quad (\text{about } 904 \text{ people})$$

To get the population in 2014, plug in  $t = 14$ .

$$y = 175.75(14) + 903.75 = 3364.25 \quad (\text{about } 3364 \text{ people})$$