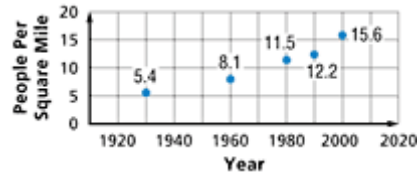


Example 6 Find a Rate of Change

The graph shows the density of population for the state of Idaho in various years.



- a. Find the rates of change for 1930-1960 and 1990-2000.

Use the formula for slope.

$$\frac{\text{rise}}{\text{run}} = \frac{\text{change in density}}{\text{change in time}}$$

$$\begin{aligned} \text{1930} - \text{1960:} \quad \frac{\text{change in density}}{\text{change in time}} &= \frac{8.1 - 5.4}{1960 - 1930} && \text{Substitute.} \\ &= \frac{2.7}{30} \text{ or } 0.09 && \text{Simplify.} \end{aligned}$$

Density increased by 2.7 people per square mile in a 30-year period for a rate of change of 0.09 people per square mile per year.

$$\begin{aligned} \text{1990-2000:} \quad \frac{\text{change in density}}{\text{change in time}} &= \frac{15.6 - 12.2}{2000 - 1990} && \text{Substitute.} \\ &= \frac{3.4}{10} \text{ or } 0.34 && \text{Simplify.} \end{aligned}$$

Over this 10-year period, the density increased by 3.4 people per square mile, for a rate of change of 0.34 people per square mile per year.

- b. Explain the meaning of the slope in each case.

For 1930-1960, on average, the people per square mile increased by 0.09 from the year before.

For 1990-2000, on average, the people per square mile increased by 0.34 from the year before.

- c. How are the different rates of change shown on the graph?

There is a greater vertical change between 1990-2000 than for 1930-1960. Therefore, the section of the graph for 1990-2000 has a steeper slope.