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Growth of the Human Population in the United States

Many changes have resulted from technological advances. These changes have helped humans to "master" the environment. Development of vaccines, antibiotics, and other medicines enable humans to enjoy better health and live longer. Humans can sometimes change the physical factors of their environment. If their home is too warm or too cold, they can set a thermostat which will turn on either a furnace or an air conditioner. Other living things adapt to their environment or die. Humans also are affected by biological factors similar to those that affect other organisms. For example, humans are sometimes overcrowded. Some areas of the earth have no people while other areas have thousands of people per square mile. Crowding can lead to competition for food, natural resources, and even living space.

In this investigation you are to compute the human population densities in the United States for every decade from 1790 to 1990. You are to compute the change in human population in the United States per decade.

Materials (per lab)

- graph paper
- ruler

Procedure

Population size can be measured as density. Density is calculated by dividing the population by the area. Population trends can be measured by comparing the growth rate of one year or decade with that of another. The rate of change in a population can be computed by using the formula: $Rate\ of\ change = \frac{\Delta D}{\Delta T}$

- Δ (delta) means "amount of change,"
- D is density
- T is time.

Assume that in 1970, there were 30 rabbits per square km in a certain area and that in 1980, there were 45 rabbits per square km {Figure 1}.

$$\frac{\text{Current Density} - \text{Previous Density}}{\text{Change in Time}} = \frac{45 - 30}{1990 - 1980}$$
$$\frac{15 \text{ rabbits per square km}}{10 \text{ years}} = 1.5 \text{ rabbits per square km a year}$$

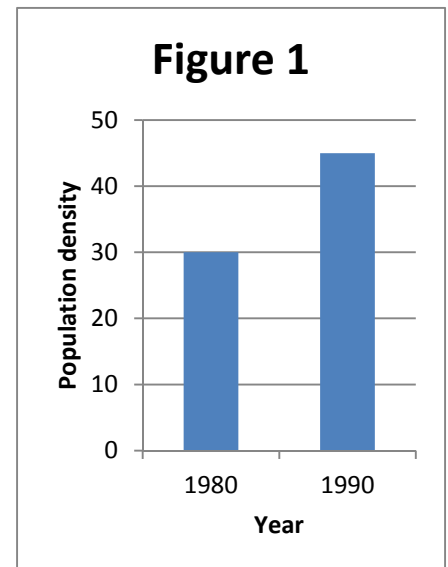
There are more rabbits in 1990 than in 1980, the rate of change is an increase. The rabbits are increasing at the rate of 1.5 new rabbits per square km per year.

Using the data for the human population of the United States:

- Compute the population density per square km for each decade.
- Compute the rate of change in the human population in the United States for every decade.

Then construct two graphs:

- On the first, show the population of the United States from 1790 to 1990.
- On the second show the population density from 1790 to 1990 and the rate of change at ten-year intervals.



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Table 1. Land Area And Population Of The United States

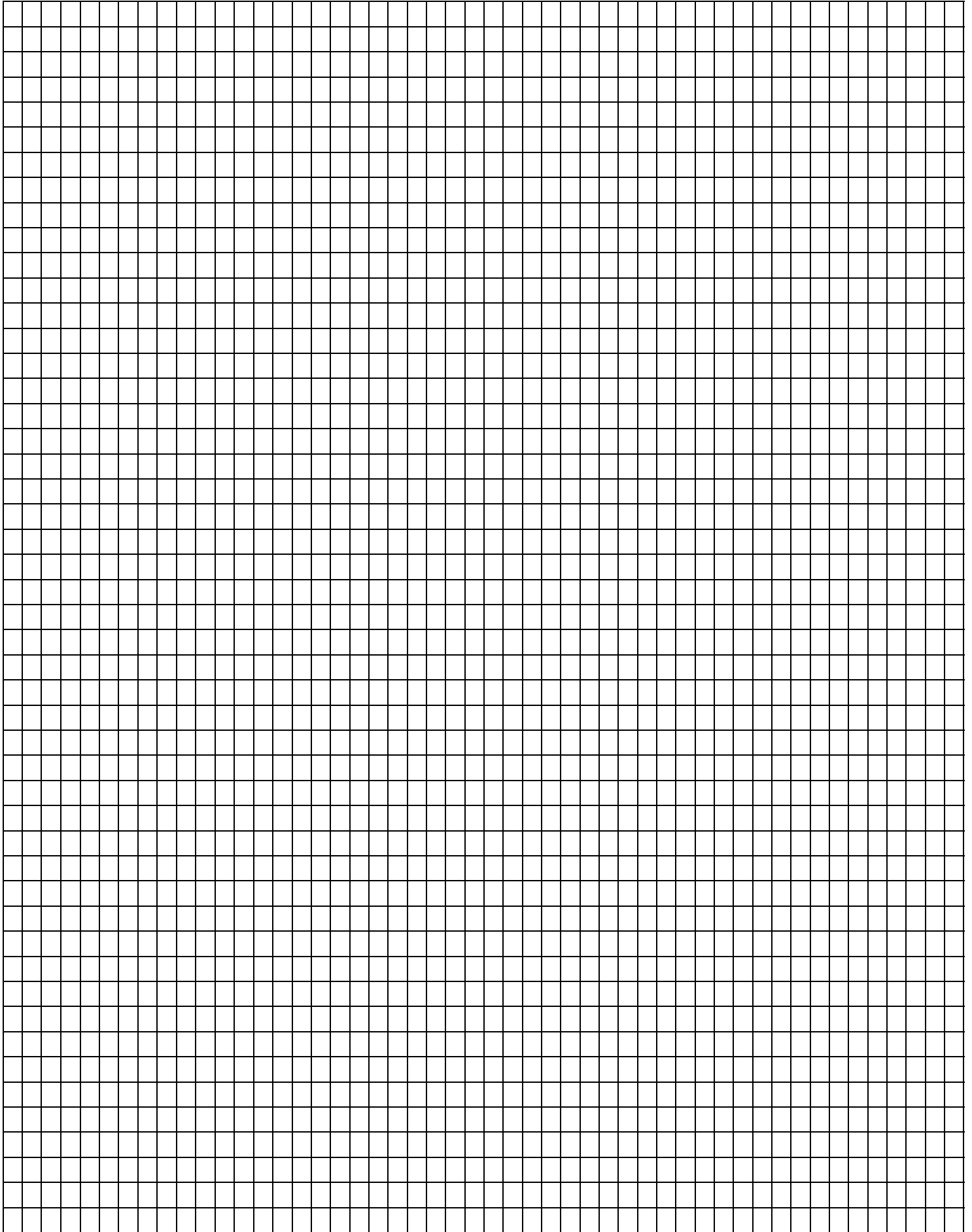
Year	Land Area Of The United States (Square Km)	Population of the United States	Density per square km	Rate of Change per Year
1790	2,239,692	3,929,214		
1800	2,239,692	5,308,483		
1810	4,355,935	7,239,881		
1820	4,531,107	9,638,453		
1830	4,531,107	12,866,020		
1840	4,531,107	17,069,453		
1850	7,614,709	23,191,876		
1860	7,691,367	31,443,321		
1870	7,691,367	39,818,449		
1880	7,691,367	50,189,209		
1890	7,691,367	62,979,766		
1900	7,691,870	76,212,168		
1910	7,691,173	92,228,496		
1920	7,691,111	106,021,537		
1930	7,710,762	123,202,624		
1940	7,710,762	132,164,569		
1950	9,200,214	151,325,798		
1960	9,170,959	179,323,175		
1970	9,168,660	202,302,031		
1980	9,168,660	226,542,203		
1990	9,168,660	248,709,873		

Formulating Generalizations: Answer on a separate piece of paper. Support your answers with the data.

1. Which of the three lines could you extend with reasonable accuracy to the year 2050? Explain.
2. How would the line showing the population of the United States compare with a graph of a hypothetical bacteria population?
3. From the population trend, which is higher, birth rate or death rate?
4. What other factors could cause the human population of an area to increase?
5. How are the three lines different? How are they similar? Why are there differences in the lines?
6. Can you account for a decrease in U.S. land area between 1950 and 1970?

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