

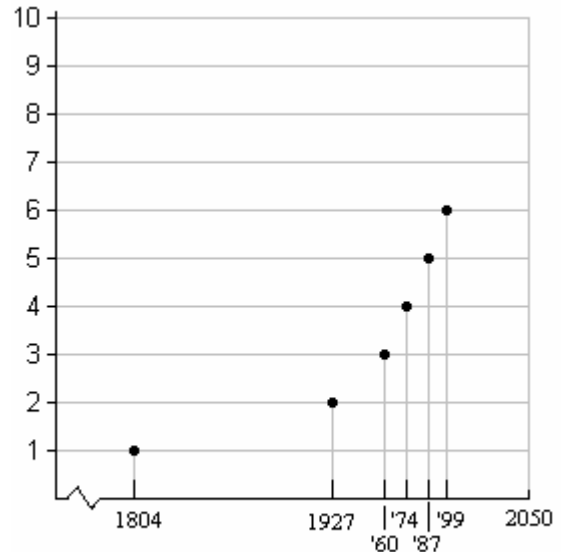
World population did not reach one billion until 1804. It took 123 years to reach 2 billion in 1927, 33 years to reach 3 billion in 1960, 14 years to reach 4 billion in 1974 and 13 years to reach 5 billion in 1987. It has taken just 12 years for the world to add this most recent billion people. This is the shortest period of time in world history for a billion people to be added.

**Table 1. World population milestones**

Year, <i>t</i>	World population <i>P</i> (billions)
1804	1
1927	2
1960	3
1974	4
1987	5
1999	6

Source: United Nations Population Fund, 1999  
<http://www.unfpa.org/>

**Figure 1. World population (Billions)**



1. Looking at the graph, do you think the world population from 1960 to 1999 is growing at an approximately constant rate? Explain your reasoning. If it *were* at a constant rate, predict the population of the world in 2050.
  
- (3) 2. Calculate the average rates of change of the world population on these intervals. Show work. Report units.
  - from 1804 to 1927:  $\frac{\Delta P}{\Delta t} = \frac{10^9 \text{ people}}{123 \text{ years}} \approx 8130081 \text{ people per year}$
  - from 1927 to 1960:
  - from 1960 to 1974:
  - from 1974 to 1987:
  - from 1987 to 1999:
  
- (4) 3. Report each of the above rates in people per minute. Show work. Use 1 year = 365.25 days.
  - from 1804 to 1927:  $\frac{\Delta P}{\Delta t} = \frac{10^9 \text{ people}}{123 \text{ years}} \cdot \frac{1 \text{ yr}}{365.25 \text{ days}} \cdot \frac{1 \text{ day}}{24 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \approx 15 \text{ people per minute}$
  - from 1927 to 1960:
  - from 1960 to 1974:
  - from 1974 to 1987:
  - from 1987 to 1999:

4. After looking at the calculations in Question 3, reflect on Question 1 again about *how* the population has been increasing. If the population were increasing at an approximately constant rate from 1960 to 1999, what would be true about the calculations in Question 3?

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Would you say the population prior to 1999 has been increasing at a decreasing rate, a constant rate, or an increasing rate?

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5. There are many world population clocks on the Internet, some of which are dynamically updated at every tick of the clock. Use the Internet search engine to find one. Then report the world population and the date (i.e., August 22, 2007) that you wrote the population, as well as the Internet address of the population clock.

World population: \_\_\_\_\_

Date \_\_\_\_\_

Internet address: \_\_\_\_\_

6. While no one knows exactly what the population of the world is to the nearest person, we can nonetheless make predictions based on past trends. Based on your work on this assignment, predict the world population in the year 2050. \_\_\_\_\_