

How to Calculate Annualized Rate of Growth

1. Find the population difference (D) between two time periods.
 - a) Subtract the beginning time period's population (C_{T1}) and the ending time period's population (C_{T2}).
 - b) $D = C_{T2} - C_{T1}$
2. Calculate the cumulative change in growth, expressed as a proportion (P).
 - a) Divide the difference (D) by the beginning period's population (C_{T1}).
 - b) $P = D/C_{T1}$
3. Find the difference (T_D) between two time periods.
 - a) $T_D = T_2 - T_1$
 - T_2 is the more recent time period (Year 2008, for example).
 - T_1 is the older time period (Year 2002, for example).
4. Add 1 to the proportion of change (P) calculated earlier. We'll call this value X . This is important because the n th root of a value greater than 1 will be greater than 1 but less than the original value, whereas the n th root of a value less than 1 will be greater than the original value but less than 1.
 - a) $X = 1 + P$.
5. Calculate the n th root of X . We'll call this n th root Y .
 - a) $Y = X^{1/n}$
 - b) n = the difference in time (T_D) calculated above.
6. Calculate annualized rate of growth (G)
 - a) $G = (Y - 1) * 100\%$
 - b) Subtracting 1 from Y returns a decimal value. Multiplying this decimal value by 100% yields annualized rate of growth over T_D .

Annualized Growth Rate: A Sample Calculation

Table 1 below displays sample data that we'll use to calculate annualized growth rate for Anytown.

| Variable | Time 1 (T_1) | Time 2(T_2) |
|------------|------------------|-----------------|
| Year | 1999 | 2005 |
| Population | 1000 people | 1100 people |

Table 1: Sample data to calculate annualized rate of growth

$$D = C_{T_2} - C_{T_1} = 1100 - 1000 = 100 \text{ people}$$

$$P = D/C_{T_1} = 100/1000 = .10 = 10\% \text{ cumulative growth since 1999.}$$

$$T_D = T_2 - T_1 = 2005 - 1999 = 6 \text{ years}$$

$$X = 1 + P = 1 + .10 = 1.10$$

$$Y = X^{1/n} = 1.10^{1/6} = 1.016$$

$$G = (Y - 1) * 100\% = (1.016 - 1) * 100\% = .016 * 100\% = 1.6\%$$

Summary: From 1999 through 2005, Anytown experienced an overall growth of 10%. This equates to an annualized growth rate of approximately 1.6% during that six-year span of time.

Annualized Growth with Real Data

Table 2 below lists overall student enrollments for Mountain Home School District since 2000. Using the procedure described above, what is the district's growth rate for any given span of time?

| Year | Enrollment |
|------|------------|
| 2000 | 3914 |
| 2001 | 3912 |
| 2002 | 3823 |
| 2003 | 3790 |
| 2004 | 3631 |
| 2005 | 3924 |
| 2006 | 3955 |
| 2007 | 4080 |

Table 2: Student Enrollment, Mountain Home School District, 2000-2007