

Example Write an equation to represent the following information. A population of a town is 20,000. The population is growing at a rate of 5% per year, find the population after t years.

The general equation for growth
 $a = 20,000$ the original population
 $b = 1.05$, 100% + 5% growth
 $x = t$

$$y = ab^x$$

Population in 10 years

$$y = 20,000(1.05)^t$$

$$y = 20,000(1.05)^{10}$$

$$y \approx 20,000(1.628)$$

$$y \approx 32,560$$

Example **Bob places \$10,000 in the bank and is paid 6% per year. How much money will be in the bank account after 5 years.**

The equation for growth/decay is $y = ab^x$

a - the original amount invested is \$10, 000

b - the rate of growth is 1.06, 100% + 6%

x - the time is 5 years

$$y = 10,000(1.06)^5$$

$$y \approx 10,000(1.338)$$

$$y \approx 13, 380$$

After 5 years, Bob would approximately \$13,380 in his account.

Example Jack's base pay when he started his job was \$30,000. If he was promised a cost of living increase of 2% per year for his first 10 years on the job, what would be his pay after 10 years.

$$\begin{aligned}y &= a(1 + r)^x \\y &= 30,000(1 + .02)^x \\y &= 30,000(1.02)^{10} \\y &= 30,000(1.218) \\y &\approx 36,540\end{aligned}$$

Jack's base pay would approximate \$36,540.

Example Write an equation to represent the following information. A population of a town is 20,000. The population is decreasing at a rate of 5% per year, find the population after t years.

The general equation for growth $y = ab^x$

$a = 20,000$ the original population

$b = .95$, (100% – 5%) decay

$x = t$

$$y = 20,000(.95)^t$$

To find the population (y) after 10 years, $y = 20,000(.95)^{10}$

$$y \approx 20,000(.598)$$

$$y \approx 11,960$$

The population of the town after 10 years will approximate 11,960 people.