The population of a Midwestern city follows the exponential law. If N is the population of the city and t is the time in years, express N as a function of t. If the population doubled in size over an 18-month period and the current population is 10,000, what will the population be 2 years from now?

Solution

Let N_0 – current population, C - constant, then $N = N_0 C^t$.

The population doubled in size after 18-month (1,5 years) period, than:

$$2N_0 = N_0 C^{1,5}, \quad C^{\frac{3}{2}} = 2, \qquad C = \sqrt[3]{4}\,.$$

$$N = N_0\left(\sqrt[3]{4}\right)^t$$

After 2 years: $N = 10000 \cdot \left(\sqrt[3]{4}\right)^2 = 10000 \cdot \sqrt[3]{16} \approx 25200.$

Answer: $= N_0\left(\sqrt[3]{4}\right)^t$, $25200.$