Question #16957 The count in a bacteria culture was 200 after 15 minutes and 1500 after 40 minutes. What was the initial size of the culture? Find the doubling period. Find the population after 120 minutes. When will the population reach 11000. **Solution.** It is well-known that bacteria grow under the law $y(T) = y_0 e^{kT}$, $y(T)$ is the size of population at time T. Next $y(15) = 200$ and $y(40) = 1500$, thus $y_0 e^{k15} = 200$ and $y_0 e^{k40} = 1500$, so $e^{25k} = 7.5$ and $k = \dfrac{ln\,7.5}{25} \approx 0.08$. Moreover, $y_0 = 200/e^{15 \cdot \frac{ln\,7.5}{25}} \approx 60.24$. The doubling period is T' such that $y(T') = 2y_0$ or $T' = \dfrac{ln\,2}{k} = \dfrac{ln\,2}{0.08} = 25$. The population reaches 1100 at time T'' such that $y(T'') = 1000$ or $T'' = \dfrac{ln\,\frac{11000}{y_0}}{k} \approx 60.51$

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