

Exponential Growth and Decay

Build an exact exponential model, then solve the contextual amount or time question.

Continuous percentages give $k=r$; periodic percentages give $k=\ln(1+r)$. Keep exact values until the final approximation.

1. Growth model

Assume exponential growth. A cell culture measures 1200 cells at $t=6$ hours and 2571 cells at $t=13$ hours. Let t be measured in hours from the stated origin $t=0$. Find the modeled amount at $t=16$ hours. Round the model estimate to the nearest whole cell. Write the model and show your work.

Model: _____

Work / substitution:

Answer (cells): _____

2. Decay model

Assume exponential decay. A laboratory sample measures 1240 grams at $t=6$ hours and 670 grams at $t=13$ hours. Let t be measured in hours from the stated origin $t=0$. Find the time t when the modeled amount reaches 469 grams. Round to 2 decimal places. Write the model and show your work.

Model: _____

Work / substitution:

Answer (hours): _____

3. Growth model

Assume exponential growth. A cell culture starts at 1200 cells and increases continuously at 4% per hour. Let t be measured in hours from the stated origin $t=0$. Find the modeled amount at $t=16$ hours. Round the model estimate to the nearest whole cell. Write the model and show your work.

Model: _____

Work / substitution:

Answer (cells): _____

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4. Decay model

Assume exponential decay. A laboratory sample starts at 1240 grams and decreases continuously at 4% per hour. Let t be measured in hours from the stated origin $t=0$. Find the time t when the modeled amount reaches 620 grams. Round to 2 decimal places. Write the model and show your work.

Model: _____

Work / substitution:

Answer (hours): _____

5. Growth model

Assume exponential growth. A cell culture starts at 400 cells and doubles every 3 hours. Let t be measured in hours from the stated origin $t=0$. Find the time t when the modeled amount reaches 800 cells. Round to 2 decimal places. Write the model and show your work.

Model: _____

Work / substitution:

Answer (hours): _____

6. Decay model

Assume exponential decay. A laboratory sample starts at 440 grams and has a half-life of 4 days. Let t be measured in days from the stated origin $t=0$. Find the modeled amount at $t=5$ days. Round to 2 decimal places. Write the model and show your work.

Model: _____

Work / substitution:

Answer (grams): _____