

6N / CLASSROOM LESSON

Exponential growth and decay

Name: _____ Class: _____ Date: _____

Today you will

- Build models for repeated percentage changes.
- Use whole-period comparisons to make justified decisions.

Keep these ideas

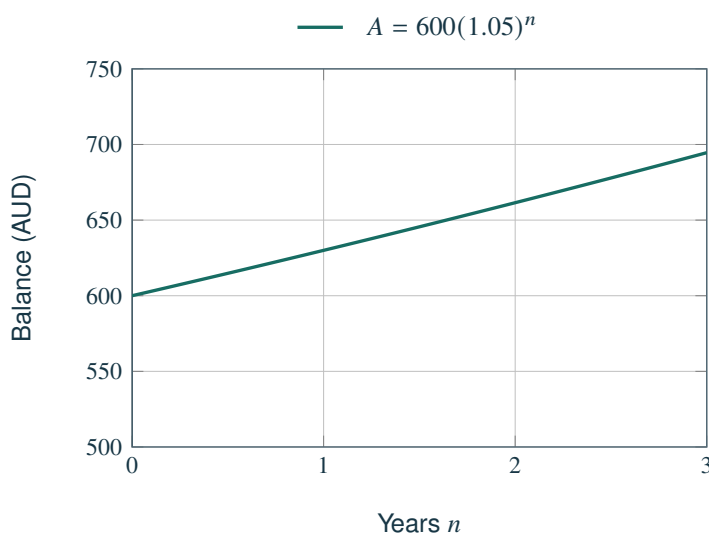
An increase of $r\%$ uses multiplier $q = 1 + \frac{r}{100}$; a decrease uses $q = 1 - \frac{r}{100}$.

After n periods, $A = A_0q^n$, where A_0 is the initial amount.

Keep the full multiplier and intermediate values. Round the final money amount to cents; check the previous whole period for an earliest-time decision.

Worked example

A fund starts at \$600 and grows by 5% each year. Find its balance after two years.



1. The multiplier is $q = 1.05$, so $A = 600(1.05)^n$.

2. At $n = 2$, $A = 600(1.05)^2 = 661.5$.

Answer
\$661.50.

The savings model used in the worked example. Annual balances occur at whole years.

Your turn

1. Write the multipliers for a 9% increase and a 14% decrease.

2. A \$1,200 camera loses 15% of its remaining value yearly. Write its model and value after two years.

Apply it on the graph

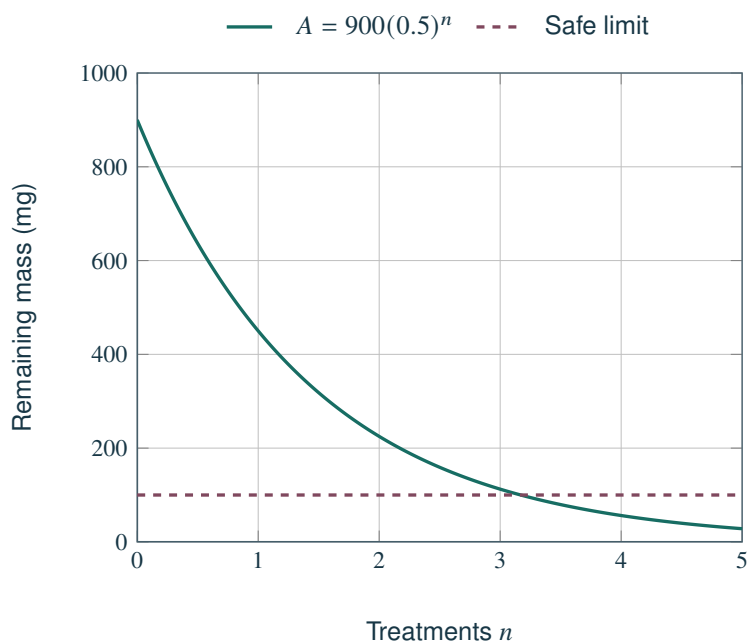
Write your calculations beside each diagram. Label any points or curves you add.



Savings begin at \$800; the purchase price is \$1,050. Use this graph for Questions 3 and 4.

3. The graph shows $S = 800(1.08)^n$. Find the savings after three years, rounded to cents.

4. Using the same graph, find the first whole year when savings cover \$1,050. Give the balance in that year.



Contaminant amount and the 100 mg limit are supplied. Read whole treatments only.

5. The sample follows $A = 900(0.5)^n$ mg. How much remains after three treatments? Is it at or below the 100 mg limit?

6. Using the same graph, find the first safe whole treatment cycle. State the amount at that cycle and one cycle earlier.