

Exponential Functions

Name: _____

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Concepts

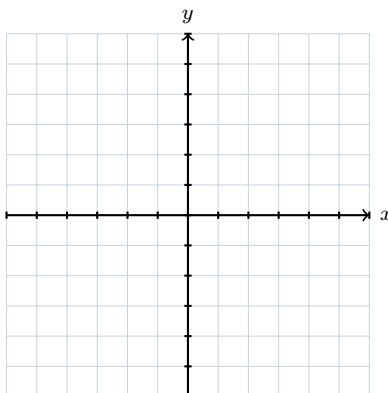
- Finding the Rule of an Exponential Function
- Graphing an Exponential Function
- Properties of the Exponential Function
- Solving Problems Involving the Exponential Function
- The Exponential Function (theory)
- The Inverse of the Exponential Function

Finding the Rule of an Exponential Function

1. An exponential function $f(x) = a c^x$ passes through $(0, 5)$ and $(3, 40)$. Find a and c , then state whether the function is increasing or decreasing and give the equation of its asymptote.

Graphing an Exponential Function

2. Sketch $f(x) = 4\left(\frac{1}{2}\right)^x$ on the grid using at least four exact points. State the equation of the asymptote, the domain, the range, and whether f is increasing or decreasing.



Properties of the Exponential Function

3. The charge remaining in a laboratory capacitor, in microcoulombs, after x minutes is $f(x) = 6 \left(\frac{1}{2}\right)^x - 3$, where the model is extended to all of $\mathbb{R}$ for study purposes. Give the domain, the range, the equation of the asymptote, the variation, the initial value and the zero of f , then state the sign of f .

Solving Problems Involving the Exponential Function

4. A radioactive tracer used in a hospital has an activity of 240 units when it is prepared, and its activity is halved every 6 hours.

- a) Write the rule giving the activity A after t hours.
- b) What is the activity after 18 hours?
- c) After how long does the activity fall to 15 units?

The Exponential Function

5. Among the six rules below, identify those that define an exponential function of the form $f(x) = a c^x$ or $f(x) = a c^x + k$, and for each rule that is rejected, say precisely which condition of the definition fails.

$$\begin{array}{lll} f_1(x) = x^3 & f_2(x) = 3^x & f_3(x) = (-2)^x \\ f_4(x) = 5(0.8)^x - 2 & f_5(x) = 1^x & f_6(x) = 4\left(\frac{7}{2}\right)^x \end{array}$$

The Inverse of the Exponential Function

6. Let $f(x) = 5(2)^x - 3$. Find the rule of f^{-1} , its domain and its range, and give the equation of its asymptote.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Exponential Functions — with the reasoning written out in full — are available at tutorinmontreal.ca.