

Exponential Functions

Name: _____

Date: _____

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
- The Role of the Parameters in an Exponential Function (theory)

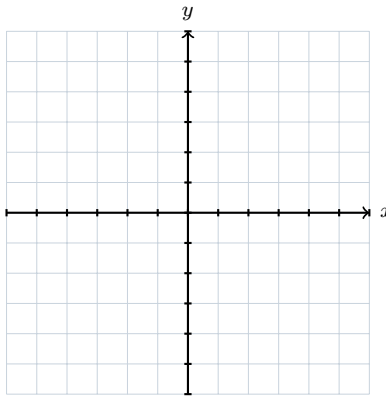
Finding the Rule of an Exponential Function

1. An exponential function of the form $f(x) = ac^x$ passes through the points $(0, 5)$ and $(3, 135)$.
 - a) Find its rule.
 - b) Solve $f(x) = 405$.
 - c) Give the equation of the asymptote and the range of f .

Graphing an Exponential Function

2. Consider $f(x) = 2(2)^x - 4$.

- Give the equation of the asymptote, the y -intercept and the zero of f .
- Sketch the curve, plotting also the points of abscissa -1 and 2 .
- Give the range of f and say whether f is increasing or decreasing.



Properties of the Exponential Function

3. Consider $f(x) = 3\left(\frac{1}{2}\right)^x - 6$.

- Give the domain, the range and the equation of the asymptote.
- Find the zero and the y -intercept.
- Is f increasing or decreasing? Justify.

Solving Problems Involving the Exponential Function

4. A batch of maple syrup cools in a sugar shack. Its temperature is $T(t) = 20 + 84(0.85)^t$, in degrees Celsius, t minutes after the boil.

- a) What is the temperature at $t = 0$?
- b) What is the temperature after 10 minutes, to the nearest tenth of a degree?
- c) What temperature does the syrup approach in the long run, and what does that number represent?

The Exponential Function

5. Four rules are proposed below. State which ones define exponential functions. For each exponential function, give the equation of its asymptote and say whether it is increasing or decreasing; for each rejected rule, justify the rejection.

- a) $f(x) = 5(0.8)^x$
- b) $g(x) = x^4$
- c) $h(x) = -3(2)^x + 4$
- d) $j(x) = 7(1)^x$

The Inverse of the Exponential Function

6. Find the rule of the inverse of $f(x) = 3(2)^x$, and state the domain of f^{-1} .

The Role of the Parameters in an Exponential Function

7. Let $f(x) = 5(2)^{-x} + 3$.

- a) Give the equation of the horizontal asymptote, the range and the y -intercept.
- b) Is f increasing or decreasing? Rewrite the rule with a base smaller than 1 and explain what this shows about the sign of the parameter b .

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.