

Comparing Linear to Exponential Functions

Prerequisite Skills

This lesson requires the use of the following skills:

- determining the rate of change of a function
- graphing functions
- identifying linear and exponential functions

Introduction

In previous lessons, linear functions were compared to linear functions and exponential functions to exponential. Here, the properties of linear functions will be compared to those of exponential functions.

Key Concepts

- The equation of a linear function can be written in the form $f(x) = mx + b$.
- A **factor** is one of two or more numbers or expressions that when multiplied produce a given product. In the equation $f(x) = mx + b$, m and x are factors.
- As the value of x increases, the value of $f(x)$ will increase at a constant rate. The rate of change of linear functions remains constant.
- Exponential functions are written in the form $g(x) = ab^x + k$, where a and k are real numbers, b is the base, and x , the input, is a real number.
- The variable of an exponential function is part of the exponent.
- As the value of x increases, the value of $g(x)$ will increase or decrease by a power of b .
- The rate of change of an exponential function varies depending on the interval observed.
- Graphs of exponential functions where the base is greater than 1 will increase at a faster rate than graphs of linear functions.
- A quantity that increases exponentially will always eventually exceed one that increases linearly.

Common Errors/Misconceptions

- incorrectly determining the rate of change
- not comparing the absolute values of the slopes to determine which function is steeper
- interchanging the x - and y -intercepts
- assuming the rate of change of a function is linear by only referencing one interval