7.1 Graph Exponential Growth Functions

TEKS 2A.4.B, 2A.11.B, 2A.11.C, 2A.11.F

Before You graphed polynomial and radical functions.

Now You will graph and use exponential growth functions.

Why? So you can model population growth, as in Ex. 40.

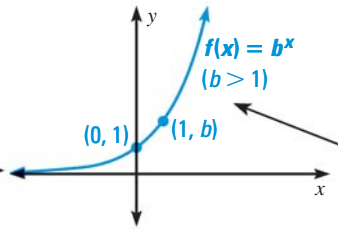
Key Vocabulary
- **exponential function**
- **exponential growth function**
- **growth factor**
- **asymptote**

An **exponential function** has the form $y = ab^x$ where $a \neq 0$ and the base b is a positive number other than 1. If $a > 0$ and $b > 1$, then the function $y = ab^x$ is an **exponential growth function**, and b is called the **growth factor**. The simplest type of exponential growth function has the form $y = b^x$.

KEY CONCEPT *For Your Notebook*

Parent Function for Exponential Growth Functions

The function $f(x) = b^x$, where $b > 1$, is the parent function for the family of exponential growth functions with base b. The general shape of the graph of $f(x) = b^x$ is shown below.



The *x*-axis is an asymptote of the graph. An asymptote is a line that a graph approaches more and more closely.

The graph rises from left to right, passing through the points (0, 1) and (1, *b*).

The domain of $f(x) = b^x$ is all real numbers. The range is $y > 0$.

EXAMPLE 1 Graph $y = b^x$ for $b > 1$

Graph $y = 2^x$.

Solution

STEP 1 **Make** a table of values.

x	−2	−1	0	1	2	3
y	$\frac{1}{4}$	$\frac{1}{2}$	1	2	4	8

STEP 2 **Plot** the points from the table.

STEP 3 **Draw**, from *left* to *right*, a smooth curve that begins just above the x-axis, passes through the plotted points, and moves up to the right.