

GUIDED NOTES – 6.2 GRAPHS OF EXPONENTIAL FUNCTIONS

LEARNING OBJECTIVES

In this section, you will:

- Graph exponential functions.
- Graph exponential functions using transformations.

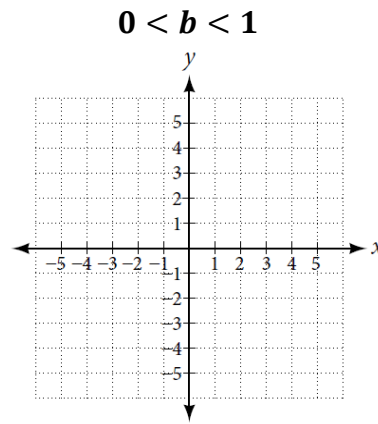
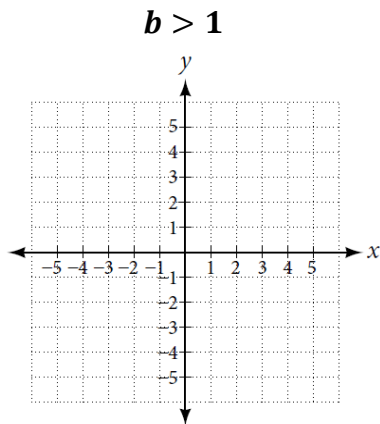
GRAPHING EXPONENTIAL FUNCTIONS

Study the box in your textbook section titled “characteristics of the graph of the parent function $f(x) = b^x$.”

- An exponential function with the form $f(x) = b^x, b > 0, b \neq 1$, has these characteristics:

- _____ function
- Horizontal asymptote: _____
- Domain: _____
- Range: _____
- x -intercept: _____
- y -intercept: _____
- Increasing if b _____ 1
- Decreasing if b _____ 1

- Sketch the exponential function in the form $f(x) = b^x$, when



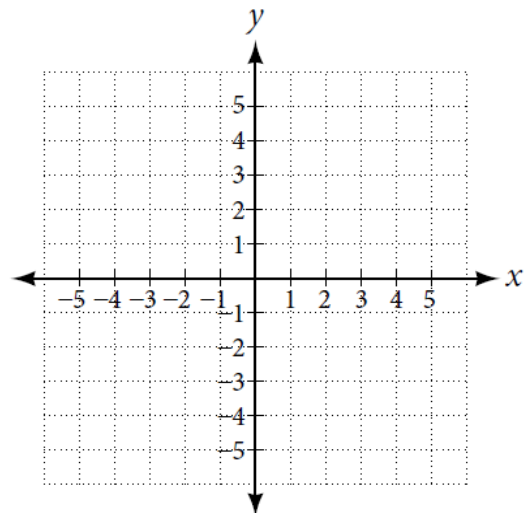
- Write out the 4 step process for graphing the function, given an exponential function in the form $f(x) = b^x$.

- 1.
- 2.
- 3.

4.

Try It: Read Example 1 in the text, then answer the following.

Sketch the graph $f(x) = 4^x$. State the domain, range, and asymptote.



GRAPHING TRANSFORMATIONS OF EXPONENTIAL FUNCTIONS

Study the box in your textbook section titled “shifts of the parent function $f(x) = b^x$ ”.

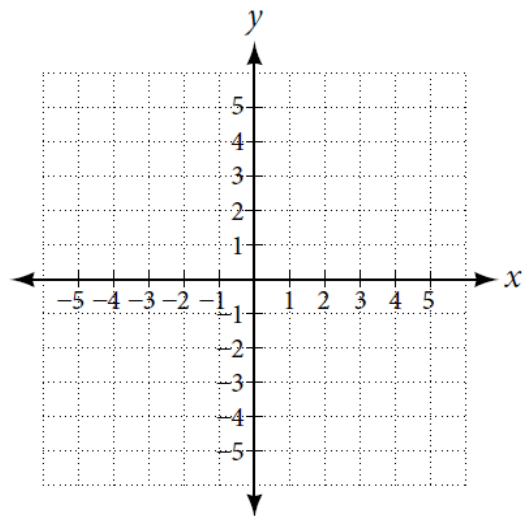
- For any constants c and d , the function $f(x) = b^{x+c} + d$ shifts the parent function $f(x) = b^x$
 - Vertically _____ units, in the _____ direction of the sign of _____
 - Horizontally _____ units, in the _____ direction of the sign of _____
 - The y-intercept becomes $(0, \text{_____})$
 - The horizontal asymptote becomes $y = \text{_____}$
 - The range becomes _____
 - The domain remains _____
- Write out the 4 step process for graphing the translation, given an exponential function in the form $f(x) = b^{x+c} + d$.
 - 1.
 - 2.

3.

4.

Try It: Read Example 2 in the text, then answer the following.

Graph $f(x) = 2^{x-1} + 3$. State the domain, range, and asymptote.

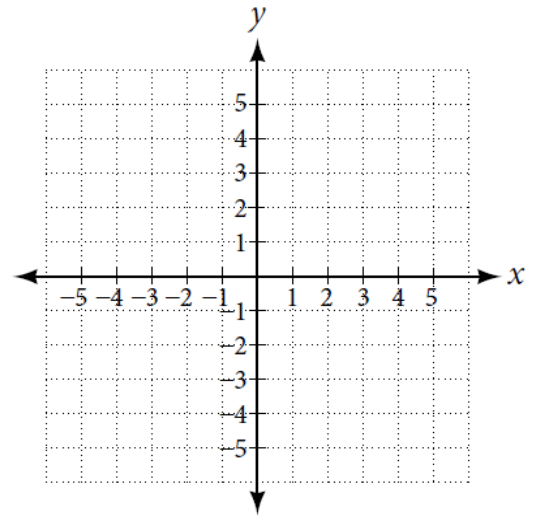


Study the box in your textbook section titled “stretches and compressions of the parent function $f(x) = b^x$ ”.

- For any factor $a > 0$, the function $f(x) = a(b)^x$
 - Is _____ vertically by a factor of a if $|a| > 1$
 - Is _____ vertically by a factor of a if $|a| < 1$
 - The y -intercept becomes $(0, \text{_____})$
 - The horizontal asymptote is $y = \text{_____}$
 - The range is _____
 - The domain is _____

Try It: Read Example 4 in the text, then answer the following.

Sketch the graph $f(x) = \frac{1}{2}(4)^x$. State the domain, range, and asymptote.



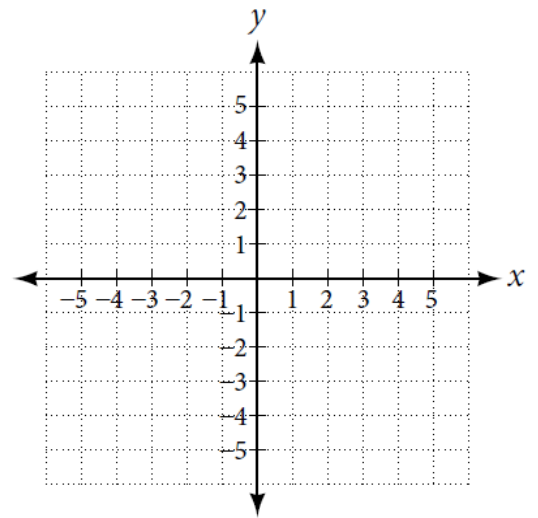
Study the box in your textbook section titled “reflections of the parent function $f(x) = b^x$.”

- The function $f(x) = -b^x$
 - Reflects the parent function $f(x) = b^x$ about the ___-axis
 - The y-intercept becomes $(0, \underline{\hspace{2cm}})$
 - The horizontal asymptote is $y = \underline{\hspace{2cm}}$
 - The range is $\underline{\hspace{2cm}}$
 - The domain is $\underline{\hspace{2cm}}$

- The function $f(x) = b^{-x}$
 - Reflects the parent function $f(x) = b^x$ about the ___-axis
 - The y-intercept becomes $(0, \underline{\hspace{2cm}})$
 - The horizontal asymptote is $y = \underline{\hspace{2cm}}$
 - The range is $\underline{\hspace{2cm}}$
 - The domain is $\underline{\hspace{2cm}}$

Try It: Read Example 5 in the text, then answer the following.

Find and graph the equation for a function, $g(x)$, that reflects $f(x) = 1.25^x$ about the y-axis. State its domain, range, and asymptote.



Study your textbook section to fill in the following table.

Translations of the Parent Function $f(x) = b^x$	
Translation	Form
Shift _____ _____	$f(x) =$ _____
Stretch and Compress _____ _____	$f(x) =$ _____
Reflect about the x -axis	$f(x) =$ _____
Reflect about the y -axis	$f(x) =$ _____
General equation for all translations	$f(x) =$ _____

Study the box in your textbook section titled “translations of exponential functions.”

- A translation of an exponential functions has the form

$f(x) = \underline{\hspace{2cm}}$, where the parent function $f(x) = b^x$, $b > 1$ is

- Shifted horizontally $\underline{\hspace{1cm}}$ units to the $\underline{\hspace{1cm}}$
- $\underline{\hspace{1cm}}$ vertically by a factor of $|a|$ if $|a| > 1$
- $\underline{\hspace{1cm}}$ vertically by a factor of $|a|$ if $0 < |a| < 1$
- Shifted vertically $\underline{\hspace{1cm}}$ units
- Reflected about the x -axis when $a \underline{\hspace{1cm}} 0$

* Note the order of the shifts, transformations, and reflections follow the order of operations.

Try It: Read Example 6 in the text, then answer the following.

Write the equation for the function described below. Give the horizontal asymptote, the domain, and the range.

$f(x) = e^x$ is compressed vertically by a factor of $\frac{1}{3}$, reflected across the x -axis and then shifted down 2 units.