



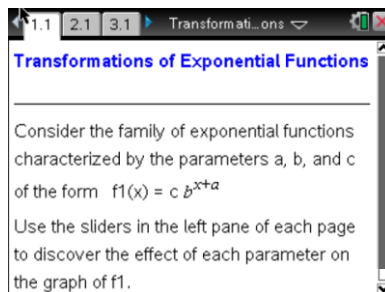
Transformation of Exponential Functions

Student Activity

DATE _____

Open the TI-Nspire document *Transformations_of_Exponential_Functions.tns*.

The purpose of this activity is to examine the family of exponential functions of the form $f(x) = c b^{x+a}$ where a , b , and c are parameters. At the end of this activity, you will use your results to match each function with its corresponding graph.



Note: The parameter b is the base of the exponential function and $b > 0, b \neq 1$.

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Press **ctrl** **▶** and **ctrl** **◀** to navigate through the lesson.

1. The graph of $y = f1(x) = b^x$ is shown in the right panel. Click the arrows in the left panel to change the value of b , and observe the changes in the graph of $f1$.
 - a. Explain why for every value of b , the graph of $f1$ passes through the point $(0,1)$.
 - b. For $b > 1$, using limit notation, describe the graph of $y = f1(x) = b^x$.
 - c. For $0 < b < 1$, using limit notation, describe the graph of $y = f1(x) = b^x$.
 - d. Find the domain and range of function $f1(x) = b^x$.
 - e. Does the graph of $y = b^x$ intersect the x -axis? Explain why or why not.



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2. The graph of $y = f1(x) = b^{x+a}$ is shown in the right panel. For a specific value of b , click the arrows to change the value of a and observe the changes in the graph of $f1$. Repeat this process for other values of b .
 - a. Describe the effect of the parameter a on the graph of $y = b^{x+a}$. Discuss the effects of both positive and negative values of a .

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3. The graph of $y = f1(x) = c \cdot b^{x+a}$ is shown in the right panel. For specific values of a and b , click the arrows to change the value of c , and observe the changes in the graph of $f1$. Repeat this process for other values of a and b .
 - a. Describe the effect of the parameter c on the graph of $y = c \cdot b^{x+a}$. Discuss the effects of both positive and negative values of c .

CONCLUSION:

Describe the transformation of the graph with parameters a, b, c , and d : $y = c \cdot b^{x+a} + d$.

Describe the transformation of the graph: $y = 3 \cdot 2^{x+1} - 5$



Student Activity

4. Match each equation with its corresponding graph.

(a) $f(x) = 3^{x-4}$

(b) $f(x) = -\left(\frac{1}{3}\right)^x$

(c) $f(x) = (0.7)^{x-4}$

(d) $f(x) = -2(0.1)^{x+3}$

(e) $f(x) = e^x$

(f) $f(x) = -\left(\frac{1}{2}\right) \cdot \pi^x$

Note: The function in part (e) is the “natural” exponential function and involves the number $e \approx 2.71828\dots$

