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| In this activity, you will examine the family of exponential functions of the form  where and are parameters. You will use the **Transformation App** (Transfrm) on your handheld to manipulate these parameters in Questions 1 - 3.  |  |

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| The parameter  is the base of the exponential function and  Using the transformation app, change the value of a parameter by entering the equation for each question into Y1 and Y2, and pressing the arrow keys to manipulate each parameter of the function on the graph. **Question 1** |
| Graph the following functions:  and  For specific values of $B (B \ne 1),$ press the arrows to change the value of $C$, and observe the changes in the graph of $Y\_{1}$.a. Explain why for every value of $B$ the graph of $Y\_{2}$ passes through the point  b. Is it possible for the graph of  to intersect the *x-*axis? Explain why or why not. |
| **Question 2** |
| Graph the following function:  For a specific value of $B$, click the arrows to change the value of $A$, and observe the changes in the graph of  Repeat this process for other values of $B.$ Describe the effect of the parameter $A$ on the graph of  Discuss the effects of both positive and negative values of $A$. |

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| **Question 3** |
| Graph the following functions:  and  For specific values of $A$ and $B$, click the arrows to change the value of $C$, and observe the changes in the graph of $Y\_{1}$. Describe the effect of the parameter $C$ on the graph of Discuss the effects of both positive and negative values of $C$. |
| **Question 4** |
| Turn off the Transformation App by selecting Quit-App on the $y=$ screen. Graph each function given and answer the following questions.a. Display the graphs of  and  (i) How is the graph of $Y\_{2}$ related to the graph of $Y\_{1}$? (ii) Use the properties of exponents to justify your answer. b. Display the graph of  and  (i) How is the graph of $Y\_{2}$ related to the graph of $Y\_{1}$? (ii) Use the properties of exponents to justify your answer.  |
| 1. Use your answers to parts (a) and (b) to explain the relationship between a horizontal dilation of the graph of an exponential function and a change of base of the exponential function.
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| **Question 5** |
| 5. Without using your calculator, match each equation with its corresponding graph. Check your answers by graphing each function on your calculator.(a)  (b)  (c)  (d)  (e)  (f) Note: The function in part (e) is the “natural” exponential function and involves the number  |
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| (i) |  | (ii) |  |
| (iii) |  | (iv) |  |
| (v) |  | (vi) |  |

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