**Transformations of Exponentials: Part 1**

**Recall:**

Consider the parent function y = f(x).

If this function is modified using the constants k, d, a, and c as follows:

Then the graph of this function will appear similar to the original function

with the following transformations:

* 'k' horizontally expands/compresses the graph by a factor of .
* 'd' horizontally shifts the graph right 'd' units.
* 'a' vertically expands/compresses the graph by a factor of 'a'.
* 'c' vertically shifts the graph up 'c' units.

**Example 1**

Consider the parent function . Determine the values for the constants k, d, a, and c for each new relationship below. Describe each transformation.

a) b)

|  |  |
| --- | --- |
| Constant | Transformation |
| k = |  |
| d = |  |
| a = |  |
| c = |  |

|  |  |
| --- | --- |
| Constant | Transformation |
| k = |  |
| d = |  |
| a = |  |
| c = |  |

**Example 2**

a) Complete the table of values then graph the function .



**y**

**x**

|  |  |
| --- | --- |
| x | y |
| 0 |  |
| 1 |  |
| 4 |  |
| 9 |  |

b) Use transformations to graph the following functions:

i) ii)

k = k =

d = d =

a = a =



**y**

**x**

c = c =



**y**

**x**

**Example 3**

a) Complete the table of values then graph the function .



**y**

**x**

|  |  |
| --- | --- |
| x |  |
| -2 |  |
| -1 |  |
| 0 |  |
| 1 |  |
| 2 |  |

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b) Use transformations to graph the following functions:

Note: For the parent function the transformation constants are

found in the following locations:

**i) ii)**

k = k =

d = d =

a = a =



**y**

**x**



**y**

**x**

c = c =