**Exponential Funtions**

Name:

Students can:

* Target #3: Identify characteristics of exponential functions on the graphs
* Target #4: Use technology to graph and identify characteristics of exponential functions

**WARM-UP:**

Watch the video on cell division to answer the following questions.

1. In the function $f\left(x\right)=a∙b^{x}$, when b > 1 what does the function do?

2. What does the coefficient (the 1) represent?

3. When the coefficient changed to a 4, how did the GRAPH change?

4. How did the graph change when the base changed from a 2 to a 3?

**MINI LESSON:**

Go to [www.desmos.com](http://www.desmos.com) and click “Launch Calculator.”

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| --- |
| **Exponential Functions:** $y=a∙b^{x}$ |

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| --- | --- |
| *Graph the following functions on the same screen:*$y=2^{x} y=3^{x} y=4^{x}$ Describe how the graphs are different.What stayed the same? |  *Graph the following functions on the same screen:* $y=1∙2^{x} y=2∙2^{x} y=3∙2^{x}$Describe how these graphs are different.So the coefficient determines the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |

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| *Graph the following functions on the same screen:*$y=\left(\frac{1}{2}\right)^{x} y=\left(\frac{1}{3}\right)^{x} y=\left(\frac{1}{4}\right)^{x}$ Describe how these graphs are different than the first three that we graphed. | *Graph the following functions on the same screen:*$y=2^{x} y=\left(\frac{1}{2}\right)^{x} $ Describe the transformation.If you don’t see it yet, graph $y=3^{x} \& y=\left(\frac{1}{3}\right)^{x} $ |

|  |  |
| --- | --- |
| *Graph the following functions on the same screen:*$y=2^{x} y=-2^{x} $ Describe the transformation.If you don’t see it yet, graph $y=3^{x} \& y=-3^{x} $ | Based on the parent function $y=a∙b^{x}$,A fractional base (b value) causes a reflection across the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and a negative coefficient (a value) causes a reflection across the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |

**WORKSHOP:**

**Use the graphs of the following functions to answer the questions.**

 **1. f**$(x)=-2\left(2\right)^{X}$ **2. f**$(x)=4\left(\frac{1}{4}\right)^{X}$





What is the y-intercept? What is the y-intercept?

What is the x-intercept? What is the x-intercept?

What is the domain? What is the domain?

What is the range? What is the range?

What transformations occurred? What transformations occurred?

**Draw a quick sketch for each function. Fill in the chart. Describe the transformations.**

y=-5x

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| --- | --- | --- |
| Sketch: | Domain: | x-intercept: |
| Range: | y-intercept: |

3. 5. $y=\left(\frac{1}{6}\right)^{x}$

 6. $ y=-\left(\frac{1}{6}\right)^{x}$

 7. $ y=-3\left(8\right)^{x}$

y=3(½)x

|  |  |  |
| --- | --- | --- |
| Sketch: | Domain: | x-intercept: |
| Range: | y-intercept: |

4.

 8. $ y=-2\left(\frac{2}{7}\right)^{x}$