**GUIDED NOTES – Lesson 7-1**

Graphing Logarithmic Functions Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_

**OBJECTIVE:** I can identify the types of exponential functions, as well as evaluate and graph them.

**GRAPHING:** Logarithmic functions are really just the inverse function of exponentials.

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**EXPONENTIAL FUNCTION INVERSE FUNCTION**

$y=2^{x}$ $x=2^{y}$

|  |  |
| --- | --- |
| **x** | **y** |
|  | -1 |
|  | 0 |
|  | 1 |
|  | 2 |
|  | 3 |

|  |  |
| --- | --- |
| **x** | **y** |
| -1 |  |
| 0 |  |
| 1 |  |
| 2 |  |
| 3 |  |



**LOGARITHMIC FUNCTION (write the inverse as a log like lesson 6-5)**

$2^{y}=x$ 🡪 $log$

For the parent function, $y=log\_{b}x$, the graph contains the ordered pairs (1, 0) and (b, 1). It has an asymptote at x = 0.

Domain: Range: x-intercept: y-intercept: Asymptote:

**TRANSFORMATIONS:** $f\left(x\right)=(a)log\_{b}(x-h)+k$

**h** tells us about horizontal movement.

If **h is positive**… If **h is negative**…

**a** tells us about stretching, reflecting, and compressing.

If **a is negative**… If **a > 1**… If **0 < a < 1**…

**k** tells us about vertical movement.

If **k is positive**… If **k is negative**…

**So to graph logarithmic functions with transformations…**

1. Plot the parent function ordered pairs and asymptote. (1, 0) and (b, 1)
2. Move each ordered pair and the asymptote h units and k units

$y=log\_{2}(x+3)$$y=log\_{2}\left(x-1\right)+3$

Domain: Range: Domain: Range:

x-intercept: y-intercept: x-intercept: y-intercept:

Asymptote: Asymptote:

$y=-log\_{2}x$$y=-log\_{2}\left(x+2\right)-3$

Domain: Range: Domain: Range:

x-intercept: y-intercept: x-intercept: y-intercept:

Asymptote: Asymptote:

**COMMON LOG-BASE 10**

When we use a common log with base 10, it is not necessary to indicate the base.

$log15$ really means (to the calculator) $log $ which is \_\_\_\_\_

Use the log button on the calculator to take the base 10 log of any number.

**Evaluate:** Log 4 Log -2 Log 7

**How do we evaluate logarithms that are not common?** Not all of the logs we need to take will be base 10….

Change of base formula: so try that with $log\_{20}135$



**Evaluate using change of base:** $log\_{2}8$ $log\_{3}4$ $log\_{\frac{1}{2}}9$

**But wait!!!** If you have a newer calculator you can do the following….

  