

# 6.7 – Graphing Exponential Equations

$$y = a \bullet b^{x-h} + k$$

It's an Exponential **Growth** Function when...

**$b$  is greater than 1**

**OR**

**if the exponent is negative and it flips  $b$  and  $b$  is greater than 1**

$$y = a \bullet b^{x-h} + k$$

It's an Exponential **Decay** Function when...

**$b$  is a fraction (greater than 0 and less than 1)**

**OR**

**if the exponent is negative and it flips  $b$  and  $b$  is less than 1**

**State whether  $f(x)$  is an exponential growth or exponential decay**

1.  $f(x) = \left(\frac{2}{3}\right)^x$  **DECAY**

2.  $f(x) = \left(\frac{5}{4}\right)^x$  **GROWTH**

3.  $f(x) = 6^x$  **GROWTH**

**State whether  $f(x)$  is an exponential growth or exponential decay**

4.  $f(x) = -4\left(\frac{1}{3}\right)^x$  **DECAY**

5.  $f(x) = 5\left(\frac{3}{4}\right)^{-x}$  **GROWTH**

6.  $f(x) = 2(0.15)^x$  **DECAY**

# Transformations

$$y = a \bullet b^{x-h} + k$$

**Describe the transformation.**

7.  $f(x) = \left(\frac{4}{3}\right)^x + 2$  **Up 2**

8.  $f(x) = 2^x - 5$  **Down 5**

9.  $f(x) = \left(\frac{3}{5}\right)^{x+1}$  **Left 1**

**Describe the transformation.**

10.  $f(x) = (.25)^{x-3}$  **Right 3**

11.  $f(x) = -2^x$  **Reflect over the x-axis**

12.  $f(x) = 3\left(\frac{2}{3}\right)^{-x} + 2$

**Vert. Stretch 3, Reflect over y-axis,  
Up 2**



# Asymptote

$$y = k$$

- A *line* that a graph approaches but will never touch
- Horizontal, Dashed line

$$y = a \bullet b^{x-h} + k$$

Identify the *asymptote* of the graph of the function.

13.  $f(x) = 3^{x-2} + 4$        $y = 4$

14.  $f(x) = 4^{x+2} - 3$        $y = -3$

15.  $f(x) = -5\left(\frac{1}{2}\right)^x$        $y = 0$   
the x-axis

**Domain**

**and**

**Range**

# Domain

**ALL REAL**

$(-\infty, \infty)$

# Range

Use  $k$

$$y = a \bullet b^{x-h} + k$$

If  $a$  is positive use  $(k, \infty)$

If  $a$  is negative use  $(-\infty, k)$

# Identify the *domain* and *range*.

20.  $f(x) = -2^x + 4$     **D:**  $(-\infty, \infty)$

**R:**  $(-\infty, 4)$

21.  $f(x) = 3 \bullet 2^x$     **D:**  $(-\infty, \infty)$

**R:**  $(0, \infty)$

22.  $f(x) = 4^{x+3} - 1$     **D:**  $(-\infty, \infty)$

**R:**  $(-1, \infty)$

# X-Int:

$(\#, 0)$  - Where the graph crosses the x-axis

**\*\*Plug 0 in for y and solve for x!!\*\***

# Y-Int:

$(0, \#)$  - Where the graph crosses the Y-axis

**\*\*Plug 0 in for x and solve for y!!\*\***

**Read from left to right!**

**Increasing:**

up from left to right

**Decreasing:**

down from left to right

**\*\*Write answers in Interval Notation –  
should match your DOMAIN\*\***



# End Behavior

**Domain**  $\left\{ \begin{array}{l} x \rightarrow \text{_____}, f(x) \rightarrow \text{_____} \\ x \rightarrow \text{_____}, f(x) \rightarrow \text{_____} \end{array} \right\}$  **Range**

**Let's  
Practice**