

Name: _____

Date: _____

Graphing and Characteristics of Exponential Equations

Transformations:

$$y = a(b)^{x-h} + k$$

-a: reflect across x-axis
 |a| > 1: v stretch of a
 |a| < 1: v shrink of a

h: left/right
 + -
 (in equation)

k: up/down
 + -

Domain:

$$(-\infty, \infty)$$

Range:

$$(-\infty, k) \text{ or } (k, \infty)$$

Asymptote:

$y = k$; the line the graph approaches but never touches

X-Int:

look at the graph, or plug in 0 for y and solve
 (may not exist)

Y-Int:

look at the graph, or plug in a 0 for x and solve
 (ALWAYS exists)

Increasing or Decreasing

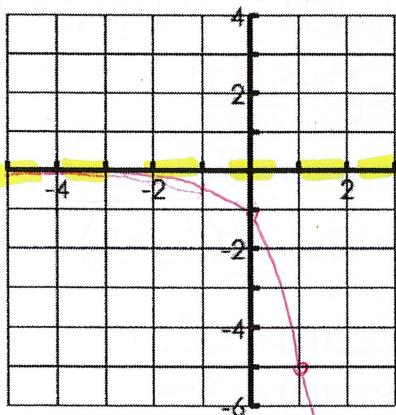
$$\emptyset \text{ or } (\infty, \infty)$$

It will only do one or the other

End Behavior:

$x \rightarrow \infty, f(x) \rightarrow$ _____ $\rightarrow \infty$ if it's going up forever
 $x \rightarrow -\infty, f(x) \rightarrow$ _____ $\rightarrow -\infty$ if it's going down forever
 _____ k if it's going toward the asymptote

1. $y = -5^x$



Transformations: Reflect across x-axis

State 3 points on Graph (1, -5) (0, -1) (-1, -1/5)

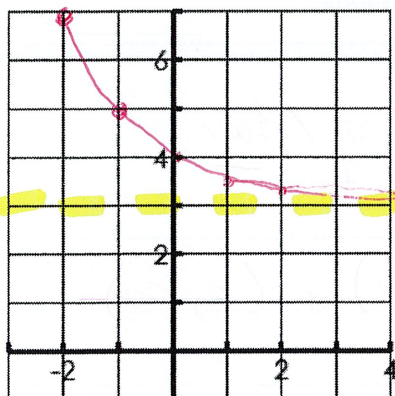
Domain $(-\infty, \infty)$ Range $(-\infty, 0)$

Asymptote $y = 0$ Increasing or Decreasing Decreasing

X-intercept None Y-intercept (0, -1)

End Behavior $x \rightarrow -\infty, f(x) \rightarrow 0$
 $x \rightarrow \infty, f(x) \rightarrow -\infty$

2. $y = \left(\frac{1}{2}\right)^x + 3$



Transformations: Up 3

State 3 points on Graph $(-2, 7)$ $(-1, 5)$ $(0, 4)$

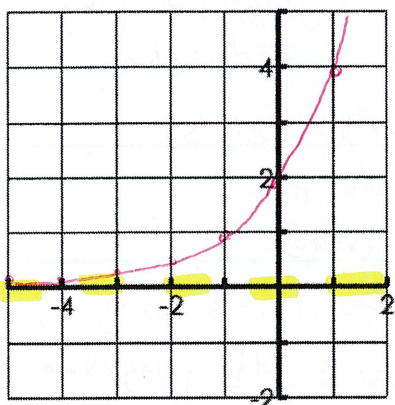
Domain $(-\infty, \infty)$ Range $(3, \infty)$

Asymptote $y = 3$ Increasing or Decreasing

X-intercept None Y-intercept $(0, 4)$

End Behavior $x \rightarrow -\infty, f(x) \rightarrow \infty$
 $x \rightarrow \infty, f(x) \rightarrow 3$

3. $y = 2^{x+1}$



Transformations: Left 1

State 3 points on Graph $(-1, 1)$ $(0, 2)$ $(1, 4)$

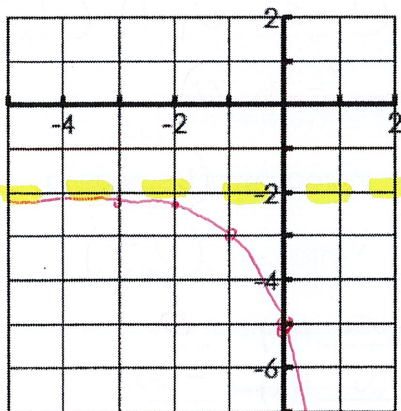
Domain $(-\infty, \infty)$ Range $(0, \infty)$

Asymptote $y = 0$ Increasing or Decreasing

X-intercept None Y-intercept $(0, 2)$

End Behavior $x \rightarrow -\infty, f(x) \rightarrow 0$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

4. $y = -3^{x+1} - 2$



Transformations: Reflect over x-axis, Left 1, Down 2

State 3 points on Graph $(-2, -\frac{3}{3})$ $(-1, -3)$ $(0, -5)$

Domain $(-\infty, \infty)$ Range $(-\infty, -2)$

Asymptote $y = -2$ Increasing or Decreasing

X-intercept None Y-intercept $(0, -5)$

End Behavior $x \rightarrow -\infty, f(x) \rightarrow -2$
 $x \rightarrow \infty, f(x) \rightarrow -\infty$