

Algebra 2
Graphing Exponential Functions

Name: KEY
Date: _____ Period: _____

Graph each function. State all the important information.

1.) $y = \frac{1}{2} \cdot 3^{x-2} + 4$

Growth/Decay: GROWTH Why? 3 > 1

Parent Function: $y = 3^x$

Asymptote: $y = 4$

Domain: $(-\infty, \infty)$

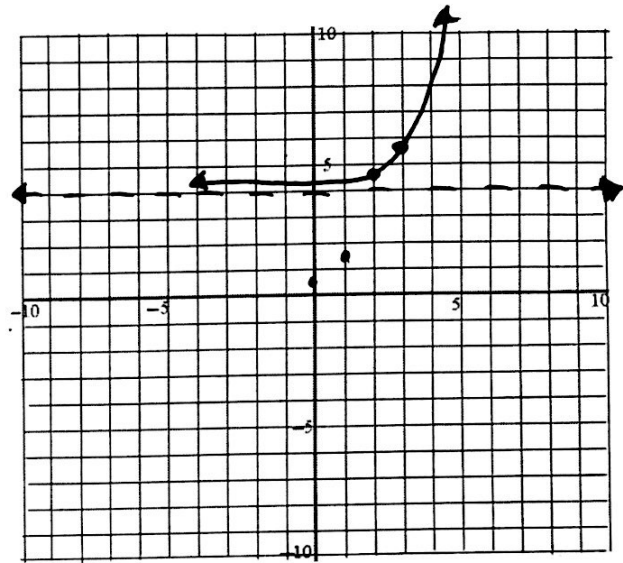
Range: $(4, \infty)$

End Behavior:
as $x \rightarrow \infty, f(x) \rightarrow \infty$
as $x \rightarrow -\infty, f(x) \rightarrow 4$

Transformations:
VERTICAL SHRINK OF 1/2
RIGHT 2
UP 4

Zero(s):
N/A

y-intercept:
 $y = \frac{1}{2} \cdot 3^{0-2} + 4$
 $y = \frac{1}{2} \cdot 3^{-2} + 4$
 $y = \frac{1}{2} \cdot \frac{1}{9} + 4$
 $y = \frac{1}{18} + 4$
 $y = 4\frac{1}{18}$
 $(0, 4\frac{1}{18})$



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

Growth/Decay: DECAY Why? $\frac{2}{3} < 1$

Parent Function: $y = \left(\frac{2}{3}\right)^x$

Asymptote: $y = -2$

Domain: $(-\infty, \infty)$

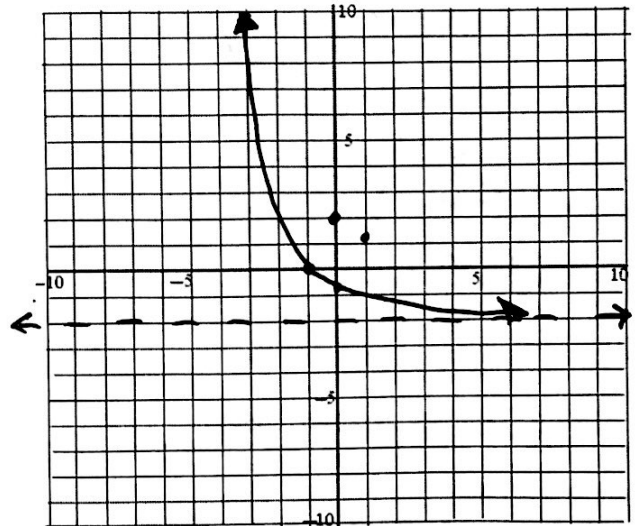
Range: $(-2, \infty)$

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

Transformations:
VERTICAL STRETCH OF 2
← 1
↓ 2

Zero(s):
 $x = -1$

y-intercept:
 $y = 2 \left(\frac{2}{3}\right)^{0+1} - 2$
 $y = 2 \left(\frac{2}{3}\right)^1 - 2$
 $y = \frac{4}{3} - 2$
 $y = \frac{4}{3} - \frac{6}{3}$
 $y = -\frac{2}{3}$
 $(0, -\frac{2}{3})$



Graph each function. State all the important information.

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

Growth/Decay: GROWTH Why? $3 > 1$

Parent Function: $y = 3^x$

Asymptote: $y = 4$

Domain: $(-\infty, \infty)$

Range: $(-\infty, 4)$

End Behavior:

as $x \rightarrow \infty, f(x) \rightarrow -\infty$

as $x \rightarrow -\infty, f(x) \rightarrow 4$

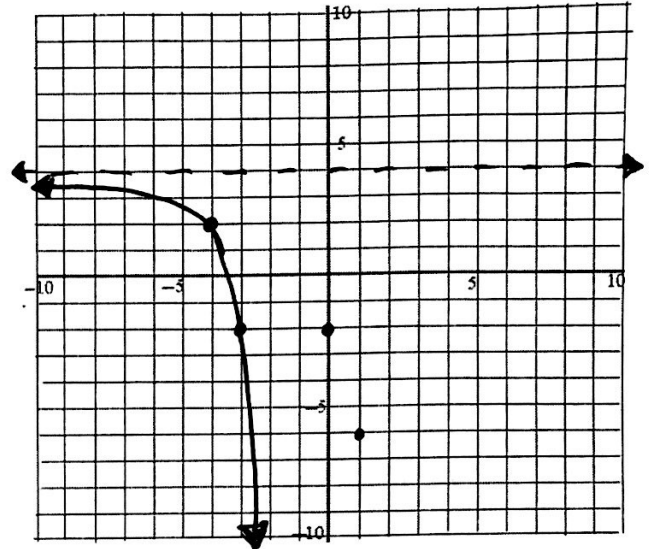
Transformations:

REFLECTION OVER THE X-AXIS

VERTICAL STRETCH OF 2

$\leftarrow 4$

$\uparrow 4$



Zero(s):

$x = -3.5$

y-intercept:

$$y = -2(3)^{0+4} + 4$$

$$y = -2(3)^4 + 4$$

$$y = -162 + 4$$

$$y = -158 \quad (0, -158)$$

4.) $y = 4\left(\frac{3}{4}\right)^{x-3} + 1$

Growth/Decay: DECAY Why? $3/4 < 1$

Parent Function: $y = \left(\frac{3}{4}\right)^x$

Asymptote: $y = 1$

Domain: $(-\infty, \infty)$

Range: $(1, \infty)$

End Behavior:

as $x \rightarrow \infty, f(x) \rightarrow 1$

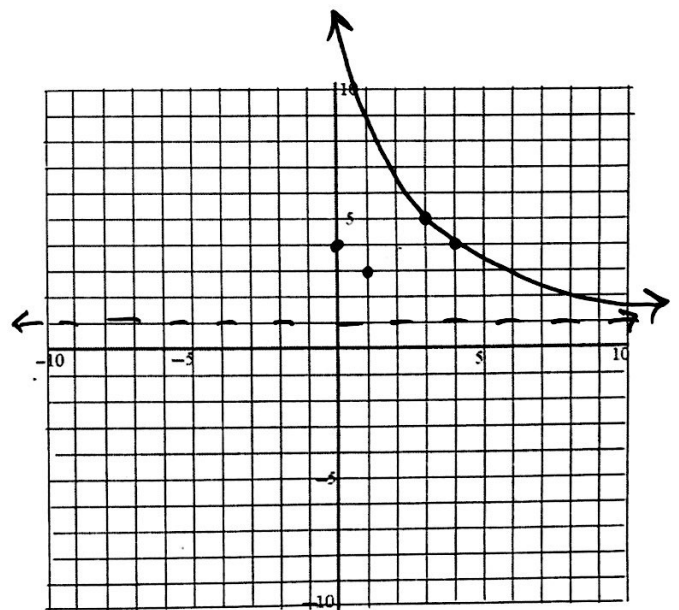
as $x \rightarrow -\infty, f(x) \rightarrow \infty$

Transformations:

VERTICAL STRETCH OF 4

$\rightarrow 3$

$\uparrow 1$



Zero(s):

N/A

y-intercept:

$$y = 4\left(\frac{3}{4}\right)^{0-3} + 1$$

$$y = 4\left(\frac{3}{4}\right)^{-3} + 1$$

$$y = 10.48$$

$$(0, 10.48)$$

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

Growth/Decay: GROWTH Why? $\frac{3}{2} > 1$

Parent Function: $y = \left(\frac{3}{2}\right)^x$

Asymptote: $y = -3$

Domain: $(-\infty, \infty)$

Range: $(-3, \infty)$

End Behavior:

as $x \rightarrow \infty, f(x) \rightarrow \infty$

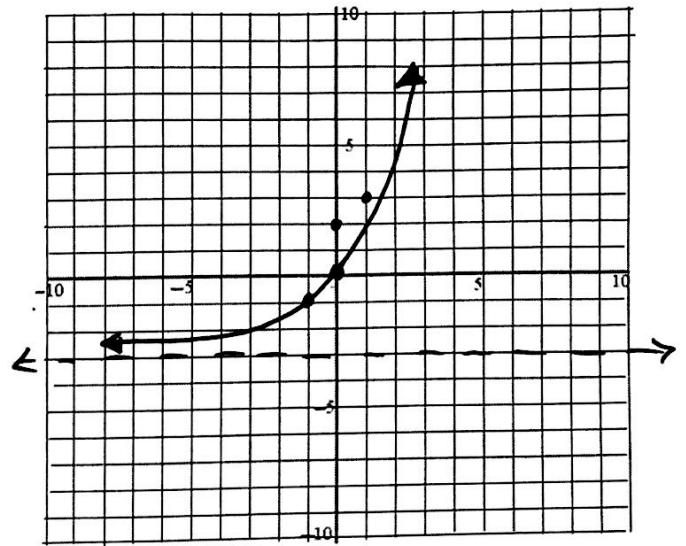
as $x \rightarrow -\infty, f(x) \rightarrow -3$

Transformations:

VERTICAL STRETCH OF 2

← 1

↓ 3



Zero(s):

$x = 0$

y-intercept:

$(0, 0)$

Write an equation of an exponential function that has the given parent function with the transformations described below.

6.) $y = 3^x$

- Vertical Stretch of 2
- Horizontal Shift of Right 3
- Vertical Shift of Down 4

Equation: $y = 2 \cdot 3^{x-3} - 4$

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

- Reflections over the x-axis
- Vertical Shrink of $\frac{2}{3}$
- Horizontal Shift of Left 1
- Vertical Shift of Down 2

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

8.) $y = 2^x$

- Reflections over the x-axis
- Vertical Stretch of 4
- Horizontal Shift of Left 3
- Vertical Shift of Up 1

Equation: $y = -4(2)^{x+3} + 1$