

Solve the following Exponential Equations.

$$1. 3^{2x+3} = 27^{x+1}$$

$$3^{2x+3} = 3^{3(x+1)}$$

$$\begin{array}{r} 2x+3 = 3x+3 \\ -2x \quad -2x \\ \hline 3 = x+3 \\ -3 \quad -3 \\ \hline 0 = x \end{array}$$

$$2. 4^{3x} = 8^{x+1}$$

$$2^{2(3x)} = 2^{3(x+1)}$$

$$\begin{array}{r} 6x = 3x+3 \\ -3x \quad -3x \\ \hline 3x = 3 \\ \boxed{x=1} \end{array}$$

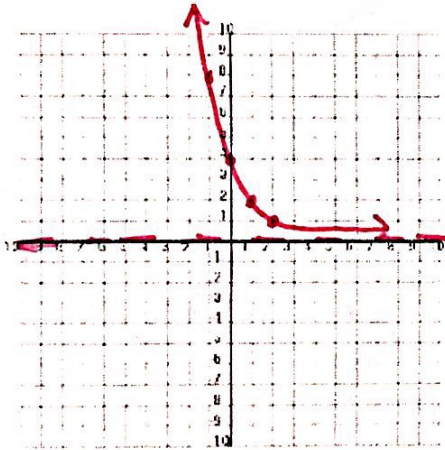
$$3. 3^{x-14} = \left(\frac{1}{3}\right)^{2x-1}$$

$$3^{x-14} = 3^{-1(2x-1)}$$

$$\begin{array}{r} x-14 = -2x+1 \\ +2x \quad +2x \\ \hline 3x-14 = 1 \\ +14 \quad +14 \\ \hline 3x = 15 \\ \boxed{x=5} \end{array}$$

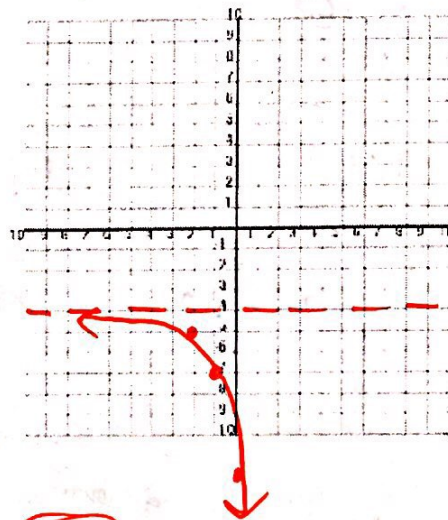
For each exponential function, tell the characteristics and sketch with at least 3 specific points and the asymptote dotted in.

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



x	y
2	1
1	2
0	4
-1	8

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



x	y
-2	-5
-1	-7
0	-13

Growth or Decay?

Transformations: NONE

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

Asymptote: $y=0$

Increasing or Decreasing?

X-intercept: NONE Y-intercept: $(0, 4)$

End Behavior:
 R As $x \rightarrow \infty$, $f(x) \rightarrow 0$
 L As $x \rightarrow -\infty$, $f(x) \rightarrow \infty$

Growth or Decay?

Transformations: Reflect x-axis, Left 2, Down 4

Domain: $(-\infty, \infty)$ Range: $(-\infty, -4)$

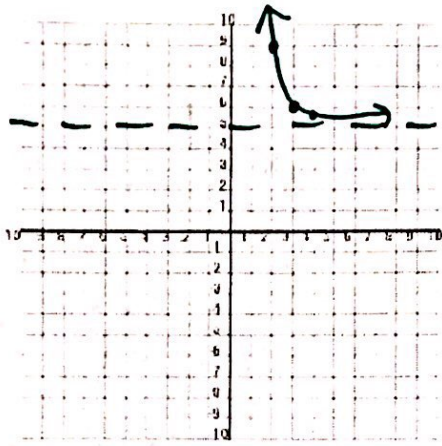
Asymptote: $y=-4$

Increasing or Decreasing?

X-intercept: NONE Y-intercept: $(0, -13)$

End Behavior:
 R As $x \rightarrow \infty$, $f(x) \rightarrow -\infty$
 L As $x \rightarrow -\infty$, $f(x) \rightarrow -4$

$$6. f(x) = \left(\frac{1}{4}\right)^{x-3} + 5$$



X	Y
2	9
3	6
4	5.25

Growth or Decay?

Transformations: Right 3, up 5

Domain: $(-\infty, \infty)$ Range: $(5, \infty)$

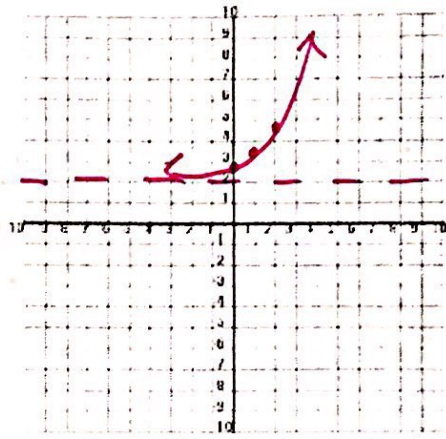
Asymptote: $y=5$

Increasing or Decreasing?

X-intercept: NONE Y-intercept: $(0, 69)$

End Behavior:
 $\begin{matrix} \text{R} & \text{As } x \rightarrow \infty, f(x) \rightarrow 5 \\ \text{L} & \text{As } x \rightarrow -\infty, f(x) \rightarrow \infty \end{matrix}$

$$7. f(x) = \frac{1}{3}(2)^{x+1} + 2$$



X	Y
0	2.7
1	3.3
2	4.7

Growth or Decay?

Transformations: Left 1, up 2

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

Asymptote: $y=2$

Increasing or Decreasing?

X-intercept: NONE Y-intercept: $(0, 2.7)$

End Behavior:
 $\begin{matrix} \text{R} & \text{As } x \rightarrow \infty, f(x) \rightarrow \infty \\ \text{L} & \text{As } x \rightarrow -\infty, f(x) \rightarrow 2 \end{matrix}$

Solve each of the following using the correct formula.

8. You put \$5000 into an account that pays 6% interest compounded quarterly. How much will you have in 10 years?

$$y = 5000 \left(1 + \frac{.06}{4}\right)^{4(10)}$$

$$y = \$9070.09$$

9. How long will it take your money in #5 to triple?

Plug $y = 5000 \left(1 + \frac{.06}{4}\right)^{4x}$ in calculator & look in your table for y-value of \$15000. 19 years

10. Tuition at a college is \$35,000 per year this year (2019). It increase 2.5% per year. Write an equation for this growth. Using this model, how much will it be in 2023?

$$y = 35000 (1 + .025)^4$$

$$y = \$38,633.45$$

11. Your car depreciates at 15% every other year. You bought it for \$35,000 6 years ago. How much is it worth now?

$$y = 35000 (1 - .15)^3$$

$$y = \$21,494.38$$