

2-4 Exponential and Logarithmic Functions

$$y = \boxed{b}^x$$

↑
base

What is the solution of $16^{3x} = 8$

- Change the base
so we can set
exponents equal to
each other

$$\boxed{2^{4(3x)}} = \boxed{2^3}$$

$$4(3x) = 3$$

$$\frac{12x}{12} = \frac{3}{12} \div 3$$

$$\boxed{x = \frac{1}{4}}$$

$$27^{3x} = 81$$

$$3^{3(3x)} = 3^4$$

$$3(3x) = 4$$

$$\cancel{9}x = \frac{4}{\cancel{9}}$$

$$x = \frac{4}{9}$$

$$2^x = 8$$

$$2^x = 2^3$$

$$x = 3$$

$$x = 3$$

$$2^{5x+1} = 32$$

$$2^{5x+1} = 2^5$$

$$\begin{array}{r} 5x+1=5 \\ -1 \quad -1 \\ \hline \end{array}$$

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{4}{5}$$

$$x = \frac{4}{5}$$

$$3^{-2x+2} = 81$$

$$3^{-2x+2} = 3^4$$

$$\begin{array}{r} -2x+2 = 4 \\ \underline{-2 \quad -2} \\ -2x = 2 \\ \underline{-2 \quad -2} \\ x = -1 \end{array}$$


$$x = -1$$

1. What is something you learned today?
2. What is something you are struggling with?
3. Change the base of the problem, solve for the variable:

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

$$15^{3x} = 285$$

• if you can't change the base, turn it into a log.



$$\log 15^{3x} = \log 285$$

$$\frac{3x \log 15}{3 \log 15} = \frac{\log 285}{3 \log 15}$$

$$x = \log(285) \div (3 \log(15))$$

$$x = 0.696$$


$$5^{2x} = 130$$


$$\log 5^{2x} = \log 130$$

$$\frac{2x \log 5}{2 \log 5} = \frac{\log 130}{2 \log 5}$$

$$x = 1.512$$

$$2^x = 3$$


$$\log 2^x = \log 3$$

$$\frac{x \log 2}{\log 2} = \frac{\log 3}{\log 2}$$

$$x = 1.5854$$

$$\begin{array}{r} 8 + 10^x = 1008 \\ \underline{-8} \qquad \qquad \qquad \underline{-8} \end{array}$$

$$10^x = 1000$$

$$10^x = 10^3$$

$$\boxed{x=3}$$

$$9^{2y} = 66$$

$$12^{y-2} = 20$$

$$(y-2) \log 12^{y-2} = \log 20$$

$$\frac{(y-2)(\log 12)}{\log 12} = \frac{\log 20}{\log 12}$$

$$y-2 = 1.205$$

$$\begin{array}{r} +2 \\ +2 \end{array}$$

$$\boxed{y = 3.205}$$

$$25^{2x+1} = 144$$

**How do you convert
between log form
and exponential
form?**

Use the rule: $\log a = b$
if and only if $a = 10^b$

What is the solution of $\log(4x - 3) = 2$?

$$\log(4x - 3) = 2$$

$$4x - 3 = 10^2$$

$$4x - 3 = 100$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$\begin{array}{r} 4x = 103 \\ \hline 4 \quad 4 \end{array}$$

$$x = 25.75$$

What is the solution of $\log(3 - 2x) = -1$

$$\log(3 - 2x) = -1$$

$$3 - 2x = 10^{-1}$$

$$\begin{array}{r} 3 - 2x = 0.1 \\ -3 \qquad -3 \end{array}$$

$$\begin{array}{r} -2x = -2.9 \\ \hline -2 \qquad -2 \end{array}$$

$$x = 1.45$$

$$\log 2x = -1$$

$$2x = 10^{-1}$$

$$\frac{2x}{2} = \frac{.1}{2}$$

$$x = 0.05$$

$$\log(3x + 1) = 2$$

$$\log x + 4 = 8$$

33-43 odd (2-4)

36. $\frac{4 \log x}{4} = \frac{4}{4}$

$$\log x = 1$$

$$x = 10^1$$

$x = 10$

