

To convert from exponential form to logarithmic form and vice versa: Exponential form

$$
\begin{aligned}
& x= b^{y} \rightarrow \text { exponent } \\
& \downarrow \\
& \text { base }
\end{aligned}
$$ Logarithmic form $\rightarrow \log$

$$
\log _{b} x=y \text { expend }
$$

$\log$ base $b$ of $x$ equals $y$ $\log$ of $x$ with base $b$

Conc. to exp. form $\rightarrow x=b^{y}$

1. $\log _{8} 1=0$
2. $\log _{2} \frac{1}{16}=-4$

$$
1=8^{\circ}
$$

$$
\frac{\frac{1}{16}=2^{-4}}{\frac{1}{2^{4}}} \rightarrow 2^{-4}=\frac{1}{16}
$$

3. $\log _{4} 16=2$
4. $\log _{3} \frac{1}{27}=-3$

$$
16=4^{2}
$$

$$
\frac{1}{27}=3^{-3}
$$

$\begin{array}{ll}\text { 5. } 10^{3}=1000 & \text { 6. } 9^{\frac{1}{2}}=3\end{array}$
7. $4^{3}=64$

$$
\log _{10} 1000=3 \downarrow
$$

$\log _{4} 64=3$
8. $122^{\frac{1}{3}}=5$

Evalu ate
9. $\log _{2} 64=X$
10. $\log _{3} 81=r$
11. $\log _{4} 256=h$

$$
\begin{aligned}
& 2^{x}=64=2^{6} \\
& 2^{x}=2^{6} \\
& x=6
\end{aligned}
$$

Solve a Logarithmic Equation
12. $\log _{4} x=\frac{5}{2}$

$$
\begin{aligned}
& 4^{\frac{5}{2}}=x \\
& \sqrt{4^{5}}=x
\end{aligned}
$$

$$
32=x
$$

13. $\log _{9} x=\frac{3}{2}$
$9^{\frac{3}{2}}=x$
$\sqrt{9^{3}}=x$
$27=x$
14. $\log _{16} x=\frac{5}{2}$

$$
16^{\frac{5}{2}=x}
$$

$$
\sqrt{16^{5}}=x
$$



Property of Equality for Logarithmic Functions If $\log _{7} x=\log _{7} 3$, then $x=3$
15. $\log _{5}(3 x+4)=\log _{5}(7 x-8)$

$$
\begin{aligned}
3 x+4 & =7 x-8 \\
4 & =4 x-8 \\
12 & =4 x \\
3 & =x
\end{aligned}
$$

16. $\log _{3} 50=\log _{3}(6 x-4)$

$$
\begin{aligned}
50 & =6 x-4 \\
54 & =6 x \\
9 & =x
\end{aligned}
$$

17. $\log _{6}(2 x-9) \leq \log _{6}(4 x+3)$

$$
\begin{aligned}
2 x-9 & \leq 4 x+3 \\
-9 & \leq 2 x+3 \\
-12 & \leq 2 x \\
-6 & \leq x \text { on } x \geq-6
\end{aligned}
$$

18. $\log _{8} 38<\log _{8}(5 x+3)$

$$
\begin{aligned}
& 38<5 x+3 \\
& 35<5 x \\
& 7<x \text { or } x>7
\end{aligned}
$$

