

$$x = \frac{\log 40}{\log 8} \approx \underline{\underline{1.77}} \quad \text{DRILL}$$

① Rewrite as a log equation:

$$\log_8 40 = x$$

$$8^x = 40$$

↑ base ← power
power exp
↓ ↓
base

② Rewrite as an exponential equation:

$$5^3 = x$$

$$\rightarrow x = 125$$

$$\log_5 x = 3$$

↑ base

③ Evaluate: $f(3)$ if $f(x) = 2^x - 3$

$$f(3) = 2^{(3)} - 3$$

$$f(3) = 8 - 3$$

$$f(3) = 5$$

* Solving Log. & Exp. Equations

* When you solve any equation you isolate (get by itself) the variable.

Ex: $3^x = 2187$

Rewrite:

$$\log_3 2187 = x$$

Change of base formula:

$$x = \frac{\log 2187}{\log 3}$$

Calculator

$$x = 7$$

Solve for x:

Ex: $2^x = \frac{1}{1024}$

Rewrite: $\log_2 \left(\frac{1}{1024} \right) = x$

Change of base formula: $x = \frac{\log \left(\frac{1}{1024} \right)}{\log 2}$

Calculator: $x = -10$

Ex: $4^{3x-1} = 4096$

base \rightarrow 4 $3x-1$ \leftarrow exp. 4096 \leftarrow power

$$\log_4 4096 = 3x - 1$$

$$\frac{\log 4096}{\log 4} = 3x - 1$$

$$\begin{array}{r} 6 = 3x - 1 \\ + 1 \quad \quad \quad + 1 \\ \hline 7 = 3x \end{array}$$

$$\frac{7}{3} = \frac{3x}{3}$$

Solve for x:

\downarrow Rewrite with logs

\downarrow change of base

$$x = \frac{7}{3}$$

Solve

Ex:

$$3^{2x-3} - 8 = 24$$
$$+ 8 \quad + 8$$



$$3^{2x-3} = 32 \quad \boxed{x \approx 3.08}$$

$$\log_3 32 = 2x - 3$$
$$\frac{\log 32}{\log 3} = 2x - 3$$

$$3.15 \approx 2x - 3$$
$$+ 3 \quad + 3$$
$$\frac{6.15}{2} \approx \frac{2x}{2}$$