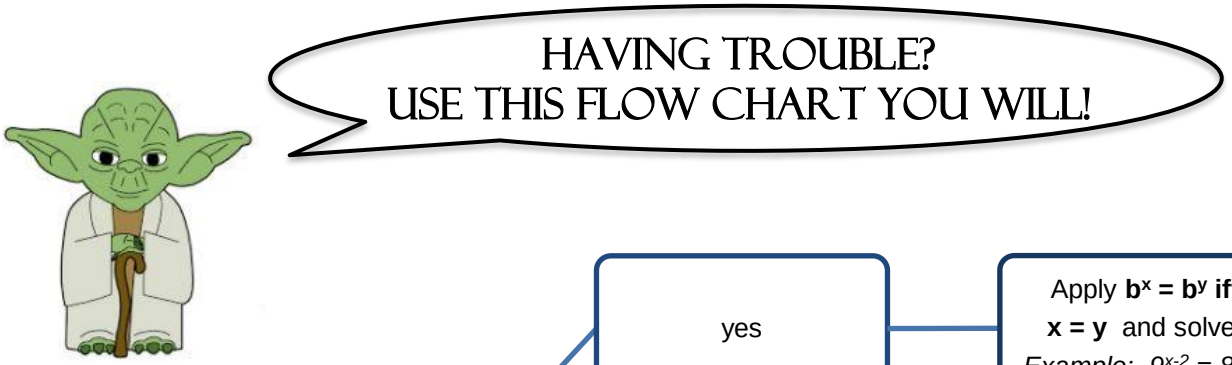
Solving Logarithmic and Exponential Equations



Decide: Is this an **exponential** or **logarithmic** equation?

EXPONENTIAL!

Can I get like bases?

- yes → Apply $\mathbf{b^x = b^y}$ **iff** $\mathbf{x = y}$ and solve!
  Example: $9^{x-2} = 81^{4x}$
- no
  - Is there an x in one exponent?
    Example: $3^{x-2} = 5$
    → Write it in **log form** and/or use the **change of base formula.**
  - Is there an x in both exponents?
    Example: $3^{x-2} = 5^{4x}$
    → Take the log of both sides (*Hint: use the base of the more complex exponent*).

LOGARITHMIC!

Does it have 1 log or 2 logs?

→ **USE THE PROPERTIES OF LOGARITHMS** to **condense** the equation as much as you can.

- Does the equation have **Two logs with like bases?**
  Example: $\log_4 x = \log_4(x-3)$
  → Apply $\mathbf{\log_b x = \log_b y}$ **iff** $\mathbf{x = y}$ and solve it!
  "set the logs equal to each other and solve"
- Does the equation have only **One log?**
  Example: $\log_3 x = 4$
  → Write the equation in **exponential form** and solve it (*do the log dance*)!