

# Solving Equations

→ if  $a=b$  then  $a^n = b^n$

if  $x^a = x^b$  then  $a=b$ ,  $x \neq 1$

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$$4^x = 256 = 4^4$$

$x=4$

$$\begin{aligned} 4^1 &= 4 \\ 4^2 &= 16 \\ 4^3 &= 64 \\ 4^4 &= 256 \end{aligned}$$

$$3^x = \frac{1}{81} = \frac{1}{3^4} = 3^{-4}$$

$$\begin{aligned} 3 &= 3^1 \\ 9 &= 3^2 \\ 27 &= 3^3 \\ 81 &= 3^4 \end{aligned}$$

$$4^{3x} = 8^{2x+7}$$

$$\begin{aligned} 4 &= 2^2 \\ 8 &= 2^3 \end{aligned}$$

$$(2^2)^{3x} = (2^3)^{2x+7}$$

$$2^{6x} = 2^{6x+14}$$

$$\begin{aligned} 6x &= 6x+14 \\ -6x & \quad -6x \\ 0 &= 14 \quad \text{no solution} \end{aligned}$$

Use the properties of exponents to simplify

1)  $3x^2 \cdot 4x^5 = 12x^7$       2)  $4x^7 \cdot 2x^{-4} = 8x^3$

3)  $\frac{4x^{-2}}{20x^4} = \frac{4}{20x^4x^2} = \frac{1}{5x^6}$        $\left(\frac{7x^5}{28x^3}\right)^{-2}$   
 $\frac{1x^{-2-4}}{5} = \frac{x^{-6}}{5} = \frac{1}{5x^6}$        $\left(\frac{1x^2}{4}\right)^{-2} = \left(\frac{4}{x^2}\right)^2 = \frac{4^2}{(x^2)^2} = \frac{16}{x^4}$

5)  $\left(\frac{7x^5y^4}{9x^7(-7y)^{-4}}\right)^0 = 1$       6)  $\frac{3x^2y^{-2} \cdot 8x^{-4}y^7}{6x^{-3}y^1 \cdot 2x^{-2}y^{-3}}$

$1 = \frac{\cancel{x} \cancel{x} \cancel{x}}{\cancel{x} \cancel{x} \cancel{x}} = \frac{x^3}{x^3} = x^{3-3} = x^0$

$\frac{3 \cdot 8}{6 \cdot 2} \cdot \frac{x^2x^3x^2}{x^4} \cdot \frac{y^7y^3}{y^2y^1}$

$\frac{24}{12} \cdot \frac{x^7}{x^4} \cdot \frac{y^{10}}{y^3}$

$2x^3y^7$

$$2^x = 32$$

$$\textcircled{x} = \textcircled{5}$$

$$2 = 2$$

$$2^1 = 2$$

$$2^2 = 4$$

$$2^3 = 8$$

$$2^4 = 16$$

$$2^5 = 32$$

$$4^{3x-1} = 8^{x+7}$$

$$(2^2)^{3x-1} = (2^3)^{x+7}$$

$$\textcircled{2(3x-1)} = \textcircled{3(x+7)}$$

$$2 = 2$$

$$2(3x-1) = 3(x+7)$$

$$\begin{array}{r|l} 6x - 2 & 3x + 21 \\ -3x + 2 & -3x + 21 \\ \hline 3x & 23 \end{array}$$

$$\frac{3x}{3} = \frac{23}{3}$$

$$x = \frac{23}{3}$$

NRW  
examp

$$2^{3x-1} = 32$$

$$\textcircled{3x-1} = \textcircled{5}$$

$$2 = 2$$

$$\Rightarrow 3x-1 = 5$$

$$\begin{array}{r} +1 \\ 3x = 6 \\ \hline x = 2 \end{array}$$

$$2^5 = 32$$

$$2^{3x-1} = 2^5$$