

# C12 - 7.1 - Simplifying/Separating Exponents Notes

Simplify

$$\begin{aligned} 3^x \times 3 &= \\ 3^x \times 3^1 &= 3^{x+1} \end{aligned}$$

Add Exponents

$$(5^2)^x = 5^{2x}$$

Multiply Exponents

$$\begin{aligned} \frac{6^x}{6} &= \\ \frac{6^x}{6^1} &= 6^{x-1} \end{aligned}$$

$$\begin{aligned} \frac{3}{3^x} &= \\ \frac{3^1}{3^x} &= 3^{1-x} \end{aligned}$$

Subtract Exponents

Separate into a multiplication/division/or use brackets with the same base. (*Isolate #<sup>x</sup>*)

$$6^{x+1} = 6^x(6^1) = 6(6^x)$$

$$7^{x-1} = 7^x \times 7^{-1} = \frac{7^x}{7^1}$$

$$4^{1-x} = 4^1(4^{-x})$$

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

$$5^{2x} = (5^x)^2 = (5^2)^x$$

$$\begin{aligned} 3^{2x+1} &= 3^{2x}3^1 \\ &= (3^x)^2 3^1 \\ &= 3(3^x)^2 \end{aligned}$$

$$\begin{aligned} 6^x &= (2 \times 3)^x \\ &= 2^x \times 3^x \end{aligned}$$

$$\begin{aligned} \frac{2^{7x+5} \times 8^{x+1}}{4^{x-2}} &= \\ \frac{2^{7x+5} \times (2^3)^{x+1}}{(2^2)^{x-2}} &= \\ \frac{2^{7x+5} \times 2^{3x+3}}{2^{2x-4}} &= \\ \frac{2^{10x+8}}{2^{2x-4}} &= 2^{8x+12} \end{aligned}$$

Change Base  
Multiply Exponents  
Add Exponents  
Subtract Exponents

Subtracting  
Negative  
Exponents!

$$\frac{2^{7x+5} \times 8^{x+1}}{4^{x-2}} =$$

$$\begin{aligned} 8^{(x+1)} &= \\ (2^3)^{(x+1)} &= 2^{3x+3} \end{aligned}$$

$$\frac{2^{7x+5} \times 2^{3x+3}}{2^{2x-4}} =$$

$$\begin{aligned} 4^{x-2} &= \\ (2^2)^{x-2} &= 2^{2x-4} \end{aligned}$$