

Day 1: Properties of Exponents

Warm-Up: Before we begin today's lesson, how much do you remember about exponents? Use expanded form to write the rules for the exponents.

OBJECTIVE 1 Multiplying Exponential Expressions

$3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$
 $3^2 \cdot 3^4 = 3^6 = 729$ | $y^4 \cdot y^{10} = y^{14}$ | $12^3 \cdot 12^5 = 12^8 = 429981696$ | **SUMMARY:** $a^m \cdot a^n = a^{m+n}$

OBJECTIVE 2 Dividing Exponential Expressions (Remember: $\frac{x}{x} = 1$)

$\frac{3^6}{3^2} = 3^4 = 81$ | $\frac{y^{10}}{y^4} = y^6$ | $\frac{12^5}{12^3} = 12^2 = 144$ | **SUMMARY:** $\frac{a^m}{a^n} = a^{m-n}$

OBJECTIVE 3 Negative Exponential Expressions: Simplify 2 WAYS using expanded form AND the rule from OBJECTIVE 2

$3^{-2} = \frac{1}{3^2} = \frac{1}{9}$ | $y^{-10} = \frac{1}{y^{10}}$ | $12^{-3} = \frac{1}{12^3} = \frac{1}{1728}$ | **SUMMARY:** $\frac{1}{a^n} = a^{-n}$
 Another Rule to Remember $a^0 = 1$

OBJECTIVE 4 Exponential Expressions Raised to a Power

$(3^6)^2 = 3^{12}$ | $(y^3)^4 = y^{12}$ | $(12m)^5 = 12^5 m^5$ | **SUMMARY:** $(a^m)^n = a^{mn}$
SUMMARY: $(a \cdot b)^n = a^n b^n$

The lesson...

I. Find the value of x in each of the following expressions.

① Simplify using Exponent Rules so 1 exponential per side
 ② Once bases are =, set exponents = & solve

$5^x \cdot 5^2 = 5^7$ $5^{x+2} = 5^7$ $x+2=7$ $x=5$	$3^{-2} \cdot 3^x = 3^2$ $3^{-2+x} = 3^2$ $-2+x=2$ $x=4$	$4^{2/3} \cdot 4^x = 4$ $4^{2/3+x} = 4^1$ $2/3+x=1$ $x=1/3$
$(5^3)^x = 5^6$ $5^{3x} = 5^6$ $3x=6$ $x=2$	$3^{-2x} = 3^{-2}$ $(3^{-2})^x = \frac{1}{3^2}$ $-2x=-2$ $x=1$	$(4^x)^{1/2} = 4$ $4^{1/2x} = 4^1$ $1/2x=1$ $x=2$
$\frac{5^6}{5^x} = 5^4$ $5^{6-x} = 5^4$ $6-x=4$ $-x=-2$ $x=2$	$\frac{3^x}{3^{12}} = \frac{1}{3^2}$ $\frac{1}{3^x} \cdot 3^{12} = \frac{1}{3^2}$ $3^{12-x} = 3^{-2}$ $12-x=-2$ $x=10$	$\frac{4^{3/2}}{4^x} = 4$ $4^{3/2-x} = 4^1$ $3/2-x=1$ $-x=-1/2$ $x=1/2$
$\frac{5^2}{5^x} = 1$ $5^{2-x} = 5^0$ $2-x=0$ $x=2$	$(3^x)^2 = 1$ $3^{2x} = 3^0$ $2x=0$ $x=0$	$4^{6+x} = 1$ $4^{6+x} = 4^0$ $6+x=0$ $x=-6$

Do 1st column together and 2nd and 3rd column... you try the others

