

Worksheet 5-1: Powers and Exponent Rules

Exponent Review:

2^4 is a power, where **2** is the base of the power
and **4** is the exponent of the power

Exponential Form $\rightarrow 2^4 = 2 \times 2 \times 2 \times 2$ Product Form
 $= 16$ Standard Form

Investigation 1: Multiplying Powers with the Same Base

Product	Expanded Form	Number of Factors	Single Power
$5^2 \times 5^4$	$(5 \times 5) \times (5 \times 5 \times 5 \times 5)$	6	5^6
$3^5 \times 3^2$			
$(-2)^5 \times (-2)^3$			
$\left(\frac{1}{2}\right)^5 \times \left(\frac{1}{2}\right)$			

Exponent Rule 1: $(x^m)(x^n) =$

Investigation 2: Dividing Powers with the Same Base

Quotient	Expanded Form	Number of Factors	Single Power
$\frac{5^6}{5^2}$	$\frac{5 \times 5 \times 5 \times 5 \times 5 \times 5}{5 \times 5}$	4	5^4
$\frac{3^5}{3^3}$			
$(-7)^4 \div (-7)$			
$\left(\frac{2}{3}\right)^4 \div \left(\frac{2}{3}\right)^3$			

Exponent Rule 2: $x^m \div x^n =$

Investigation 3: Power of a Power

Power	Expanded Form	Number of Factors	Single Power
$(5^3)^2$	$(5^3) \times (5^3) = (5 \times 5 \times 5) \times (5 \times 5 \times 5)$	6	5^6
$(3^2)^4$			
$((-7)^2)^3$			
$\left(\left(\frac{1}{2}\right)^4\right)^3$			

Exponent Rule 3: $(x^m)^n =$

Practice:

1. Write each expression as a single power, then evaluate. You need a scientific calculator!

(a) $6^2 \times 6^3$ (b) $\frac{(-7)^6}{(-7)^4}$ (c) $(3^4)^3$ (d) $\left(\frac{1}{2^3}\right)^2$

2. Evaluate $\left(\frac{1}{81}\right)^3$ and $\left(\frac{1}{9}\right)^6$. Use the exponent rule to explain why the answers are the same.

3. Mac evaluated the problem $2^3 \times 2^2$. His solution is 2^6 . Is his solution correct? If not, explain where he went wrong and correct his work.