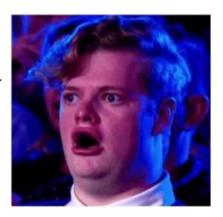
Math 9

2.5: Exponent Laws Part II



Exponent Law 3: Powers of Powers

Sometimes you will see a power raised to another power.



I know, right?

Don't worry, there's an exponent law for that, and it's pretty easy. If you see a power raised to another power, you just multiply the exponents together:

$$(a^m)^n = a^{m \times n}$$

Example 1: Simplify (write as 1 power) first without exponent laws, then use an exponent law

a)
$$(3^{2})^{\frac{1}{4}}$$
 $3^{2} \cdot 3^{2} \cdot 3^{2} \cdot 3^{2}$
 $3^{2} \cdot 2^{2} \cdot 2^{2} \cdot 2^{2}$
 $3^{3} \cdot 3^{2} \cdot 3^{2} \cdot 3^{2}$
 $3^{3} \cdot 3^{2} \cdot 3^{2} \cdot 3^{2}$
 $3^{3} \cdot 3^{2} \cdot 3^{2} \cdot 3^{2}$

b)
$$(-2^{2})^{3}$$

$$= (-2^{2})(-2^{2})(-2^{2})$$

$$= -2^{2+2+2}$$

$$= -2^{2}$$

$$= -2^{2\times 3}$$

$$= -2^{2\times 3}$$

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Example 2: Simplify

a)
$$(5^2)^{10}$$

b)
$$\left[\left(\frac{1}{2}\right)^{2}\right]^{4}$$

$$= \left(\frac{1}{2}\right)^{2\times 4} = \left(\frac{1}{2}\right)^{8}$$

Exponent Law 4: Power of a Product

If a power's base consists of two numbers being multiplied together, you can distribute the exponent to both numbers:

$$(\underline{a}\underline{b})^m = a\underline{m}b\underline{m}$$

Example 3: Calculate first without exponent laws, then use an exponent law

a) (5 × 4

$$=5^2 \times 4^2$$

b) $((-4) \times 5)^3$

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Exponent Law 5: Power of a Quotient

If a power's base consists of two numbers being divided, you can distribute the exponent to both numbers:

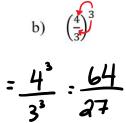
$$\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$$

Example 4: Calculate first without exponent laws, then use an exponent law





$$=\frac{1^2}{2^2}=\frac{1}{4}$$





Textbook Assignment: Pg. 84 # 4-8, 14aceg