2.4 - Exponent Laws Pt. I

October 2, 2019 8:48 AM

Math 9

2.4: Exponent Laws Part I

Exponent Law 1: Product of Powers

When you are multiplying two powers together (a product) that have the same base, you can use this exponent law to simplify them:

$$a^m \times a^n = a^{m+n}$$

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

a) $(7^2)(7^3)$

Expand:

$7^2 \cdot 7^3$

$7 \cdot 7 \cdot 7 \cdot 7 \cdot 7$

$= 7^5$

Exponent Law:

$(7^2)(7^3)$

$= 7^{2+3}$

$= 7^5$

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

Check:

① Same Base? Yes!

② Powers are multiplied? Yes!

⇒ We can use the exponent Law!

$(-3)^4(-3)^5 = (-3)^{4+5}$

$= (-3)^9$

Example 2: Simplify

a) $(2^{100})(2^{100})$

$(2^{100})(2^{100})$

$= 2^{100+100}$

$= 2^{200}$

b) $(8^{1234})(8^6)$

$(8^{1234})(8^6)$

$= 8^{1234+6}$

$= 8^{1240}$

c) $(-9)^{11}(-9)^{27}$

$= (-9)^{11+27}$

$= (-9)^{38}$

Math 9

Exponent Law 2: Quotient of Powers

When you are dividing two powers (a quotient) that have the same base, you can use this exponent law to simply them:

$$a^m \div a^n = a^{m-n}$$

Example 3: Simplify (write as 1 power) first without exponent laws, then use an exponent law

a) $6^5 \div 6^2$

Expand:

$6 \cdot 6 \cdot 6 \cdot 6 \cdot 6 = 6 \cdot 6 \cdot 6$

$6 \cdot 6$

$= 6^3$

Exponent Law:

$6^5 \div 6^2$

$= 6^{5-2}$

$= 6^3$

b) $\frac{8^9}{8^3}$

Check:

① Same Bases? Yes!

② Powers being divided? Yes!

⇒ Exponent Law!

$\frac{8^9}{8^3} = 8^{9-3} = 8^6$

Example 4: Simplify

a) $6^2 + 6^3 \times 6^2$

$= 6^2 + 6^{3+2}$

$= 6^2 + 6^5$

b) $(-10)^4[(-10)^6 \div (-10)^4] - 10^7$

$= (-10)^4[(-10)^{6-4}] - 10^7$

$= (-10)^4(-10)^2 - 10^7$

$= (-10)^{4+2} - 10^7$

$= (-10)^6 - 10^7$

Textbook Assignment: Pg. 76 # 3-5, 8, 10, 16