

Properties of Exponents in Chapter 8

- Zero and Negative Exponents $5b^{-3}c^0$
- Multiplying powers with the same base a^4a^7a
- Raising a power to a power $(m^5)^8$
- Raising a product to a power $(5a^3b^7)^2$
- Dividing powers with the same base $\frac{n^8}{n^2}$
- Raising a quotient to a power $\left(\frac{x^3}{y^7}\right)^4$

Sections 8-3 and 8-4: Multiplication Properties of Exponents

Multiplying Powers with the Same Base: Add Exponents

Raising a Power to a Power: Multiply exponents

Raising a Product to a Power:

Raise everything inside the parentheses to the power that is outside of the parentheses.

This is when you distribute the exponent

Simplify each.

1. $(5R^{-5}ST^{-4})^2$

2. $(2w^{-5}x^4)^{-3}$

What is the difference between these two?

$$(x+5)^2$$

$$(x+5)(x+5)$$

Here you can't just distribute the exponent, you have to expand.

$$\begin{array}{c} \text{F O I L} \\ x^2 + 5x + 5x + 25 \\ \hline x^2 + 10x + 25 \end{array}$$

$$(5x)^2$$

$$5^2x^2$$

$$25x^2$$

With this problem you CAN simply square everything inside the parentheses.

Simplify each.

3. $(5c^3d^{-2})^2(10cd^5)^3$

4. $(9x^4y^{-8})^0(x^3y^2)^5(x^{-2}y^4)$

Hwk #21:
Sections 8-3 and 8-4

Page 407, Problems 14, 17, 18, 21

AND

Pages 413-414, Problems 7, 14, 15, 20, 21

5. Simplify:

Multiply exponents 4 and 2 first
then raise everything to the 8th power.

Diagram illustrating the simplification of $((a^5b^3)^2)^4$:

The expression $((a^5b^3)^2)^4$ is shown. A blue box highlights $(a^5b^3)^2$, and a blue arrow points from it to $(a^5b^3)^8$. Another blue arrow points from $(a^5b^3)^8$ to a final result $a^{40}b^{24}$. A blue box highlights $a^{10}b^6$ with a blue arrow pointing to $a^{40}b^{24}$. The text "Square first then raise to the fourth power." is written next to the $a^{10}b^6$ box.

6. Simplify:

Diagram illustrating the simplification of $\frac{c^9}{c^4}$:

The expression $\frac{c^9}{c^4}$ is shown. A green circle highlights c^5 . Below the circle, the expression $c^9 \cdot c^{-4}$ is written. To the right, the expression $\frac{c \cdot c \cdot c \cdot c \cdot c \cdot \cancel{c} \cdot \cancel{c} \cdot \cancel{c} \cdot \cancel{c}}{c \cdot \cancel{c} \cdot \cancel{c} \cdot \cancel{c}}$ is shown, with the final result c^5 circled in green.

Section 8-5:
Division Properties of Exponents

Dividing Powers with the Same Base:

Subtract Exponents

Exponent in Numerator - Exponent in Denominator

Simplify each. No negative exponents in your answer!

1. $\frac{12d^8}{3d^2} = 4d^6$

2. $\frac{m^8}{m^{12}} = \frac{1}{m^4}$
 $m^{5-7} = m^{-2}$
 $m^{7-5} = \frac{1}{m^2}$

3. $\frac{8n^9}{24n^{-2}} = \frac{n^{11}}{3}$

4. $\frac{y^{-10}}{y^{-6}} = \frac{y^6}{y^{10}} = \frac{1}{y^4}$

5. Simplify.

$$\frac{7a^8b^9c^{-4}d^6}{35a^{-2}b^7c^{-8}d^{10}}$$

$$\frac{a^{10}b^2c^4}{5d^4}$$

6. Simplify

$$\left(\frac{10p^6q^5r^{-2}}{5p^2q^{-1}r^3p^4} \right)^3$$

$$\left(\frac{2q^6}{r^5} \right)^3 = \frac{8q^{18}}{r^{15}}$$

Simplify each.

7. $\left(\frac{a^9b^{-3}}{a^4c^{-5}}\right)^{-3}$ 8. $\left(\frac{8p^4q^{-3}r^6}{p^9q^2r^5}\right)^{-2}$

\downarrow

$$\left(\frac{a^9b^{-3}}{c^{-5}}\right)^{-3} \rightarrow \left(\frac{a^9c^5}{b^3}\right)^{-3} \quad \frac{a^{-15}c^{-15}}{b^{-9}}$$

$\frac{b^9}{a^{15}c^{15}}$