

Exponent Power-Up

Use exponent laws to rewrite expressions.

GRADE 8 • MA.8.AR.1.1

MA.8.AR.1.1 "Apply the Laws of Exponents to generate equivalent algebraic expressions, limited to integer exponents and monomial bases."

NAME _____

DATE _____

EXPONENT RULES

When you multiply powers with the same base, add exponents. When you divide powers with the same base, subtract exponents, and when a power is outside parentheses, multiply the exponents inside. For any nonzero base, a zero exponent equals 1, and a negative exponent can be written as a reciprocal.

WORKED EXAMPLE

Simplify: x^{12} / x^7

1. Keep the base x .
2. Subtract the exponents: $x^{(12 - 7)}$.
3. Simplify: x^5 .

Answer: x^5

PRACTICE 6 problems

1 Simplify: $a^6 * a^2$

ANSWER _____

2 Simplify: m^9 / m^3

ANSWER _____

3 Simplify: $(p^3)^2$

ANSWER _____

4 Simplify: $q^{-4} * q^{10}$

ANSWER _____

5 Simplify: $r^8 * s^{-2} * r^0 * s^6$

ANSWER _____

6 Simplify: $(3x^2)^4$

ANSWER _____

APPLY IT Show your work

- 1** A music app combines a bass setting represented by t^4 with an adjustment represented by t^{-1} . The combined setting is $t^4 \cdot t^{-1}$. Write the setting as one power of t .

WORK SPACE

ANSWER _____

- 2** A robotics club uses the expression $(3p^2)^2$ in its program to represent a scaled power setting. Rewrite the expression without parentheses.

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

Simplify completely: $((a^6b^{-3}) / (a^2b))^2$

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	Simplify: $a^6 \cdot a^2$	a^8
2	Simplify: m^9 / m^3	m^6
3	Simplify: $(p^3)^2$	p^6
4	Simplify: $q^{-4} \cdot q^{10}$	q^6
5	Simplify: $r^8 \cdot s^{-2} \cdot r^0 \cdot s^6$	$r^8 s^4$
6	Simplify: $(3x^2)^4$	$81x^8$

PART 2 • APPLY IT

1. t^3 Add the exponents because the powers have the same base. $4 + (-1) = 3$.
2. $9p^4$ Square both factors inside the parentheses. $3^2 = 9$ and $(p^2)^2 = p^4$.

CHALLENGE

$a^8 b^{-8}$

Accept equivalent forms with positive or negative exponents when they are mathematically equivalent. For problem 5, r^0 equals 1, but the factor r^8 remains in the product.