Exponents Example

Simplify a quotient of powers with the same base using the product and quotient rules.

An exponent tells how many times a base is used as a factor. For example, 2^3 means 2 x 2 x 2. Exponent laws are concise consequences of repeated multiplication. They developed as algebraic notation evolved; there is no single inventor of exponents.

FORMULA

Same base: a^m x a^n = a^(m+n); a^m / a^n = a^(m-n), for a != 0.

WORKED EXAMPLE

Simplify (2^3 x 2^4) / 2^2.

1. Combine the product

The powers in the numerator share base 2, so add their exponents.

2^3 x 2^4 = 2^(3+4) = 2^7

2. Divide the powers

For a quotient with the same nonzero base, subtract the denominator exponent.

2^7 / 2^2 = 2^(7-2) = 2^5

3. Evaluate the power

The fifth power of 2 is five factors of 2 multiplied together.

2^5 = 2 x 2 x 2 x 2 x 2 = 32

(2^3 x 2^4) / 2^2 = 2^(3+4-2) = 2^5 = 32

The simplified value is 32.

CHECK

Evaluate the original expression directly; it confirms the exponent-law result.

(8 x 16) / 4 = 128 / 4 = 32

Remember: Keep the base unchanged when multiplying or dividing powers. Add exponents for multiplication and subtract for division; do not add exponents when adding terms.