

POWER PROPERTIES

1. Product of Powers Property: This property states that to multiply powers having the same base, add the exponents. That is, for a real number non-zero a and two integers m and n ,

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

2. Quotient of Powers Property: This property states that to divide powers having the same base, subtract the exponents. That is, for a non-zero real number a and two integers m and n ,

$$a^m : a^n = a^{m-n}$$

3. Power of a Power Property: This property states that the power of a power can be found by multiplying the exponents. That is, for a non-zero real number a and two integers m and n ,

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

4. Power of a Product Property: This property states that the power of a product can be obtained by finding the powers of each factor and multiplying them. That is, for any two non-zero real numbers a and b and any integer m ,

$$(a \cdot b)^m = a^m \cdot b^m$$

5. Power of a Quotient Property: This property states that the power of a quotient can be obtained by finding the powers of numerator and denominator and dividing them. That is, for any two non-zero real numbers a and b and any integer m ,

$$(a : b)^m = a^m : b^m$$

Examples of Power Properties

- Power of a Power Property: $(2^2)^3 = 4^3 = 64$
is the same as $2^{2 \cdot 3} = 2^6 = 64$.
- Product of Powers Property: $2^2 \cdot 2^5 = 4 \cdot 32 = 128$
is the same as $2^{2+5} = 2^7 = 128$
- Power of a Product Property: $(3 \cdot 4)^2 = 12^2 = 144$
is the same as $3^2 \cdot 4^2 = 9 \cdot 16 = 144$.
- Quotient of Powers Property: $5^4 : 5^3 = 625 : 125 = 5$ is the same as $5^{4-3} = 5^1 = 5$.
- Power of a Quotient Property: $(8 : 2)^2 = 4^2 = 16$
is the same as $8^2 : 2^2 = 64 : 4 = 16$