= Exponentiation =

Exponentiation is a mathematical operation , written as bn , involving two numbers , the base b and the exponent n . When n is a positive integer , exponentiation corresponds to repeated multiplication of the base : that is , bn is the product of multiplying n bases :

<formula>

In that case , bn is called the n @-@ th power of b , or b raised to the power n .

The exponent is usually shown as a superscript to the right of the base . Some common exponents have their own names : the exponent 2 (or 2nd power) is called the square of b (b2) or b squared ; the exponent 3 (or 3rd power) is called the cube of b (b3) or b cubed . The exponent ? 1 of b , or 1 / b , is called the reciprocal of b .

When n is a negative integer and b is not zero , bn is naturally defined as 1 / b ? n , preserving the property bn × bm = bn + m .

The definition of exponentiation can be extended to allow any real or complex exponent . Exponentiation by integer exponents can also be defined for a wide variety of algebraic structures , including matrices .

Exponentiation is used extensively in many fields , including economics , biology , chemistry , physics , and computer science , with applications such as compound interest , population growth , chemical reaction kinetics , wave behavior , and public @-@ key cryptography .

= = History of the notation = =