= 3 ? 3 ? 3 ? 3 ? 3 =
243 . The base 3 appears 5 times in the repeated multiplication , because the exponent is 5 . Here , 3 is the base , 5 is the exponent , and 243 is the power or , more specifically , the fifth power of 3 , 3 raised to the fifth power , or 3 to the power of 5 .
The word " raised " is usually omitted , and very often " power " as well , so 35 is typically pronounced " three to the fifth " or " three to the five " . The exponentiation bn can be read as b raised to the n @-@ th power , or b raised to the power of n , or b raised by the exponent of n , or most briefly as b to the n .
Exponentiation may be generalized from integer exponents to more general types of numbers .

= = Integer exponents = =

The exponentiation operation with integer exponents requires only elementary algebra .

= = = Positive integer exponents = = =

Formally , powers with positive integer exponents may be defined by the initial condition
<formula>
and the recurrence relation
<formula>
From the associativity of multiplication , it follows that for any positive integers m and n ,
<formula>

= = = Zero exponent = = =

Any nonzero number raised by the exponent 0 is 1 ; one interpretation of such a power is as an empty product . The case of 00 is discussed below .

= = = Negative exponents = = =

The following identity holds for an arbitrary integer n and nonzero b :
<formula>
Raising 0 by a negative exponent is left undefined .
The identity above may be derived through a definition aimed at extending the range of exponents to negative integers .
For non @-@ zero b and positive n , the recurrence relation from the previous subsection can be rewritten as
<formula>
By defining this relation as valid for all integer n and nonzero b , it follows that
<formula>
and more generally for any nonzero b and any nonnegative integer n ,
<formula>
This is then readily shown to be true for every integer n .

= = = Combinatorial interpretation = = =

For nonnegative integers n and m , the power nm is the number of functions from a set of m elements to a set of n elements (see cardinal exponentiation) . Such functions can be represented as m @-@ tuples from an n @-@ element set (or as m @-@ letter words from an n @-@ letter alphabet) .

= = = Identities and properties = = =

The following identities hold for all integer exponents , provided that the base is non @-@ zero :
<formula>