fourth power

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Synonym	biquadratic number

The *fourth power* of a number x is the number obtained multiplying x by itself three times thus: $x \times x \times x \times x$. It's more commonly denoted as x^4. For example, $2^4 = 2 \times 2 \times 2 \times 2 = 16$. Since the square of a square number is a fourth power, $x^2 x^2 = x^{2+2} = x^4$, fourth powers are sometimes called *biquadratic numbers*. For example, $2^4 = 2^2 2^2 = 4^2 = 16$. The first few integer fourth powers are 1, 16, 81, 256, 625, 1296, 2401, etc., listed in A000290 of Sloane's OEIS.

Any integer can be represented by the sum of at most 19 integer fourth powers (see Waring's problem).

Euler's conjecture was first disproven with fifth powers, but there are also counterexamples using fourth powers. Sloane's A003828 lists the known integers n having solutions to $n^4 = a^4 + b^4 + c^4$.

The fourth power of a negative number is always a positive number; the fourth root of a negative real number is a complex number $a + bi$ with $|a| = |b|$ and $a \neq 0$.