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home / algebra / exponent / powerIn math, the terms "power" and "exponent" are often used interchangeably to refer to "n" in the expression bn. This expression can be read as "b to the power of n." The term power can also refer to the result of the expression. 52 = 25 In the above expression, both 2 and 25 may be referred to as a power, though the latter is less common. Common powers The two most common powers used in math are squares and cubes. Squares Squaring a base refers to multiplying the base by itself. It is the same as raising a base to the power of 2. The square of a number can be referred to as a perfect square. 72 = 7 7 = 49 The above expression is most commonly read as "seven squared," but can also be read as "seven to the power of two," or "seven to the second power." The result, 49, is the perfect square of 7. One important property of squaring is that the square of an expression is equal to the square of its additive inverse. For example 72 = (-7)2 = 49. This is also true for algebraic expressions. Example Show that the square of (x - 1) is equal to the square of its additive inverse, (-x + 1). (x - 1)2 = (x - 1)(x - 1) = (x)(x) + (x)(-1) + (-1)(x) + (-1)(-1) = x2 - x - x + 1 = x2 - 2x + 1 (-x + 1)2 = (-x + 1)(-x + 1) = (-x)(-x) + (-x)(1) + (1)(-x) + (1)(1) = x2 - x - x + 1 = x2 - 2x + 1 Cubes Cubing a base means multiplying it by itself two additional times; given a base b, b cubed is b b b. The cube of an expression is the same as raising it to the third power. Given b = 5: b3 = 5 5 5 = 125 The result of cubing an integer is a perfect cube. In the example above, 125 is the perfect cube of 5. The name "cube" comes from the fact that the volume of a geometric cube can be found by cubing its side length, similar to how squaring the side lengths of a square yields its area. Consequently, multiplying a number, n, by its square, gives us its cube. Basic power properties If the power is a positive integer, then the power tells us how many times to multiply the base by itself. 52 = 5 5 = 25 If the power is a negative integer, -n, and b is a non-zero real number, we take the reciprocal of the base raised to the power of n. b-n = 5-2 = Anything raised to the power of 0 is 1. 00 is a special case that is either considered 1 or undefined. 1360 = 1 If the power is a fraction, we take the nth root of the base, where n is the number in the denominator of the fraction. Solving powers requires an understanding of multiplication rules. A power, or exponent, is a shortcut to indicate a number should be multiplied by itself. The number being multiplied is referred to as the "base." The exponent is located to the right of the base in superscript or with the ^ symbol appearing before it. Determine if the base is negative or positive. Check for parenthesis placement, especially when working with a negative base. Keep in mind (-3)^4 is different from -3^4. For a positive base, multiply the number as indicated by the exponent. For 5^3, multiple 5_5_5 to arrive at your answer of 125. For a base whose negative sign is contained in the parenthesis, keep the negative symbol in front of each act of multiplication. For example, (-3)^4 would be multiplied as (-3)(-3)(-3)*(-3), to arrive at your answer of 81. For exponents whose negative sign is without parenthesis, save the negative symbol until after you have finished multiplying the base. For example, -3^4 would be multiplied as -(3)(3)(3)(3), to arrive at your answer of -81. If you have an equation consisting of two exponents with the same base, you can add the exponents together for simplification. For example, 2^3_2_4 can be converted to 2^7. Then, you can solve the equation as usual. Remember that, as with all algebraic functions, anything inside parenthesis must be dealt with first.Purplemath.com: Exponents; Basic Rules Doucette, Chrystal. "How To Do Powers In Math" sciencing.com, . 24 April 2017. APA Doucette, Chrystal. (2017, April 24). How To Do Powers In Math. sciencing.com. Retrieved from Chicago Doucette, Chrystal. How To Do Powers In Math last modified August 30, 2022. We know how to calculate the expression 5 x 5. This expression can be written in a shorter way using something called exponents. $$5\cdot 5=5^{2}$$ An expression that represents repeated multiplication of the same factor is called a power. The number 5 is called the base, and the number 2 is called the exponent. The exponent corresponds to the number of times the base is used as a factor. Example Write these multiplications like exponents $$5\cdot 5\cdot 5=5^{3}$$ $$4\cdot 4\cdot 4\cdot 4\cdot 4=4^{5}$$ $$3\cdot 3\cdot 3\cdot 3=3^{4}$$ Multiplication If two powers have the same base then we can multiply the powers. When we multiply two powers we add their exponents. The rule: $$x^{a}\cdot x^{b}=x^{a+b}$$ Example $$4^{2}\cdot 4^{5}=\left (4\cdot 4 \right)\cdot \left (4\cdot 4\cdot 4\cdot 4\cdot 4 \right)=4^{7}=4^{2+5}$$ Division If two powers have the same base then we can divide the powers. When we divide powers we subtract their exponents. The rule: $$\frac{x^{a}}{ x^{b}}=x^{a-b}$$ Example $$\frac{4^{2}}{ 4^{5}}=\frac{{\color{red} {ot}{4}}\cdot {\color{red} {ot}{4}}}{{\color{red} {ot}{4}}\cdot {\color{red} {ot}{4}}\cdot 4\cdot 4\cdot 4}=\frac{1}{4^{3}}=4^{-3}=4^{2-5}$$ A negative exponent is the same as the reciprocal of the positive exponent. $$x^{-a}=\frac{1}{x^{a}}$$ Example $$2^{-3}=\frac{1}{2^{3}}$$ When you raise a product to a power you raise each factor with a power $$(x\cdot y)^{a}=x^{a}\cdot y^{a}$$ Example $$(2x)^{4}=2^{4}\cdot x^{4}=16x^{4}$$ The rule for the power of a power and the power of a product can be combined into the following rule: $$(x^{a}\cdot y^{b})^{z}=x^{a\cdot z}\cdot y^{b\cdot z}$$ Example $$(x^{3}\cdot y^{4})^{2}=x^{3\cdot 2}\cdot y^{4\cdot 2}=x^{6}\cdot y^{8}$$ Video lessons Rewrite the expressions $$2\cdot 2\cdot 2$$ $$x\cdot x\cdot x\cdot x$$ $$3^{4}$$ $$x^{3}$$ Simplify the expression $$\left (x^{2}\cdot y^{3}\cdot z^{5} \right)^{3}$$ The power of a number says how many times to use the number in a multiplication. Powers are also called Exponents or Indices. For example, 8^2 could be called "8 to the power 2" or "8 to the second power", or simply "8 squared". Some interesting fact about Power : If the indices is 1, then you just have the number itself. For example, 5^1 = 5If the indices is 0, then you get 1. For example, 5^0 = 1Exponents make it easier to write and use many multiplicationsNegative exponent means how many times to divide one by the number.For example, 5^-1 = 1 /5 = 0.2 How we check if a number is power of y for a given integer x ?Naive solution:Given two positive numbers x and y, check if y is a power of x or not.Examples : Input: x = 10, y = 1Output: True Input: x = 10, y = 1000Output: True Input: x = 10, y = 1001Output: False Approach : A simple solution is to repeatedly compute powers of x. If a power becomes equal to y, then y is a power, else not. C++ // C++ program to check if a number is power of// another number#include using namespace std; /* Returns 1 if y is a power of x */bool isPower(int x, long int y){ // The only power of 1 is 1 itself if (x == 1) return (y == 1); // Repeatedly compute power of x long int pow = 1; while (pow < y) pow *= x; // Check if power of x becomes y return (pow == y);} /* Driver program to test above function */int main(){ cout