

2024/10/04

negative exponents: $x^{-n} = \frac{1}{x^n}$

$$\text{Ex.: } 2^{-3} = \frac{1}{2^3} = \frac{1}{8}$$

$$\text{Ex. 2: } 2^5 \cdot (2^5)(2^2) = 2^{5+5+2} = 2^{12} = 4096$$

$$\text{Ex. 3: } (3^3)(3^2) = (3^3 \times 3^4)(3^4) = 3^{3+4+4} = 3^{11} = 177147$$

Fractional exponents: used to denote roots:

$$x^{1/n} = \sqrt[n]{x} \quad \text{Ex.: } 16^{1/2} = \sqrt{16} = 4$$

Using previous rules

$$16^{3/2} = (16^{1/2})^3 = (\sqrt{16})^3 = 4^3 = 64$$

$$27^{2/3} = (27^{1/3})^2 = (\sqrt[3]{27})^2 = 3^2 = 9$$

$$100^{-3/2} = \frac{1}{(100^{3/2})} = \frac{1}{(100^{1/2})^3} = \frac{1}{10^3} = \frac{1}{1000} = 0.001$$

Problems on Exponents - Simplify the following:

$$23.) (x^3)(x^4)(x^2) = x^{3+4+2} = x^9$$

$$24.) (x^{20})(y^4)(x^3) = (x^{20+3})(y^4) = x^{23}(y^4)$$

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$$25.) (a^3)(a^{-1/2}) = (a^3)(\frac{1}{a^{1/2}}) = a^{3-1/2} = a^{5/2}$$

$$\left(\frac{1}{a^{1/2}}\right)(a^3) = a^{-1/2+3} = a^{5/2}$$

$$\left(\frac{1}{a^3}\right)\left(\frac{1}{a^{1/2}}\right) = \frac{1}{(a^3)(a^{1/2})} = \frac{1}{a^{3+1/2}} = \frac{1}{a^{7/2}} = a^{-7/2}$$

$$26.) \frac{2(2^6)}{2^3} = \frac{2^7}{2^3} = 2^{7-3} = 2^4 = 16$$

$$27.) 10^{-2} = \frac{1}{10^2} = \frac{1}{100} = 0.01$$

$$28.) (3t)^2 = 3^2 \cdot t^2 = 9t^2$$

$$29.) [(1+5)^2 - 32] \cdot [6^2 - 22] \cdot [36 - 22] = [4] \cdot [14] \cdot [14] = 784$$