

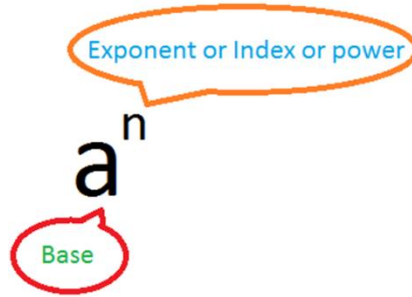
Grade 6 and 7 – Number system

Sample problem – Exponents

An exponent refers to the number of times a number is multiplied by itself.

For example, $3 \times 3 \times 3 = 3^3$

Parts of an exponent:



Rules of exponents

Product rule - $(b^m)(b^n) = b^{m+n}$

Quotient rule - $\frac{b^m}{b^n} = b^{m-n}$

Power of a power rule - $(b^m)^n = b^{mn}$

Power of a product rule - $(ab)^m = a^m b^m$

Power of a quotient rule - $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$

Zero property - $b^0 = 1$

Negative property - $b^{-m} = \frac{1}{b^m}$

Let's find out how to solve the exponents using these rules.

$$\left(\frac{a^{\frac{2}{3}} b^{\frac{2}{3}}}{b^{-\frac{1}{2}}}\right)^6 \left(\frac{a^{-2}}{b^3}\right)^2$$



STEP 1:

To start with, it is good to convert the negative exponent to positive.

using Negative property of exponents,

$$\left(a^{\frac{2}{3}} b^{\frac{2}{3}} b^{\frac{1}{2}}\right)^6 \left(\frac{1}{b^3 a^2}\right)^2$$

STEP 2: Using product rule,

$$\left(a^{\frac{2}{3}} b^{\frac{2}{3}+\frac{1}{2}}\right)^6 \left(\frac{1}{b^3 a^2}\right)^2$$

We know that, $\frac{2}{3} + \frac{1}{3} = \frac{7}{6}$, And also using power of power rule in $\left(\frac{1}{b^3 a^2}\right)^2$

$$\left(a^{\frac{2}{3}} b^{\frac{7}{6}}\right)^6 \left(\frac{1}{b^6 a^4}\right)$$

STEP 3: Using power of power rule again in $\left(a^{\frac{2}{3}} b^{\frac{7}{6}}\right)^6$,

$$\left(a^{\frac{2}{3} \times 6} b^{\frac{7}{6} \times 6}\right) \left(\frac{1}{b^6 a^4}\right)$$

$$(a^4 b^7) \left(\frac{1}{b^6 a^4}\right)$$

STEP 4: Multiply both the terms $\left(\frac{a^4 b^7}{b^6 a^4}\right)$

STEP 5: Using quotient rule, $(a^{4-4} b^{7-6}) = a^0 b^1$

STEP 6: Using zero property, $a^0 = 1$ and $b^1 = b$

Therefore,
$$\left(\frac{a^{\frac{2}{3}} b^{\frac{2}{3}}}{b^{-\frac{1}{2}}}\right)^6 \left(\frac{a^{-2}}{b^3}\right)^2 = b$$