Surds and indices- Quant Study Notes for Competitive Exams

Hello friends, we usually encounter problems on surds and indices in competitive exams. So lets study and clear our doubts. Lets learn some basic properties of indices:

- $a^m = a \times a \times a \times a \times$.....(m times)
- $a^0 = 1$
- $a^m \times a^n = a^{m+n}$
- $a^m / a^n = a^{m-n}$
- $(a^m)^n = a^{m \times n}$
- $a^{1/m} = \sqrt[m]{a}$
- $a^{n/m} = \sqrt[m]{a^n}$

Note: If the power of any number is negative, the reciprocal of the same number makes the power positive.

Let us see some cases:

$(a)^{-m} = 1/(a)^m$

$1/(a)^{-m} = (a)^m$

$(a)^{-m}/(b)^{-n} = (b)^n/(a)^m$

$(a/b)^{-m} = (b/a)^m$

Let's solve some problems on these properties.

E.g. Find the value of y, if $3^7 \times 8^2 = 9^2 \times 4^2 \times 12y$

Sol: We know that $9 = 3^2$, $4 = 2^2$ and $8 = 2^3$ then,

$3^7 \times (2^3)^2 = (3^2)^2 \times (2^2)^2 \times 12y$

$3^7 \times 2^6 = 3^4 \times 2^4 \times 12y$

$3^3 \times 2^2 = 12y$

$27 \times 4/12 = y$

$y = 9$ (Ans.)

E.g. Find the value of y, if

$(27/64)^2 \times (3/4)^2 \times (9/16)^{2 \times y + 1} = (81/256)^{3 \times y}$

Sol: Now, $(27/64)^2 \times (3/4)^2 \times (9/16)^{2 \times y + 1} = (81/256)^{3 \times y}$

$(3/4)^{3 \times 2} \times (3/4)^2 \times (3/4)^{2 \times (2 \times y + 1)} = (3/4)^{4 \times 3 \times y}$

$(3/4)^{6 + 2 + 2 + 4 \times y} = (3/4)^{12 \times y}$

$(3/4)^{10 + 4 \times y} = (3/4)^{12 \times y}$

$10 + 4 \times y = 12 \times y$

$8 \times y = 10$

$y = 10/8 = 1.25$ (Ans.)

Now, let's learn some vividly used powers of numbers.

1. Squares

Squares refer to the numbers which are obtained when a number is multiplied by itself or raised to the power 2 i.e. Square of $a = a \times a = a^2$. The table below shows the squares of numbers from 1 to 30.

1	121	441
4	144	484
9	169	529
16	196	576
25	225	625
36	256	676
49	289	729
64	324	784
81	361	841
100	400	900

2. Cubes

Cubes refers to the numbers which are obtained when a number is multiplied by itself thrice or raised to the power 3 i.e. Cube of $a = a \times a \times a = a^3$

The table given below shows the cubes of numbers from 1 to 20.

1	1331
8	1728
27	2197
64	2744
125	3375
216	4096
343	4913
512	5832
729	6859
1000	8000

Hope this blog clear your concept. For more such blogs, stay connected with us.

Thank you