Tips, Formulae and shortcuts for Logarithms, surds and indices

By

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Cracku Tip 1 – Logarithms, Surds and Indices

- "Logarithms, Surds and Indices" is one of the easiest topics in the quantitative section of the CAT exam.

- Although the number of formulae is high, the basic concepts are very simple to understand and apply.

- There are no shortcuts to remember and the scope of the questions that can be asked is very limited.

- The accuracy of answering questions from this section is very high and good students tend to score very well here.

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Cracku Tip 2 – Logarithms, Surds and Indices

If X,Y > 0 and m,n are rational numbers then

- $X^m \times X^n = X^{m+n}$

- $X^0 = 1$

- $\dfrac{X^m}{X^n} = X^{m-n}$

- $(X^m)^n = X^{mn}$

- $X^m \times Y^m = (X \times Y)^m$

- $\dfrac{X^m}{Y^m} = (X/Y)^m$

- $X^{-m} = \dfrac{1}{X^m}$

Cracku Tip 3 – Logarithms, Surds and Indices

If X and Y are positive real numbers and a,b are rational numbers.

- $(X/Y)^{-a} = (Y/X)^a$

- $X^{1/a} = \sqrt[a]{X}$

- $X^{a/b} = \sqrt[b]{X^a}$

- $\sqrt[a]{X} \times \sqrt[a]{Y} = \sqrt[a]{XY}$

- $\sqrt[a]{X} / \sqrt[a]{Y} = \sqrt[a]{X/Y}$

- $\dfrac{1}{\sqrt{N+1}-\sqrt{N}} = \sqrt{N+1}+\sqrt{N}$

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Cracku Tip 4 – Logarithms, Surds and Indices

- Surd is an irrational number involving a root ex : $\sqrt{5}, \sqrt[3]{7}, \sqrt[5]{2}$

- Like surds are two surds having same number under radical sign.

- Like surds can be added or subtracted. $6\sqrt{2} + 3\sqrt{2} = 9\sqrt{2}$

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Cracku Tip 5 – Logarithms, Surds and Indices

- If $a+\sqrt{b} = c+\sqrt{d}$, then $a = c$ and $b = d$

- The conjugate of $a+\sqrt{b}$ is $a-\sqrt{b}$

- $\sqrt{a\sqrt{a\sqrt{a\ldots\ldots\infty}}} = a$

- $\sqrt{a\sqrt{a\sqrt{a\ldots\ldots x\text{ times}}}} = a^{1-[1/(2^\wedge x)]}$

- To find $\sqrt{\sqrt{x}+\sqrt{y}}$, $\sqrt{x} + \sqrt{y}$ should be written in the form of $m+n+2\sqrt{mn}$ where
  $x = m+n$ and $4mn = y$ and $\sqrt{\sqrt{x}+\sqrt{y}} = \pm\,(\sqrt{m} + \sqrt{n}\,)$

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Cracku Tip 6 – Logarithms, Surds and Indices

If $N = a^x$ then, x is defined as the logarithm of N to base a

or $x = \log_a N$

Logarithm of a negative number or zero is not defined.

- $\log_a 1 = 0$

- $\log_a xy = \log_a x + \log_a y$

- $\log_a b^c = c \log_a b$

- $\log_a a = 1$

- $x^{\log_b y} = y^{\log_b x}$

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Cracku Tip 7 – Logarithms, Surds and Indices

- $\log_a \sqrt[n]{b} = \dfrac{\log_a b}{n}$

- $\log_a x = \dfrac{1}{\log_x a}$

- $b^{\log_b x} = x$

- $\log_a b = \dfrac{\log_c b}{\log_c a}$

- $\log_a b * \log_b a = 1$

- $\log_a(X/Y) = \log_a X - \log_a Y$

Cracku Tip 8 – Logarithms, Surds and Indices

- If $0 < a < 1$, then $\log_a x < \log_a y$ (if x>y)

- If $a > 1$ then $\log_a x > \log_a y$ (if x>y)

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