

RATIO AND PROPORTION

Ratio

$a:b \rightarrow$ Consequent (Second term)
Antecedent (First term)

Features of Ratio

Fraction

$\frac{a}{b} \rightarrow \frac{a}{b}$
Both a, b

Same kind

Eg. Height Both a, b

Same Unit

Eg. kg. Both a, b

Order

$a:b \neq b:a$

Comparison
Convert into decimal

other
Eg. 495
4:1
180 as 495
45

No. of Coins
Convert into ₹

Same Power
Direct apply

Different Power
Power Rule

Given
Given ratio k-sathk

Not Given
Add or Sub $\rightarrow x$

Based on Types of Ratio

Ratio Given
Relation find out

Relation Given
Ratio find out (a:b)

Ratio Given
Add or Sub
New Ratio

Types of Questions

Proportion

$a:b = c:d$
Product of Extremes = Product of Means
 $\frac{a}{b} \times \frac{c}{d} = ad = bc$

Continued Proportion
 $a:b = b:c$
 $\frac{a}{b} \times \frac{b}{c} = \downarrow$
 $b^2 = ac$
Mean

Properties of Proportion

Invertendo

Componendo

Dividendo

Alternendo

Alternendo

Componendo

Dividendo

Subtrahendo

Variation

Direct

$\frac{a}{b} = \frac{c}{d}$
 $ad = bc$

Inverse

$ab = cd$

Types of Ratio

Compound Ratio

$a:b = c:d$
 $ac : bd$

Inverse Ratio

$a:b =$
 $b:a$

Duplicate Ratio

$a:b \Rightarrow$
 $a^2:b^2$

Triplicate Ratio

$a:b =$
 $a^3:b^3$

Sub duplicate Ratio

$a:b =$
 $\sqrt[n]{a} : \sqrt[n]{b}$

Sub triplicate Ratio

$a:b =$
 $\sqrt[n]{a} : \sqrt[n]{b}$

Continued Ratio

$a:b ; b:c$
 $a:b : c$

Continued Ratio

$a:b ; b:c$ then
 $a:b:c$

11 21 22

$a:b, b:c$ and $c:d$
then $a:b:c:d$

111 211 221 222

MIND MAP

INDICES

RITU JINDAL

Laws of Indices

- # $a^m \cdot a^n = a^{m+n}$
- # $\frac{a^m}{a^n} = a^{m-n}$
- # $(a^m)^n = a^{mn} = a^{nm}$
- # $(ab)^n = a^n \cdot b^n$
- # $\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}$
- # $a^0 = 1$
- # $a^x = a^y$ then $x=y$
- # $a^0 = y^0$ then $x=y$

Laws of Surds

- # $\sqrt[n]{a} = a^{1/n}$
- # $\sqrt[n]{ab} = \sqrt[n]{a} \sqrt[n]{b}$
- # $\sqrt[n]{\frac{a}{b}} = \frac{\sqrt[n]{a}}{\sqrt[n]{b}}$
- # $(\sqrt[n]{a})^n = a$
- # $a^m = \frac{1}{a^{-m}}$
- # $a^x = b$ then $a = b^{1/x}$

Some Basic Results

- # $(a+b)^2 = a^2 + b^2 + 2ab$
- # $(a-b)^2 = a^2 + b^2 - 2ab$
- # $(a+b)^3 = a^3 + b^3 + 3ab(a+b)$
- # $(a-b)^3 = a^3 - b^3 - 3ab(a-b)$
- # $a^2 - b^2 = (a+b)(a-b)$
- # $(a^3 + b^3) = (a+b)(a^2 + b^2 - ab)$
- # $(a^3 - b^3) = (a-b)(a^2 + b^2 + ab)$
- # $a^3 + b^3 + c^3 - 3abc = (a+b+c)(a^2 + b^2 + c^2 - ab - bc - ca)$
- # $a^2 + b^2 + c^2 - ab - bc - ca = \frac{1}{2}(a+b+c)^2 - 3abc$

Types of Questions

More than Two Values Equal

Relation Given

Power ki multiply Base ki Power ke reciprocal

Relation Not Given

Maximum Relation Highest Value
Maximum Prime factor karte

- # Numerical \rightarrow Prime factor
- # Variable \rightarrow Combine one by one
- # Numerical + Variable
- # Power given first simplify power
- # = sign given Base Same power same
- # $\sqrt{\quad}$ Hatane ke liye Squaring
- # $\sqrt[3]{\quad}$ Hatane ke liye Cubic

- # $x \div 1 = x$
- # $x + 0 = x$
- # $x - 0 = x$
- # $x \cdot 1 = x$
- # $x \cdot 0 = 0$

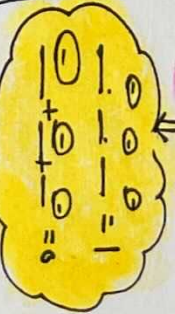
Miscellaneous

- # $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}} = 2 \times 3$
- # $a + b + c = 0$
- # $a^3 + b^3 + c^3 = 3abc$

Formula Based

- # $a = x^{1/3} + x^{-1/3}$
- # $a^3 - 3a = \frac{x^2 + 1}{x}$
- or
- # $a = x^{1/3} - x^{-1/3}$
- # $a^3 + 3a = \frac{x^2 - 1}{x}$

Circular



Square Root

- # Eg. $\sqrt{5+2\sqrt{6}}$
- # $\sqrt{3+2\sqrt{2}}$

MIND-MAP
LOGARITHM

Laws of Logarithm

$\log_a mn = \log_a m + \log_a n$
 $\log_a \frac{m}{n} = \log_a m - \log_a n$
 $\log_a m^n = n \log_a m$
 $\log_a a = 1$
 $\log_a 1 = 0$
 $\log_a b = \frac{\log b}{\log a} = \frac{\log b}{\log a}$
 $\log_a b = \frac{1}{\log_a b}$
 $a^{\log_a b} = b$

Types of Questions

$\log_a b = x$
 $a^x = b$

Single Log
 Convert into Exponential form

More than One Log with + or - sign
 Convert into single log
 $\log m + \log n = \log mn$
 $\log m - \log n = \log \frac{m}{n}$

Single log but No benefit to Convert into Exponential
 Exponential
 $x + -$

More than one log without + or - sign
 = given
 Left side Convert into Exponential
 ≠ given
 Right side Prime factor Power Age

Some More Types
Different Base
 $\log_a b = \frac{m}{n} \log_a b$

Divide me log
 $\frac{1}{\log_a b} = \log_b a$

Circular
 $\log_a b \log_b a = 1$

More than one log with = sign
 Multiply $\Rightarrow 1$
 Add or Sub $\Rightarrow 0$

Calc Tricks

$\log_a m$
 $m \sqrt{19}$
 time -1
 $\times 227695 =$

$\log_{25} 21952$
 $8 \times 1 \sqrt{x} =$
 $= = \dots = \square$

Anti log m
 $m \div 227695$
 $+1 =$
 $(x =) 19$
 times