

Ratio, Proportion, Indices and algorithm

* Ratio:-

Ratio is the comparison of the two or more quantities

$$a:b$$

a and b are called terms of ratio

A is called first term or Antecedent

B is called second term or consequent

* Rules of ratio:-

→ write ratio in lowest terms.

→ Divide or multiply two sides with same number

→ Same kind of ratio

→ order of the ratio will be same.

→ To compare ratio, convert them into fractions

* Note:- If second term of both ratio are equal then they are called equivalent fraction.

Factor multiplying ratio = $a:b$

$$\text{Increase} = a:b \Rightarrow a > b$$

$$\text{Decrease} = a:b \Rightarrow b > a$$

Continuous ratio :- ratio of more than 2 qty.

Inverse ratio :- ratio is the inverse of the other if their product is 1

If $a:b$ in $a > b$ so called greater inequality
If $a:b$ in $a < b$ so called lesser inequality

* Compound ratio

Multiply first term / multiply second terms

* Duplicate ratio

For a, b , Duplicate ratio will be $a^2:b^2$

* Triplicate ratio = $a:b = a^3:b^3$

* Sub-Duplicate ratio = $a:b = a^{1/2}:b^{1/2}$ (root) = $\sqrt{a}:\sqrt{b}$

* Sub-Triplicate ratio = $a:b = a^{1/3}:b^{1/3}$ (cube)

* If the ratio of 2 similar quantities can be expressed as a ratio of 2 integers the quantities are said to be commensurable.

* In $a:b$, if a or b are not integers said to be incommensurable.

* Continued ratio :-

formule $a : b : c$ where $a < c < b$

Proportion

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* An equality of two ratios is called a proportion.

$$\text{Ex} = a:b :: c:d$$

→ a, b, c, d called Terms of Proportion

→ a is called first Proportion

→ first and last terms called extreme

→ second and third terms called means

⇒ Product of extreme = Product of mean

* Continuous Proportion

$$L \quad a:b :: b:c$$

$$b^2 = a \times c$$

* Properties of Proportion

1. If $a:b = c:d$ then $ad = bc$ (Cross x)

2. If $a:b = c:d$ then $\frac{b}{a} = \frac{d}{c}$ (Invertendo)

3. If $a:b = c:d$ then $\frac{a}{c} = \frac{b}{d}$ (Alternendo)
change in mean

(I.M.P.) 4. If $a:b = c:d$ then $\frac{a+b}{b} = \frac{c+d}{d}$ (Componendo)

(I.M.P.) 5. If $a:b = c:d$ then $\frac{a-b}{b} = \frac{c-d}{d}$ (Dividendo)

(I.M.P.) 6. If $a:b = c:d$ then $a+b : a-b = c+d : c-d$
(Componendo + Dividendo)

7. If $a:b = c:d = e:f$ then $(a+c+e) : (b+d+f)$
(Addendo)

8. If $a:b = c:d = e:f$ then $(a-b-e) : (b-d-f)$
(Subtrahendo)

$\frac{3+4}{3}$
 $\frac{2}{3}$

$\frac{2}{3}$
 $\frac{2-6}{3}$

Indices (Power)

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⇒ If you have n has negative sign

$$a^{-n} = \frac{1}{a^n}$$

$$\frac{1}{a^{-n}} = a^n$$

* Law : 1 $a^m \times a^n = a^{m+n}$

* Law : 2

when m and n are int integers
and $m > n$

Ex. $\frac{2^5}{2^3} = 2^{5-3} = 2^2 = 4$