Algebraic Equations

$\rightarrow (a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2ac + 2bc$

$\rightarrow (a - b - c)^2 = a^2 + b^2 + c^2 - 2ab - 2ac + 2bc$

$\rightarrow (a + b)^3 = a^3 + 3ab^2 + 3a^2b + b^3$

$\rightarrow (a - b)^3 = a^3 + 3ab^2 - 3a^2b - b^3$

$\rightarrow (a + b)(a - b) = a^2 - b^2$

$\rightarrow (a^m)(a^n) = a^{m+n}$

$\rightarrow (a^m)^n = a^{mn}$

$\rightarrow (ab)^m = a^m b^m$

$\rightarrow x^0 = 1$

$\rightarrow$ a & b $= \dfrac{(a*b)}{(a+b)}$

$\rightarrow \sqrt{k(k + 1) + \sqrt{k(k + 1) + \ldots + \infty}} = + (k + 1)$

$\rightarrow \sqrt{k(k + 1) - \sqrt{k(k + 1) - \ldots - \infty}} = - k$

$\rightarrow \sqrt[n]{x} = x^{\frac{1}{n}}$

$\rightarrow \log (a\, b) = \log a + \log b$

$\rightarrow \log \dfrac{a}{b} = \log a - \log b$

$\rightarrow \log_a a = 1$

$\rightarrow \log_a 1 = 0$

$$\rightarrow \log a^b = b \log a$$

$$\rightarrow \log \frac{a}{b} = \frac{1}{\log \frac{b}{a}}$$

Percentages:

1	
1	100
2	50
3	33.33
4	25
5	20
6	16.66
7	14.28
8	12.5
9	11.11
10	10
11	9.09
12	8.33

Read as:

$$\rightarrow \frac{1}{9} = 11.11\%$$

Increase	decrease
9.09	8.33
10	9.09
11.11	10
12.5	11.11
14.28	12.5
16.66	14.28
20	16.66
25	20
33.33	25
50	33.33
60	37.5
66.66	40
75	42.85
100	50

Read as:

$\rightarrow$ If a increases by 10% ,
$\rightarrow$ (1.1)a
$\rightarrow$ Now, 1.1a must decrease by 9.09% to become a.

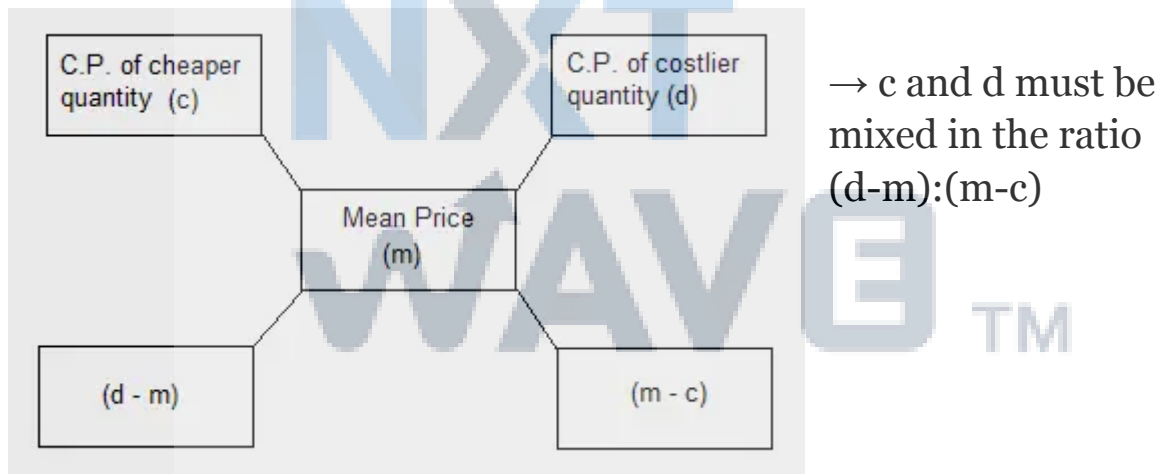# Simple Interest and Compound Interest:

$\rightarrow Simple\ Interest = \dfrac{Principal * Time * Rate\ of\ Interest}{100}$

$\rightarrow Amount = P(1 + \dfrac{r}{100})^{n}$

Therefore, $Compound\ interest = Amount - Principal$

Alligation method:

$\rightarrow$ c and d must be mixed in the ratio (d-m):(m-c)

Ratio and proportion:

$\rightarrow$ if $\dfrac{a}{b} = \dfrac{b}{c}$ then, $\dfrac{a+b}{b} = \dfrac{c+d}{d}$

$\rightarrow$ if $\dfrac{a}{b} = \dfrac{c}{d}$ then, $\dfrac{a-b}{b} = \dfrac{c-d}{d}$

$\rightarrow$ if $\dfrac{a}{b} = \dfrac{c}{d}$ then, $\dfrac{a+b}{a-b} = \dfrac{c+d}{c-d}$

Work and time:

$\rightarrow M_1$ people with efficiency D_1 can do W_1 work in T_1 time.

$\dfrac{M_1 D_1 T_1}{W_1} = \dfrac{M_2 D_2 T_2}{W_2}$

$\rightarrow Time\ \alpha\ \dfrac{1}{Work}$

$\rightarrow Efficiency \propto Work$

Time, Speed and Distance:

Converting kmph to mps $\rightarrow$ multiply with $\frac{5}{18}$

Converting mps to kmph $\rightarrow$ multiply with $\frac{18}{5}$

2D geometry shapes:

Shape Name	Area	Perimeter	Terms
Square	a^2	4×a	a=side of square
Rectangle	l×b	2(l+b)	l=length b=breadth
Circle	πr^2	2πr	r=radius
Equilateral triangle	$(\sqrt{3}/4) \times a^2$	3×a	a=side of triangle
Right angled triangle	½ × b × h	b + hypotenuse + h	b=base h=height
Isosceles triangle	½ × b × h	2a + b	a=side of triangle b=base h=height
Rhombus	½ × d1 × d2	4×s	s=side of rhombus d1,d2 are diagonals
Parallelogram	b × h	2(l+b)	l=length b=breadth h=height

<h1 style="text-align:center">3D geometry shapes:</h1>

Shape Name	Volume	Surface Area	Terms
Cube	a^3	$6 \times a^2$	a=side of cube
Cuboid	l×b×h	2(lb+bh+hl)	l=length b=breadth h=height
Sphere	$(4/3)\pi r^3$	$4\pi r^2$	r=radius
Hemisphere	$(2/3)\pi r^3$	$3\pi r^2$	r=radius
Cylinder	$(\pi r^2) \times h$	$2\pi rh + 2\pi r^2$	r=radius h=height
Cone	$(\tfrac{1}{3})(\pi r^2) \times h$	$\pi r(r+l)$	r=radius h=height l=slant height

Statistics

- It is sum of values to the number of values. Mean = ($\frac{Sum\ of\ values}{No.of.values}$)

- Mean of linear data = ($\frac{a1+a2+a3+.....+an}{n}$)

- Harmonic Mean of two numbers a,b [H.M = ($\frac{2ab}{a+b}$)]

- To calculate the harmonic mean of a, b, and c, you would divide the number of terms by the reciprocal of each number, as follows: [H.M = ($\frac{3}{\frac{1}{a}+\frac{1}{b}+\frac{1}{c}}$)]

- Geometric Mean of the series $a_1, a_2, a_3 \ldots a_n$ is as follows

- $[\text{G.M} = \sqrt[n]{a1 * a2 * a3 * \ldots\ an}]$
- Relation b/w A.M ,G.M & H.M => G.M $= \sqrt{A.M\ *\ H.M}$
- Relation between Mean,Median and Mode:
  Mean – Mode = 3 (Mean – Median)
- Variance $= \sqrt{STANDARD\ DEVIATION}$

  Step 1: Add up the numbers in your given data set.

  Step 2: Square your answer:

  Step 3: Take your set of original numbers from Step 1, and square them individually this time:

  Step 4: Subtract the amount in Step 2 from the amount in Step 3.

  Step 5: Subtract 1 from the number of items in your data set.

  Step 6: Divide the number in Step 4 by the number in Step 5. This gives you the variance:

  Step 7: Take the square root of your answer from Step 6. This gives you the standard deviation.