Rules of Sets : Commutative law : AUB = BUA A∩B = B∩A
Associative law : AU(BUC) = (AUB)UC
A∩(B∩C) = (A∩B)∩C
Distributive law : AU(B∩C) = (AUB) ∩ (AUC)
A∩ (BUC) = (A∩B)U(A∩C)
DeMargones law : $(AUB)^1 = A^1 \cap B^1$ $(A\cap B)^1 = A^1 \cup B^1$

Relationship between number of elements of the sets :
n(A) + n(B) = n(AUB) +n(A∩B)
n(A) = n(AUB) +n(A∩B) - n(B) n(B) = n(AUB) +n(A∩B) - n(A)
n(AUB) = n(A) + n(B) - n(A∩B) n(A∩B) = n(A) + n(B) - n(AUB)

Series & Sequence Formulae r!

	ARTHMETIC SERIES	GEOMETRIC SERIES	HARMONIC SERIES
STANDARD FORM	a,a+d,a+2d,,...	a,ar,ar²,ar³,...	$\frac{1}{a}, \frac{1}{a+d}, \frac{1}{a+2d}$,……..
GENERAL FORM	2,4,6,8,…… 1.4.7.10,……..	2,4,8,……. 1,3,9,27,….	$\frac{1}{2}, \frac{1}{3}, \frac{1}{4}$,…… $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}$,……
n th TERM	T_n= a+ (n-1) d	$T_n = a\, r^{n-1}$	$T_n = \frac{1}{a+(n-1)d}$
MEAN	$A = \frac{a+b}{2}$	$G = \sqrt{ab}$	$H = \frac{2ab}{a+b}$
SUM OF n TERMS	$S_n = \frac{n[2a+(n-1)]d}{2}$	1) $S_n = \frac{a(r^n-1)}{r-1}$ r>1 2) $S_n = \frac{a(1-r^n)}{1-r}$ r<1 3) $S_\infty = \frac{a}{1-r}$ sum of ∞ terms	

Meaning of ^nP_r : Types of Arrangements of r things out of n things.
n! = 1x2x3x4x5x…….x n   5! = 5x4x3x2x1
$^nP_r = = \frac{n!}{(n-r)!}$ $^nP_n = n!$ $^nP_1 = n$ $^nP_0 = 1$

Meaning of ^nC_r : Types of selections of r things out of n things.
$^nC_r = = \frac{n!}{(n-r)!\,r!}$ $^nC_n = 1$ $^nC_1 = n$ $^nC_0 = 1$
$^nC_r = {}^nC_{n-r}$ $^nC_r = \frac{^nP_r}{r!}$

Probability : The chance of happening of an event when expressed quantitatively is called probability.
Random experiment: A random experiment is one in which the exact outcome cannot be predicted. However, one can list all the possible outcomes of the random experiment. For eg : *Tossing a coin * Throwing a die*Drawing a card from a well shuffled pack of cards
Sample point & Sample space : The set of all possible outcomes of a randomexperiment is called a sample space. It is generally denoted by S. (i) S = {H, T} (ii) S = {1, 2, 3, 4, 5, 6}
sample space : Each element or memberof a sample space is calleda sample point. (i) H and T are sample points.
(ii) 1, 2, 3, 4, 5 and 6 are sample points.
Event : every subset of the sample space is called an event.
Probability of an event: Probability of an event is a ratio of the number of elementary events favourable to the event E to the total number of elementary events in the sample space.
Probability of an event = $\frac{\text{No of events favourable to the event}}{\text{Total no of elementary events in sample space}}$
$P(A) = \frac{n(A)}{n(S)}$ Note : $0 \le P(A) \le 1$ Probability of an event can be any fraction from 0 to 1, including 0 and 1.
sure or certain event : An event of a random experiment is called a sure or certain event if any one of its elements will surely occur in any trial of the experiment. Probability of sure event is 1.
impossible event : An event which will not occur on any account in any trial of the experiment is called an impossible event. Probability of an impossible event is 0.
Complementary events: Suppose we throw a die once. Consider the two events,
(i) getting an even number E= {2, 4, 6}
(i i) getting an odd number E = {1, 3, 5}
Compare the two events, "getting an odd number "and "not geting an even number"we observe that event E_1 occurs only when event E_2 doesnot occur and vice versa.These two events E1 and E_2 are called complementary events.

Note : $P(E_1) + P(E_2) = 1$
Mutually exclusive events : Two or more events are said to be mutually exclusive if the occurance of one event prevents or excludes the occurance of other event. if E_1 and E_2 are two mutually exclusive events, then $E_1 \cap E_2 = \phi$ if E_1 and E_2 are two mutually exclusive events, then $P(E_1 \cup E_2) = P(E_1) + P(E_2)$. This result is known as the addition rule of probability.
Relationship between expressions and their H.C.F & L.C.M :
Product of any two expressions is equal to the product of their L.C.M & H.C.F. If H and L are H.C.F & L.C.M of two expressions A and B , then we have the following relations:
1) A X B = H X L
2) $A = \frac{H X L}{B}$ 3) $B = \frac{H X L}{A}$ 4) $H = \frac{A X B}{L}$ 4) $L = \frac{A X B}{H}$
rationalisation of surds : Conversion of surd from irrational form into rational form by multipling with suitable surd is called rationalisation of surd
Note : 1) For mononial surds they itself are Rationalising factor .
2) For mononial surds coefficients cannot be taken consideration. 3) For Binonial surds of the form (a+b) Rationalising factor is in the form (a-b) .

sl no	Surd	Rationalising factor	sl no	Surd	Rationalising factor
1	$\sqrt{5}$	$\sqrt{5}$	7	$\sqrt{5} - \sqrt{3}$	$\sqrt{5} + \sqrt{3}$
2	$3\sqrt{a}$	$\sqrt{a}$	8	$6\sqrt{x} - 4\sqrt{y}$	$6\sqrt{x} + 4\sqrt{y}$
3	$\sqrt{x+y}$	$\sqrt{x+y}$	9	$5\sqrt{a} + 3\sqrt{b}$	$5\sqrt{a} - 3\sqrt{b}$
4	$-5\sqrt{x}$	$-\sqrt{x}$	10	$-10\sqrt{a} + \sqrt{b}$	$-10\sqrt{a} - \sqrt{b}$
5	$4\sqrt{p+q}$	$\sqrt{p+q}$	11	$-\sqrt{7} + 3\sqrt{2}$	$-\sqrt{7} - 3\sqrt{2}$
6	$3 + \sqrt{2}$	$3 - \sqrt{2}$	12	$\sqrt[3]{a}$	$\sqrt[3]{a^2}$

polynomials : an algebraic expression of the form, $p(x) = a_0 + a_1x^1 + a_2x^2 + a_3x^3 + \text{---------------} + a_nx^n$ in which the variables involved have only non-negative integral exponents is called a polynomial in x. **Degree of polynomial**: The highest exponent of the variable in a polynomial is called its degree.
Division algorithm for polynomials:
If a and b are any two integers, then a = bq + r, where $0 \le r \le b$.
If p(x) and g(x) are any two polynomials with g(x) ≠ 0, then we can always find polynomials q(x) and r(x) such that p(x) = g(x) × q(x) + r(x), where r(x) = 0 or degree of r(x) < degree of g(x).
Dividend = (Divisor × Quotient) + Remainder
Quadratic Equations : Standard form of Quadratic equation is $ax^2 + bx + c = 0$. (where a ≠ 0)
Standard form of pure Quadratic equation is $ax^2 + c = 0$.
If b=0 then Standard form of Quadratic equation becomes $ax^2 + c = 0$.(Called pure Quadratic equation)
If a=0 then Standard form of Quadratic equation becomes bx + c = 0.(Called linear equation)
If b ≠ 0 then Standard form of Quadratic equation becomes $ax^2 + bx + c = 0$.(Called Adfected Quadratic equation)
The graph of $y= x^2$, $y= 2x^2$,….. is called parabola

Nature of the roots of Quadratic equation is determined by the Descriminant ▲= b^2 - 4ac.		
	Value of Descriminant	Nature of the roots
1	$b^2 - 4ac = 0$	Roots are real & equal.
2	$b^2 - 4ac > 0$	Roots are real & distinct.
3	$b^2 - 4ac < 0$	Roots are imaginary

Sum of the roots : m+n = - b/a
Product of the roots : mn = c/a If m & n are roots, the Quadratic equation is in the form $x^2 - (m+n)x + mn = 0$
Circles : Minor segments substends obtuse angles.
Major segments substends acute angles.
semi segments substends right angles.
Nature of DCT & TCTs:

	DCT	TCT
Distinct circles	2	2
externally touching circles	2	1
internally touching circles	1	None
intersecting circles	2	None
concentric circles	None	None
length of tangent	$\sqrt{d^2 - (R-r)^2}$	$\sqrt{d^2 - (R+r)^2}$

Theorem1: If two triangles are equiangular, then their corresponding sides are proportional.

Theorem 2: The areas of similar triangles are proportional to the squares of the corresponding sides.

Theorem 3 (Pythagoras theorem): In a right angled triangle, the Square on the hypotenuse is equal to the sum of the squares on the other two sides.

Theorem 4: If two circles touch each other, the point of contact and the centres of the circles are collinear.

Theorem 5: The tangents drawn to a circle from an external point are, (i) equal (ii) equally inclined to the line joining the external point and the centre (iii) subtend equal angles at the centre.

Trignometric ratios :

$\sin\Theta = \frac{Opp}{Hyp}$ $\quad$ $\operatorname{Cosec}\Theta = \frac{Hyp}{opp}$

$\cos\Theta = \frac{Adj}{Hyp}$ $\quad$ $\sec\Theta = \frac{Hyp}{Adj}$

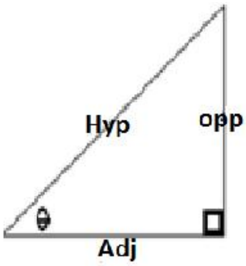
$\tan\Theta = \frac{opp}{adj}$ $\quad$ $\cot\Theta = \frac{adj}{opp}$

$\tan\theta = \frac{\sin\Theta}{\cos\Theta}$ $\quad$ $\cot\theta = \frac{\cos\Theta}{\sin\Theta}$

$\sin\theta = \frac{1}{cosec\theta}$ $\quad$ $\operatorname{Cosec}\theta = \frac{1}{\sin\theta}$

$\cos\theta = \frac{1}{\sec\theta}$ $\quad$ $\sec\theta = \frac{1}{\cos\theta}$

$\tan\theta = \frac{1}{\cot\theta}$ $\quad$ $\cot\theta = \frac{1}{\tan\theta}$



Trignometric ratios for standard angles:

	0^0	30^0	45^0	60^0	90^0
Sinθ	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
cosθ	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
tanθ	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	N.D
cosecθ	N.D	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
secθ	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N.D
cotθ	N.D	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

Trignometric simultaneous equatios:

1) $\sin^2\theta + \cos^2\theta = 1$
2) $1 + \tan^2\theta = \sec^2\theta$
3) $1 + \cot^2\theta = \operatorname{cosec}^2\theta$

Trignometric complementary angle ratios:

$\sin(90^0 - A) = \cos A$ $\quad$ $\sin(90^0 - A) = \cos A$

$\operatorname{cosec}(90^0 - A) = \sec A$ $\quad$ $\sec(90^0 - A) = \operatorname{cosec} A$

$\tan(90^0 - A) = \cot A$ $\quad$ $\cot(90^0 - A) = \tan A$

Coordinate Geometry : Horizontal line: The line parallel to earth surface is called Horizontal line **vertical line** : The line perpendicular to horizontal line is called vertical line. **slope** : The ratio of the vertical distance to the horizontal distance is called slope. Slope = $\frac{\text{Vertical distance}}{\text{Horizontal distance}}$

The slope of a line is the tangent of the angle of its inclination. It is generally denoted by (m) = $\tan\Theta = \frac{y_2 - y_1}{x_2 - x_1}$

*When vertical distance is less than the horizontal distance, slope is less than 1. * When vertical distance is equal to the horizontal distance, slope is equal to 1. * When vertical distance is more than the horizontal distance, slope is more than 1.

Slope of a straight line passing through two given points:

Slope of a straight line passing through two points A (x1, yI) and B(x2, y2) is given by $m = \frac{y_2 - y_1}{x_2 - x_1}$

Parallel lines have equal slopes. ($m_1 = m_2$)

If two lines are mutually perpendicular then, the product of their slopes is –1. ($m_1 \times m_2 = -1$)

The equation of a line with slope 'm' and whose y - intercept is 'c' is given by $y = mx + c$

Distance formula: Distance between two points : Distance between two points (x_1,y_1) & (x_2,y_2) is given by $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Distance of a point in a plane from the origin: Distance of a point (x,y) in a plane from the origin(0,0) is given by $d = \sqrt{x^2 + y^2}$

Section Formula: AB be a line joining the points $A(x_1,y_1)$ and $B(x_2,y_2)$ and point P divides the linesegment AB inthe ratio m : n then the coordinates of point P is given by $(x, y) = \left(\frac{mx_2 + mx_1}{m+n}, \frac{my_2 + my_1}{m+n}\right)$

Mid point fomula :If P is the midpoint of AB[Here $A(x_1,y_1)$ and $B(x_2,y_2)$] then coordinates of $P(x, y) = \left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2}\right)$

This is also called the mid point fomula.

	Un-grouped data	grouped data
Average,	$\bar{x} = \frac{\sum x}{N}$	$\bar{x} = \frac{\sum fx}{N}$
Direct method	$\sqrt{\frac{\sum x^2}{N} - \left(\frac{\sum x}{N}\right)^2}$	$\sqrt{\frac{\sum fx^2}{N} - \left(\frac{\sum fx}{N}\right)^2}$
actual mean method.	$\sqrt{\frac{\sum d^2}{N}}$	$\sqrt{\frac{\sum fd^2}{N}}$
assumed mean method	$\sqrt{\frac{\sum d^2}{N} - \left(\frac{\sum d}{N}\right)^2}$	$\sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2}$
Step deviation method	$\sqrt{\frac{\sum d^2}{N} - \left(\frac{\sum d}{N}\right)^2} \times C$	$\sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2} \times C$
variance	C.v = $\frac{\sigma \times 100}{\bar{x}}$	

Mensuration

	LSA	TSA	Volume
Cylinder	A= 2πrh	A= 2πr(r+h)	V= $\pi r^2 h$
Cone	A= Πrl	A= πr (r+l)	V= $\frac{\pi r^2 h}{3}$
Sphere	A= $4\pi r^2$	A= $4\pi r^2$	V= $\frac{4\pi r^3}{3}$
Hemisphere	A= $2\pi r^2$	A= $3\pi r^2$	V= $\frac{2\pi r^2}{3}$
Frustrum	$\pi(r_1 + r_2)l$	$\pi[(r_1+r_2)l + r_1^2 + r_2^2]$	$\frac{\pi h(r_1^2 + r_2^2 + r_1 r_2)}{3}$

Identities : $(a+b)^2 = a^2+b^2+2ab$ $\quad$ $(a-b)^2 = a^2+b^2-2ab$

$a^2-b^2 = (a+b)(a-b)$ $\quad$ $(a+b+c)^2 = a^2+b^2+c^2+2ab+2bc+2ca$

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

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

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

$(x+a)(x+b)(x+c) = x^3+x^2(a+b+c)+x(ab+bc+ca)+abc$

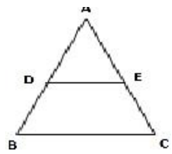
$a^3+b^3+c^3 - 3abc = (a+b+c)(a^2+b^2+c^2- ab -bc- ca)$

Pythagorean triplets : Set of three natural numbers, which makes a right angled triangle are called are called Pythagorean triplets.

Ex : 1) 3, 4, 5 $\quad$ 2) 5,12, 13 $\quad$ 3) 6,8,10 $\quad$ 4) 8, 15,17

Basic Proportionality Theorem (B.P.T) or Thales Theorem: It can be stated as,

"If a straight line is drawn parallel to one side of a triangle, then it divides the other two sides proportionally"



In Δ ABC if DE II BC then $\frac{AD}{DB} = \frac{AE}{DC}$

Converse of Thales Theorem: "If a straight line divides two sides of a triangle proportionally, then the straight line is parallel to the third side".

In Δ ABC if $\frac{AD}{DB} = \frac{AE}{DC}$ then DE II BC

Corollary of Thales Theorem: If a straight line is drawn parallel to a side of a triangle then the sides of intercepted triangle will be proportional to the sides of the given triangle.

In Δ ABC if DE II BC then $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

Converse of pythagoras theorem :

"If the square on the longest side of a triangle is equal to the sum of the squares on the other two sides, then those two sides contain a right angle."

Note:

1 Kunta = 33feetX 33feet

1 Acre = 40 Kuntas

1 Hectare = 100m X 100m = 10000m² = 2.5 Acres

******************KVS.GGPUC(B).Hassan************