1. Real Numbers:-

No.	Formulas
1.	$a^m \times a^n = a^{m+n}$
2.	$a^m \div a^n = a^{m-n}$
3.	$a^1 = a$
4.	$a^0 = 1$
5.	$(a^m)^n = a^{mn}$
6.	$a^{-m} = \frac{1}{a^m}$
7.	**Euclid's division lemma:-** $a = bq + r, 0 \leq r \leq b$

2. Polynomials Formula:-

No.	Formulas
1.	$(x+y)^2 = x^2 + 2xy + y^2$
2.	$(x-y)^2 = x^2 - 2xy + y^2$
3.	$(x+y)(x-y) = x^2 - y^2$
4.	$(x+y)(x+z) = x^2 + x(y+z) + yz$
5.	$(x+y)(x-z) = x^2 + x(y-z) - yz$
6.	$x^2 + y^2 = (x+y)^2 - 2xy$
7.	$(x+y)^3 = x^3 + y^3 + 3xy(x+y)$
8.	$(x-y)^3 = x^3 - y^3 - 3xy(x-y)$
9.	$(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2xz$
10.	$(x-y-z)^2 = x^2 + y^2 + z^2 - 2xy + 2yz - 2xz$
11.	$x^3 + y^3 = (x+y)(x^2 - xy + y^2)$
12.	$x^3 - y^3 = (x-y)(x^2 + xy + y^2)$
13.	$x^4 - y^4 = (x^2 + y^2)(x+y)(x-y)$
14.	$x^3 + y^3 + z^3 - 3xyz = (x+y+z)(x^2 + y^2 + z^2 - xy - yz - xz)$

3. Linear Equation in two variables:-

No.	Pair of lines	$\frac{a_1}{a_2}$	$\frac{b_1}{b_2}$	$\frac{c_1}{c_2}$	Compare the ratios	Graphical representation	Algebraic Interpretation
1.	x-2y=0 3x-4y-20=0	$\frac{1}{3}$	$\frac{-2}{4}$	$\frac{0}{-20}$	$\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$	Intersecting lines	Exactly one solution (unique)
2.	2x+3y-9=0 4x+6y-18=0	$\frac{2}{4}$	$\frac{3}{6}$	$\frac{-9}{-18}$	$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	coincident lines	Infinitely Many solutions
3.	x+2y-4=0 2x+4y-12=0	$\frac{1}{2}$	$\frac{2}{4}$	$\frac{-4}{-12}$	$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$	Parallel lines	No solution

4. Quadratic Equation:

No.	Name of Formula	Formula
1.	**Quadratic Equation**	$ax^2 + bx + c = 0; where\ a \neq 0$
2.	**Quadratic Polynomial**	$P(x) = ax^2 + bx + c = 0; where\ a \neq 0$
3.	**Zeros of the polynomial**	The Roots of the Quadratic Equation are zeros
4.	**Quadratic Formula**	$D = b^2 - 4ac; where\ D\ is\ Discriminant$
5.	**Real and Distinct roots**	$b^2 - 4ac = 0; where\ x = \frac{-b \pm \sqrt{D}}{2a}$
6.	**Two distinct roots**	$b^2 - 4ac > 0; where\ x = \frac{-b \pm \sqrt{D}}{2a}$
7.	**No real roots**	$b^2 - 4ac < 0$

5. Arithmetic Progression:-

No.	Name of Formula	Formula
1.	**n^{th}term of an A.P.**	$a_n = a + (n-1)d$
2.	**Sum of n^{th} term of an A.P**	$S_n = \frac{n}{2}[2a + (n-1)d]$ **OR** $S_n = \frac{n}{2}(a + a_n)$
3.	**If last term of the finite A.P. is given**	$S_n = \frac{n}{2}(a + l);$ $where\ l = Last\ term$

4.	**The sum of first *n* positive integers is given by**	$S_n = \frac{n(n+1)}{2}$

6. Triangles:-

No.	Name of Formula	Formula
1.	**Six elements of Triangles**	Three sides & Three angles
2.	**Angle sum property**	Sum of three angles $\angle A + \angle B + \angle C = 180°$
3.	**Area of Triangle**	$\frac{1}{2} \times base \times height$
4.	**Pythagoras Theorem**	$Hypotenuse^2 = Opposite^2 + Adjacent^2$
5.	**Equilateral Triangle**	All three sides and angles are equal $\frac{\sqrt{3}}{4} \times (Side)^2$
6.	**Isosceles Triangle**	Two sides and angles are equal
7.	**Scalene Triangle**	All sides and angles are Different Heron's Formula= $\sqrt{s(s-a)(s-b)(s-c)}$ $Semiperimeter(s) = \frac{a+b+c}{2}$
8.	**Congruent Triangles**	Their Corresponding parts are equal
9.	**SSS Congruence rule**	Their Corresponding sides are equal
10.	**SAS Congruence rule**	Two Corresponding sides and an angle are equal
11.	**ASA Congruence rule**	Two Corresponding angles and a side are equal

7. Co- ordinate Geometry:-

No.	Name of Formula	Formula
1.	**Distance Formula**	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
2.	**Midpoint Formula**	$(x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
3.	**Section Formula**	$(x, y) = \left(\frac{m_2 x_1 + m_1 x_2}{m_1 + m_2}, \frac{m_2 y_1 + m_1 y_2}{m_1 + m_2}\right)$

4.	**Area of triangle**	$ar\ \Delta ABC = \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

8. Introduction to Trigonometry:-

No.	Name of Formula	Formula:-
1.	**Trigonometric Identities**	a. $Sin^2\theta + Cos^2\theta = 1$ b. $tan^2\theta + 1 = sec^2\theta$ c. $Cot^2\theta + 1 = Cosec^2\theta$
2.	**Relation between Trigonometric identities**	a. $Sin\theta = \frac{Opposite}{Hypotenuse}$ b. $Cos\theta = \frac{Adjacent}{Hypotenuse}$ c. $Tan\theta = \frac{Sin\theta}{Cos\theta} = \frac{Opposite}{Adjacent}$ d. $Cot\theta = \frac{Cos\theta}{Sin\theta} = \frac{Adjacent}{Oppoasite}$ e. $Cosec\theta = \frac{1}{Sin\theta} = \frac{Hypotenuse}{Opposite}$ f. $Sec\theta = \frac{1}{Cos\theta} = \frac{Hypotenuse}{Adjacent}$
3.	**Trigonometric Ratios of Complementary angles**	a. $Sin(90° - A) = CosA$ b. $Cos(90° - A) = SinA$ c. $Tan(90° - A) = CotA$ d. $Cot(90° - A) = TanA$ e. $Sec(90° - A) = CosecA$ f. $Cosec(90° - A) = SecA$

Values of Trigonometric Ratios 0° to 90°

$\angle A$	0°	30°	45°	60°	90°
SinA	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
CosA	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
TanA	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
CotA	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
CosecA	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
SecA	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not defined

9. Circles:-

No.	Name of Formula	Formulas
1.	Area of Circle	πr^2
2.	Circumference of circle	$2\pi r$
3.	Diameter	$2r$
4.	Radius	$\frac{d}{2}$

10. Area related to Circle:-

No.	Name of Formula	Formulas
1.	Area of Minor Sector	$\frac{\pi r^2 \theta}{360}$
2.	Area of Major Sector	Area of Circle – Area of Minor Sector $\pi r^2 - \frac{\pi r^2 \theta}{360}$
3.	Area of Minor Segment	Area of Minor Sector – Area of Corresponding Triangle $\frac{\pi r^2 \theta}{360} - \frac{1}{2} \times b \times h$
4.	Area of Major Segment	Area of Circle – Area of Minor Segment
5.	Length of Minor Arc	$\frac{\pi r \theta}{180}$
6.	Length of Major Arc	Circumference of Circle – Length of Minor Arc $\pi r^2 - \frac{\pi r \theta}{180}$

11. Surface Area and Volume:-

No.	Name of Formula	Formulas
1.	Perimeter of Square	$4l$
2.	Perimeter of Rectangle	$2(l + b)$
3.	Area of Square	l^2
4.	Area of Rectangle	$l \times b$
5.	Cuboid	1. Volume $= l \times b \times h$ 2. CSA $= 2h(l + b)$ 3. TSA $= 2(lb + bh + lh)$
6.	Cylinder	1. Volume $= \pi r^2 h$ 2. CSA $= 2\pi rh$ 3. TSA $= 2\pi r(r + h)$
7.	Cube	1. Volume $= l^3$

		2. CSA $= 4l^2$ 3. TSA $= 6l^2$
8.	**Cone**	1. Volume $= \frac{1}{3}\pi r^2 h$ 2. TSA $= \pi r(l + r)$ 3. CSA $= \pi rl$ Where $l = \sqrt{r^2 + h^2}$
9.	**Sphere**	1. Volume $= \frac{4}{3}\pi r^3$ 2. TSA $= 4\pi r^2$
10.	**Hemisphere**	1. Volume $= \frac{2}{3}\pi r^3$ 2. CSA $= 2\pi r^2$ 3. TSA $= 3\pi r^2$
11.	**Frustum**	1. Volume $= \frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$ 2. CSA $= \pi l(r_1 + r_2)$ 3. TSA $= \pi l(r_1 + r_2) + \pi r_1^2 + \pi r_2^2$ Where $l = \sqrt{h^2 + (r_1 - r_2)^2}$

12. Statistics:-

No.	Name of Formulas	Formula
1.	**Mean**	Direct Mean($\bar{x}$):- $\frac{\sum fixi}{\sum fi}$
		Assumed mean($\bar{x}$):- $A + \frac{\sum fidi}{\sum fi}$ Where, $di = xi - A$
		Step – deviation($\bar{x}$):- $A + \frac{\sum fiui}{\sum fi} \times h$ Where, $ui = \frac{xi - A}{h}$
2.	**Class Length (h)**	$h = Upper\ limit - Lower\ limit$
3.	**Median (M)s**	$M = l + \frac{\frac{n}{2} - cf}{f} \times h$ Where, $cf =$ $Cumulative\ frequency\ of\ preceeding\ class$ $l = least\ value\ of\ median\ class$
4.	**Mode (Z)**	$Z = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$
5.	**Empirical formula**	$Z = 3M - 2\bar{x}$

13. Probability:-

No.	Formulas
1.	The probability of a certain event is 1

2.	The probability of impossible event is 0
3.	$\boldsymbol{P(E)} = \dfrac{Number\ of\ favourable\ outcomes}{Number\ of\ all\ possible\ outcomes}$
4.	The sum of all elementary events is $P(E) + P(\bar{E}) = 1$

All The Best