

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 $l = \text{Last term}$

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

No.	Name of Formula	Formula
1.	Six elements of Triangles	Three sides & Three angles
2.	Angle sum property	Sum of three angles $\angle A + \angle B + \angle C = 180^\circ$
3.	Area of Triangle	$\frac{1}{2} \times \text{base} \times \text{height}$
4.	Pythagoras Theorem	$\text{Hypotenuse}^2 = \text{Opposite}^2 + \text{Adjacent}^2$
5.	Equilateral Triangle	All three sides and angles are equal $\frac{\sqrt{3}}{4} \times (\text{Side})^2$
6.	Isosceles Triangle	Two sides and angles are equal
7.	Scalene Triangle	All sides and angles are Different Heron's Formula = $\sqrt{s(s-a)(s-b)(s-c)}$ $\text{Semiperimeter}(s) = \frac{a+b+c}{2}$
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	$ar \Delta ABC = \frac{1}{2} [x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$
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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. $\cot^2 \theta + 1 = \operatorname{cosec}^2 \theta$
2.	Relation between Trigonometric identities	a. $\sin \theta = \frac{\text{Opposite}}{\text{Hypotenuse}}$ b. $\cos \theta = \frac{\text{Adjacent}}{\text{Hypotenuse}}$ c. $\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\text{Opposite}}{\text{Adjacent}}$ d. $\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{\text{Adjacent}}{\text{Opposite}}$ e. $\operatorname{cosec} \theta = \frac{1}{\sin \theta} = \frac{\text{Hypotenuse}}{\text{Opposite}}$ f. $\sec \theta = \frac{1}{\cos \theta} = \frac{\text{Hypotenuse}}{\text{Adjacent}}$
3.	Trigonometric Ratios of Complementary angles	a. $\sin(90^\circ - A) = \cos A$ b. $\cos(90^\circ - A) = \sin A$ c. $\tan(90^\circ - A) = \cot A$ d. $\cot(90^\circ - A) = \tan A$ e. $\sec(90^\circ - A) = \operatorname{cosec} A$ f. $\operatorname{cosec}(90^\circ - A) = \sec A$

Values of Trigonometric Ratios 0° to 90°					
$\angle A$	0°	30°	45°	60°	90°
$\sin A$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos A$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan A$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not defined
$\cot A$	Not defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0
$\operatorname{cosec} A$	Not defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\sec A$	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 $2\pi r - \frac{\pi r \theta}{180}$

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 = $2\pi r h$ 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. $CSA = \pi r l$ 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)	$h = \text{Upper limit} - \text{Lower limit}$
3.	Median (M)s	$M = l + \frac{\frac{n}{2} - cf}{f} \times h$ Where, $cf =$ <i>Cumulative frequency of preceeding class</i> $l = \text{least value of median class}$
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.	$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Number of all possible outcomes}}$
4.	The sum of all elementary events is $P(E) + P(\bar{E}) = 1$



All The Best