IMPORTANT FORMULAES

CLASS – 10

1. Polynomials Formulas

$(x+y)^2 = x^2 + y^2 + 2xy$
$(x-y)^2 = x^2 + y^2 - 2xy$
$(x+y)(x-y) = x^2 - y^2$
$(x+y)(x+z) = x^2 + x(y+z) + yz$
$(x+y)(x-z) = x^2 + x(y-z) - yz$
$x^2 + y^2 = (x+y)^2 - 2xy$
$(x+y)^3 = x^3 + y^3 + 3xy(x+y)$
$(x-y)^3 = x^3 - y^3 - 3xy(x-y)$
$(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$
$(x-y-z)^2 = x^2 + y^2 + z^2 - 2xy + 2yz - 2zx$
$x^3 + y^3 = (x+y)(x^2 - xy + y^2)$
$x^3 - y^3 = (x-y)(x^2 + xy + y^2)$
$x^4 - y^4 = (x^2)^2 - (y^2)^2$ $= (x^2 + y^2)(x^2 - y^2)$ $= (x^2 + y^2)(x+y)(x-y)$
$(x+y+z)^2 = x^2 + y^2 + z^2 + 2xy + 2yz + 2zx$
$(x+y-z)^2 = x^2 + y^2 + z^2 + 2xy - 2yz - 2zx$
$(x-y+z)^2 = x^2 + y^2 + z^2 - 2xy - 2yz + 2zx$
$(x-y-z)^2 = x^2 + y^2 + z^2 - 2xy + 2yz - 2zx$
$x^3 + y^3 + z^3 - 3xyz$ $= \begin{bmatrix} (x+y+z) \\ (x^2 + y^2 + z^2 - xy - yz - zx) \end{bmatrix}$

2. Arithmetic Progression Formulas

n^{th} Term of an Arithmetic Progression	$a_n = a + (n-1) \times d$
Sum of 1^{st} n Terms of an Arithmetic Progression	$S_n = \frac{n}{2}[2a + (n-1)\,d]$

3. Coordinate Geometry Formulas

Distance Formula	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
Section Formula	$\left(\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n}\right)$
Mid-point Formula	$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$
Area of Triangle	$\text{ar}(\Delta ABC) = \frac{1}{2} \times \begin{bmatrix} x_1(y_2 - y_3) + \\ x_2(y_3 - y_1) + \\ x_3(y_1 - y_2) \end{bmatrix}$

4. Trigonometry Formulas

Trigonometric Identities	$\sin^2 A + \cos^2 A = 1$
	$\tan^2 A + 1 = \sec^2 A$
	$\cot^2 A + 1 = \text{cosec}^2 A$
Relations between Trigonometric Identities	$\tan A = \frac{\sin A}{\cos A}$
	$\cot A = \frac{\cos A}{\sin A}$
	$\text{cosec}\, A = \frac{1}{\sin A}$
	$\sec A = \frac{1}{\cos A}$
Trigonometric Ratios of Complementary Angles	$\sin(90^\circ - A) = \cos A$
	$\cos(90^\circ - A) = \sin A$
	$\tan(90^\circ - A) = \cot A$
	$\cot(90^\circ - A) = \tan A$
	$\sec(90^\circ - A) = \text{cosec}\, A$
	$\text{cosec}\,(90^\circ - A) = \sec A$

Values of Trigonometric Ratios of 0° and 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
$\sec A$	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined
$\text{cosec}\, A$	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
$\cot A$	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

5. Circles Formulas

Area of circle	πr^2
Diameter of circle	$2r$
Circumference of circle	$2\pi r$
Sector angle of circle	$\theta = \dfrac{(180 \times l)}{(\pi r)}$
Area of the sector	$= \left(\dfrac{\theta}{2}\right) \times r^2$
Area of the circular ring	$= \pi \times \left(R^2 - r^2\right)$
$\theta =$ Angle between two radii $R =$ Radius of outer circle $r =$ Radius of inner circle	

6. Statistics Formulas

Mean	$a_m = \dfrac{a_1 + a_2 + a_3 + a_4}{4} = \dfrac{\sum_0^n a}{n}$
Median	$\text{Median} = l + \left(\dfrac{\frac{n}{2} - cf}{f}\right) h$
Mode	$M_o = l + \left(\dfrac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) h$

7. Quadratic Equations Formulas

Quadratic Equations	$ax^2 + bx + c = 0$ where $a \neq 0$
Quadratic Polynomial	$P(x) = ax^2 + bx + c$ where $a \neq 0$
Zeroes of the Polynomial $P(x)$	The Roots of the Quadratic Equations are zeroes
One Real Root	$b^2 - 4ac = 0$
Two Distinct Real Roots	$b^2 - 4ac > 0$
No Real Roots	$b^2 - 4ac < 0$

8. Triangles Formulas

Six elements of triangle	Three sides and three angles
Angle sum property of triangle	Sum of three angles: $\angle \mathrm{A} + \angle \mathrm{B} + \angle \mathrm{C} = 180^\circ$
Right angled triangle	Adjacent Side Opposite Side Hypotenuse
Pythagoras Theorem	$H^2 = AS^2 + OS^2$
$H = \text{Hypotenuse}$ $AS = \text{Adjacent Side}$ $OS = \text{Opposite Side}$	
Equilateral Triangles	All sides are equal
Isosceles Triangle	Two sides are equal

Congruent Triangles	Their corresponding parts are equal
SSS Congruence of two triangles	Three corresponding sides are equal
SAS Congruence of two triangles	Two corresponding sides and an angle are equal
ASA Congruence of two triangles	Two corresponding angles and a side are equal

Right Pyramid	
Volume of Right Pyramid	$\frac{1}{3} \times \left[\begin{matrix}\text{Area of} \\ \text{the Base}\end{matrix}\right] \times h$
Lateral Surface Area of Right Pyramid (LSA)	$\frac{1}{2} \times p \times L$
Total Surface Area of Right Pyramid (TSA)	$\text{LSA} + \left[\begin{matrix}\text{Area of} \\ \text{the Base}\end{matrix}\right]$
Right Circular Cone	
Volume of Right Circular Cone	$\frac{1}{3} \times (\pi r^2 h)$
Lateral Surface Area of Right Circular Cone (LSA)	$\pi r l$
Total Surface Area of Right Circular Cone (TSA)	$\pi r \times (r + L)$
Hemisphere	
Volume of Hemisphere	$\frac{2}{3} \times (\pi r^3)$
Lateral Surface Area of Hemisphere (LSA)	$2\pi r^2$
Total Surface Area of Hemisphere (TSA)	$3\pi r^2$
Prism	
Volume of Prism	$B \times h$

9. Surface Area and Volume Formulas

Cuboid	
Volume of Cuboid (LSA)	$l \times b \times h$
Lateral Surface Area of Cuboid (LSA)	$2h\left(l+b\right)$
Total Surface Area of Cuboid (TSA)	$2\left(lb+bh+hl\right)$
Cube	
Volume of Cube	x^3
Lateral Surface Area of Cube (LSA)	$4x^2$
Total Surface Area of Cube (TSA)	$6x^2$
Sphere	
Volume of Sphere	$\frac{4}{3} \times \pi r^3$
Lateral Surface Area of Sphere (LSA)	$4\pi r^2$
Total Surface Area of Sphere (TSA)	$4\pi r^2$
Right Circular Cylinder	
Volume of Right Circular Cylinder	$\pi r^2 h$
Lateral Surface Area of Right Circular Cylinder (LSA)	$2 \times (\pi r h)$
Total Surface Area of Right Circular Cylinder (TSA)	$2\pi r \times (r+h)$