LIST OF FORMULAE IN MATHS FOR CLASS X

CHAPTER-1 REAL NUMBERS (6 Marks)

1. Euclid's division lemma: Given positive integers a and b, there exists unique integers q and r satisfying a= bq + r, $0 \le r < b$.
2. Fundamental theorem of Arithmetic: Every composite number can be expressed as a product of primes.
3. In rational number $\frac{p}{q}$, q is always in form of 2^n5^m (for terminating decimal representation).
4. HCF(a,b) x LCM (a,b) = a x b.

CHAPTER-2 POLYNOMIALS (4 Marks)

5. Zeroes of a polynomial: k is zero of polynomial P(x) if P (k) = 0.
6. Sum of zeroes $\alpha+\beta = -\frac{b}{a}$, product of zeroes $\alpha \times \beta = \frac{c}{a}$ for polynomial $ax^2+ bx + c=k[x^2 - (\alpha +\beta)x + \alpha\beta]$
7. For cubic polynomial , $ax^3 + bx^2+cx + d$ $\alpha + \beta + \gamma = -\frac{b}{a}$, $\alpha\beta+\beta\gamma+\gamma\alpha = \frac{c}{a}$, $\alpha\beta\gamma = -\frac{d}{a}$

CHAPTER-3 PAIR OF LINEAR EQUATIONS IN TWO VARIABLES (6 Marks)

8. For $a_1 x + b_1y +c_1=0$ and For $a_2 x + b_2y +c_2 =0$,
   unique solution : $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ graph : two intersecting lines
   no solution: $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ parallel lines
   infinite solution: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ coincident lines
9. Elimination method to solve equations
10. Cross multiplication rule: $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ then $x=\frac{(b_1c_2-b_2c_1)}{a_1b_2-a_2b_1}$ and $y=\frac{(c_1a_2-c_2a_1)}{a_1b_2-a_2b_1}$

CHAPTER-4 QUADRATIC EQUATIONS (6 Marks)

11. $ax^2+ bx + c = 0$ root are real if $D = b^2 - 4ac \geq 0$
    roots are equal if $D = b^2 - 4ac = 0, x = \frac{-b \pm \sqrt{D}}{2a}$

CHAPTER-5 ARITHMETIC PROGRESSIONS (4 Marks)

12. General term of the A.P. $a_n = a + (n-1)d$ where a=first term , d = common difference
13. Sum of n terms of an A.P. $S_n = \frac{n}{2}[2a + (n-1)d] = \frac{n}{2}[a + l]$
14. Sequence of A.P. is : a , a+d , a+2d , ……..

CHAPTER-6 SIMILAR TRIANGLES (6 Marks)

15. Similarity rules of two triangles: (i) SSS (ii) SAS (iii) AA
16. Theorem: (i)The ratio of the areas of two similar triangles is equal to the squares of the ratio of their corresponding sides.
17. (ii) [BPT] If a line is drawn parallel to one side of a triangle, it cuts other two sides in the same ratio.
18. (iii) Pythagoras theorem: In right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

(iv) Converse of Pythagoras theorem : In a triangle , if square of one side is equal to the sum of the squares of the other two sides , then the angle opposite the first side is a right angle

CHAPTER-7 COORDINATE GEOMETRY (6 Marks)

19. The distance between P(x_1,y_1) and Q(x_2,y_2) is $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
20. The distance of point P(x,y) from the origin is $\sqrt{x^2 + y^2}$
21. The coordinates of the point P(x,y) which divides the line segment joining the points A(x_1,y_1) and B(x_2,y_2) internally in the ratio m_1:m_2 are $\left(\frac{m_1x_2+m_2x_1}{m_1+m_2} + \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$.
22. The mid-point of the line segment joining the points P(x_1,y_1) and Q(x_2,y_2) is $\left(\frac{x_1+x_2}{2} + \frac{y_1+y_2}{2}\right)$.
23. The area of the triangle formed by the points (x_1,y_1), (x_2,y_2) and (x_3,y_3) is the numerical value of the expression $\frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$

CHAPTER-8 INTRODUCTION TO TRIGONOMETRY (8 Marks)

	0^o	**30^o**	**45^o**	**60^o**	**90^o**
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**

24. Sin A = $\frac{P}{H}$, Cos A=$\frac{B}{H}$, tan A=$\frac{P}{B}$, cot A=$\frac{1}{tan\ A}$, sec A=$\frac{1}{cos\ A}$, cosec A= $\frac{1}{sin\ A}$
25. Sin(90^o-A)= cos A, cos(90^o-A)= sin A, tan(90^o-A)= cot A, cot(90^o-A)= tan A, sec(90^o-A)= cosec A, cosec(90^o-A)= sec A,
26. $\sin^2$ A+ $\cos^2$A=1, $\sec^2$A-$\tan^2$A=1 for $0^o \leq A \leq 90^o$, cosec^2A=1+$\cot^2$A for $0^o < A \leq 90^o$.

CHAPTER- 9 SOME APPLICATION OF TRIGONOMETRY (4 Marks)

27. **Angle of Elevation:** When the object is above the eye then the **angle of elevation** of an object as seen by an observer is the angle between the horizontal and the line from the object to the observer's eye (the line of sight).
28. **Angle of Depression:** When the object is below the eye then angle between the horizontal and the observer's line of sight is called the **angle of depression.**

CHAPTER-10 CIRCLES (5 Marks)

29. Theorems (i) The tangent at any point of a circle is perpendicular to the radius through the point of contact. (ii) The length of tangents drawn from an external point to a circle are equal.

CHAPTER-11 CONSTRUCTIONS of similar triangles and construction of Tangents to a circle. **(4 Marks)**

CHAPTER-12 AREA RELATED TO CIRCLE (4 Marks) (i) Area of the sector = $\frac{\theta}{360^\circ}\pi r^2$

(ii) length of arc = $\frac{\theta}{360^\circ}2\pi r$ (iii) Area of minor segment = $\frac{\theta}{360^\circ}\pi r^2 - \frac{1}{2}r^2\ sin\theta$.

CHAPTER-13 SUREFACE AREAS AND VOLUME (6 Marks)

Object	**CSA**	**TSA**	**Volume**
Cube	**$4a^2$**	**$6a^2$**	**a^3**
Cuboid	**2h(l+b)**	**2(lb +bh + hl)**	**lbh**
Cylinder	**$2\pi rh$**	**$2\pi rh + 2\pi r^2$**	**$\pi r^2 h$**

Cone	πrl	$\pi rl + \pi r^2$	$\frac{1}{3}\pi r^2 h$
Sphere	-	$4\pi r^2$	$\frac{4}{3}\pi r^3$
Hemisphere	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$

(i) Volume of a frustum of cone=$\frac{1}{3}\pi h(r_1^2 + r_2^2 + r_1 r_2)$.

(ii) Curved surface area of a frustum of cone=$\pi l(r_1 + r_2)$ where l=$\sqrt{\mathrm{h}^2 + (r_1 - r_2)^2}$.

(iii) Total surface area of frustum of cone= $\pi l(r_1 + r_2) + \pi(r_1^2 + r_2^2)$

CHAPTER-14 STATISTICS (7 Marks)

A. Mean

(i) The direct method: $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$ (iii)The assumed mean method: $\bar{x}$ =a+$\frac{\sum f_i d_i}{\sum f_i}$

(ii) The step deviation method: $\bar{x}$ =a+ $\left(\frac{\sum f_i u_i}{\sum f_i}\right) \times$h

B. Mode =l+ $\left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times$h

Where l= lower limit of the modal class,
h= size of the class interval(assuming all class sizes to be equal).
f_1=frequency of the modal class,
f_2=$frequency\ of\ the\ class\ succeding\ the\ modal\ class$,
$f_0 = frequency\ of\ the\ class\ proceding\ the\ modal\ class$.

C. **Median=**l+$\left(\frac{\frac{n}{2} - cf}{f}\right) \times h$

l=lower limit of median class,
n= number of observations,
cf= cumulative frequency of class preceding the median class,
f= frequency of median class,
h= class size(assuming class size to be equal).

*** Mode = 3Median – 2Mean**

*** More than ogive : plot points (lower limit , corresponding cumulative frequency)**

*** Less than ogive : plot points (upper limit , corresponding cumulative frequency)**

CHAPTER-15 PROBABILITY (4 Marks)

$$P(E) = \frac{Number\ of\ outcomes\ favourable\ to\ E}{Number\ of\ all\ possible\ outcomes\ of\ experiment}$$

Sum of probabilities of all events is always 1 in an experiment, $0 \leq P(E) \leq 1$, P (E) + P (Not E) = 1