

TEACHER SEGMENT → List of Formulae

Chapter 1 – Real Numbers

First Law : $\log_a xy = \log_a x + \log_a y$

Second Law : $\log_a x^m = m \log_a x$

Third Law : $\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y$

Chapter 3 - Polynomials

- If α and β are the zeroes of the quadratic polynomial $ax^2 + bx + c$, $a \neq 0$, then

$$\alpha + \beta = -\frac{b}{a}, \quad \alpha\beta = \frac{c}{a}$$

- If α , β and γ are the zeroes of the quadratic polynomial $ax^3 + bx^2 + cx + d$, $a \neq 0$, then

$$\alpha + \beta + \gamma = -\frac{b}{a},$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a},$$

$$\alpha\beta\gamma = -\frac{d}{a}$$

- If α and β are the zeroes of a polynomial then the obtained polynomial is

$$x^2 - (\alpha + \beta)x + \alpha\beta$$

- The division algorithm states that given any polynomial $p(x)$ and any non-zero polynomial $g(x)$, there are polynomials $q(x)$ and $r(x)$ such that

$$p(x) = g(x) \times q(x) + r(x)$$
- Relationship between zeroes and coefficients of a quadratic polynomial:
 - Sum of zeroes = $-b/a = -(\text{coefficient of } x)/(\text{coefficient of } x^2)$
 - Product of zeroes = $c/a = (\text{constant term})/(\text{coefficient of } x^2)$
- Relationship between zeroes and coefficients of a cubic polynomial:
 - Sum of zeroes = $-b/a = -(\text{coefficient of } x^2)/(\text{coefficient of } x^3)$
 - Product of zeroes = $c/a = (\text{constant term})/(\text{coefficient of } x^3)$

Chapter 5 – Quadratic Expressions

- Quadratic formula : $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- Discriminant : $b^2 - 4ac$

Chapter 6 – Progressions

- n^{th} term of an AP is : $a_n = a + (n - 1)d$
- Sum of n terms of an AP is : $s_n = \frac{n}{2}(2a + (n - 1)d)$
- If the first and last terms of an AP are given and common difference is not given then $s_n = \frac{n}{2}(a + a_n)$
- Sum of first n positive integers : $s_n = \frac{n(n + 1)}{2}$
- The general form of GP is : a, ar, ar^2, ar^3, \dots
- n^{th} terms of GP : $a_n = ar^{n-1}$

Chapter 7 – Coordinate Geometry

- Distance between two points : $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$
- Section formula : $P(x,y) = \left(\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right)$
- Midpoint of a line segment = $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$
- Centroid of a triangle = $\left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right)$
- Area of a triangle = $\frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$
- Heron's formula of area of a triangle : $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$
 where s is $s = \frac{a+b+c}{2}$
- Slope of a line joining two points : $m = \frac{y_2 - y_1}{x_2 - x_1}$

Chapter 9 – Tangents and Secants to a Circle

- Area of a rectangle: $A = l \times b$
- Area of square: $A = S^2$
- Area of triangle: $A = \frac{1}{2}bh$
- Area of circle: $A = \pi r^2$
- Area of sector when degree measure of the angle at the centre is x° :
 $\frac{x^\circ}{360^\circ} \times \pi r^2$

- Area of semicircle: $\frac{\pi r^2}{2}$
- Area of hexagon: $6 \times \frac{\sqrt{3}}{4} a^2$

Chapter 11 – Trigonometry

$$\sin A = \frac{\text{opposite side}}{\text{hypotenuse}}$$

$$\cos A = \frac{\text{adjacent side}}{\text{hypotenuse}}$$

$$\tan A = \frac{\text{opposite side}}{\text{adjacent side}}$$

$$\operatorname{cosec} A = \frac{\text{hypotenuse}}{\text{opposite side}}$$

$$\sec A = \frac{\text{hypotenuse}}{\text{adjacent side}}$$

$$\cot A = \frac{\text{adjacent side}}{\text{opposite side}}$$

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

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

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

$$\cos^2 A + \sin^2 A = 1$$

$$1 + \tan^2 A = \sec^2 A$$

$$\cot^2 A + 1 = \operatorname{cosec}^2 A$$

$$\sin(90^\circ - x) = \cos x$$

$$\cos(90^\circ - x) = \sin x$$

$$\tan(90^\circ - x) = \cot x$$

$$\cot(90^\circ - x) = \tan x$$

$$\operatorname{cosec}(90^\circ - x) = \sec x$$

$$\sec(90^\circ - x) = \operatorname{cosec} x$$

Chapter 13 – Probability

- Probability of an event : $P(E) = \frac{\text{number of favorable outcomes}}{\text{total number of outcomes}}$
- Range of probability is $0 \leq P \leq 1$.
- Probability of a complementary event E is : $P(E) + p(\bar{E}) = 1$

Chapter 14 – Statistics

$$\text{class mark} = \frac{\text{upper class limit} + \text{lower class limit}}{2}$$

- The direct method : $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$
 - Assumed mean method : $\bar{x} = a + \frac{\sum f_i d_i}{\sum f_i}$
 - Step-deviation method : $\bar{x} = a + \left\{ \frac{\sum f_i u_i}{\sum f_i} \right\} \times h$
- Median = $l + \left(\frac{\frac{n}{2} - cf}{f} \right) \times h$
- Mode = $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \times h$