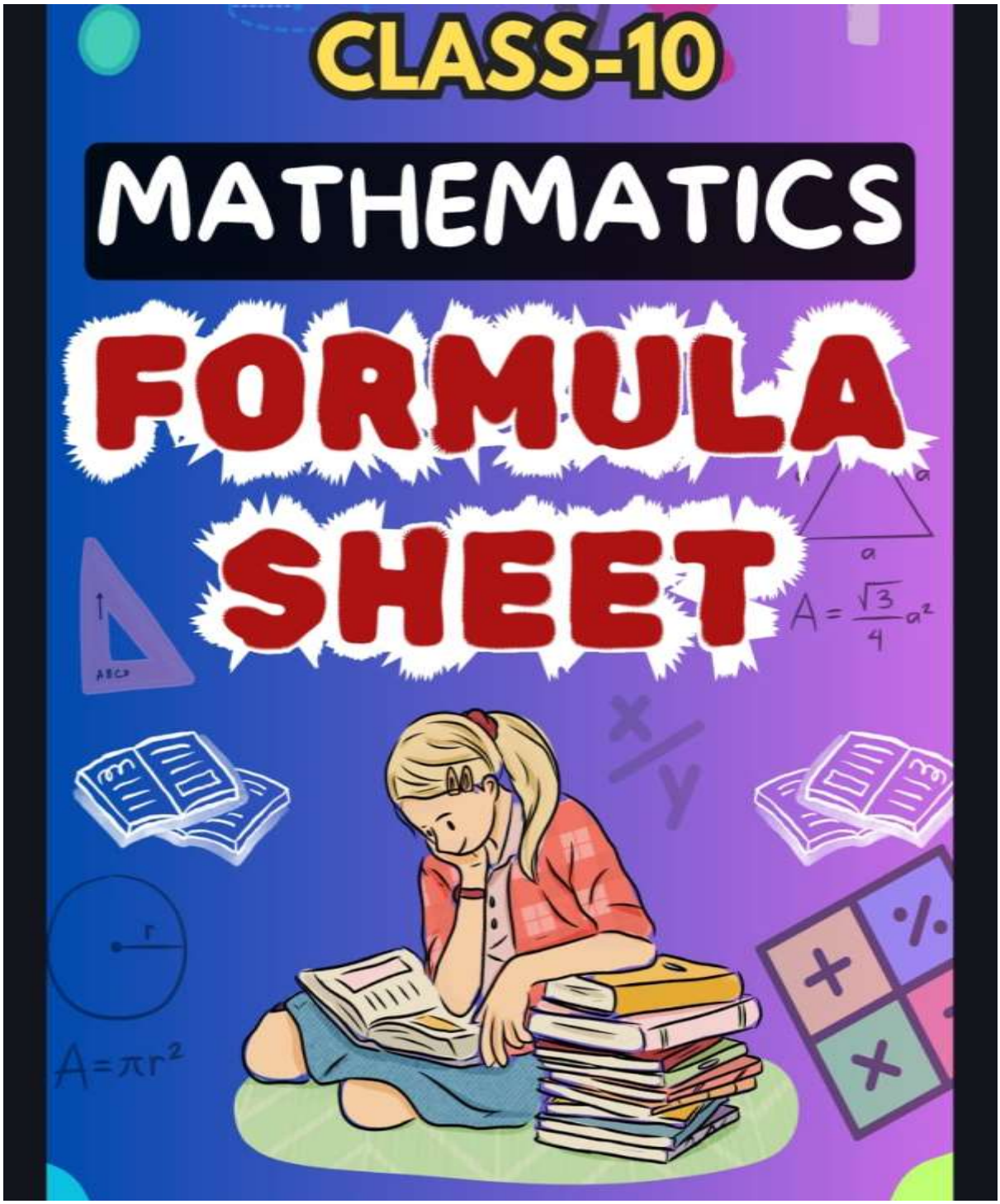


- NIKITA AGARWAL
TGT MATHEMATICS
CVPS

UNIT-I :- NUMBER SYSTEM

CHAPTER:- REAL NUMBERS

① $HCF(a,b) \times LCM(a,b) = a \times b$

UNIT-II :- ALGEBRA

CHAPTER:- POLYNOMIALS

② For zeroes of quadratic polynomial,

$p(x) = ax^2+bx+c$, $a \neq 0$

Sum of zeroes $= \alpha+\beta = -b/a$

Product of zeroes $= \alpha\beta = c/a$

③ For zeroes of cubic polynomial,

$p(x) = ax^3+bx^2+cx+d$, $a \neq 0$

Sum of zeroes $= \alpha+\beta+\gamma = -b/a$

Product of zeroes $= \alpha\beta\gamma = -d/a$

Sum of product of zeroes taken two at a time $= \alpha\beta+\beta\gamma+\gamma\alpha = c/a$

④ $(a+b)^2 = a^2+b^2+2ab$ ⑤ $(a-b)^2 = a^2+b^2-2ab$

⑥ $a^2-b^2 = (a+b)(a-b)$ ⑦ $(a+b)^3 = a^3+b^3+3a^2b+3ab^2$

⑧ $(a-b)^3 = a^3-b^3-3a^2b+3ab^2$ ⑨ $(a+b+c)^2 = a^2+b^2+c^2+2(ab+bc+ca)$

⑩ $a^3-b^3 = (a-b)(a^2+b^2+ab)$ ⑪ $a^3+b^3 = (a+b)(a^2+b^2-ab)$

⑫ $a^3+b^3+c^3-3abc = (a+b+c)(a^2+b^2+c^2-ab-bc-ca)$

⑬ If $a+b+c=0$ then $a^3+b^3+c^3 = 3abc$

CHAPTER :- PAIR OF LINEAR EQUATIONS IN TWO VARIABLE :-

(14) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (Intersecting, Consistent, 1 solution)

(15) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (parallel, inconsistent, 0 solution)

(16) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ (Coincide, infinite solution, consistent)

Methods for solving linear equations

- Substitution Method
- Elimination Method
- Reduction Method

CHAPTER :- QUADRATIC EQUATIONS

(17) $ax^2 + bx + c = 0$, where $a \neq 0$ and a, b, c are real number

(18) Quadratic Formula :- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Discriminant (D) $= b^2 - 4ac$.

* If $D > 0$, then two distinct real roots
* If $D = 0$, then two equal roots
* If $D < 0$, then no real roots

CHAPTER :- ARITHMETIC PROGRESSION

(19) General form of A.P = $a, a+d, a+2d, a+3d, \ldots$.

(20) $a_n = a + (n-1)d$ (21) $S_n = \frac{n}{2}[2a + (n-1)d]$ (22) $S_n = \frac{n}{2}[a + l]$

(23) $S_n = S_n - S_{n-1}$ (24) If a, b, c are in A.P then $2b = a + c$.

CHAPTER :- COORDINATE GEOMETRY

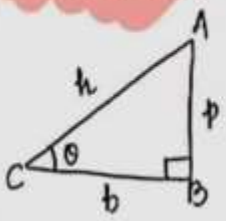
(25) Distance Formula $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

(26) Distance of point (p, x) from origin $= \sqrt{p^2 + x^2}$

(27) Section formula $= \left\{ \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \right\}$

(28) Mid-point formula $= \left\{ \frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right\}$

CHAPTER:- INTRODUCTION TO TRIGONOMETRY



(29) $\sin\theta = \frac{P}{h} = \frac{AB}{AC}$

(30) $\cos\theta = \frac{b}{h} = \frac{BC}{AC}$

(31) $\tan\theta = \frac{P}{b} = \frac{AB}{BC}$

(32) $\cot\theta = \frac{b}{P} = \frac{BC}{AB}$

(33) $\sec\theta = \frac{h}{b} = \frac{AC}{BC}$

(34) $\operatorname{cosec}\theta = \frac{h}{P} = \frac{AC}{AB}$

(35) $\cot\theta \cdot \tan\theta = 1$

(36) $\sec\theta \cdot \cos\theta = 1$

(37) $\operatorname{cosec}\theta \cdot \sin\theta = 1$

(38) $\sin^2\theta + \cos^2\theta = 1$

(39) $\sec^2\theta - \tan^2\theta = 1$
$0° \leq \theta < 90°$

(40) $\operatorname{cosec}^2\theta - \cot^2\theta = 1$
$0° \leq \theta < 90°$

Angle	0°	30°	45°	60°	90°
Sinθ	0	1/2	1/√2	√3/2	1
Cosθ	1	√3/2	1/√2	1/2	0
Tanθ	0	1/√3	1	√3	n.d
Cotθ	n.d	√3	1	1/√3	0
Secθ	1	2/√3	√2	2	n.d
Cosecθ	n.d	2	√2	2/√3	1

TRIGONOMETRIC IDENTITIES

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

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

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

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

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

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

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

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

$$\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta} \quad (\div \cos^2\theta)$$

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

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta} \quad (\div \sin^2\theta)$$

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

CHAPTER:- AREA RELATED TO CIRCLE

(41) Circumferance = $2\pi r$

(42) Area of the circle = πr^2

(43) Area of the sector = $\frac{\theta}{360^\circ} \times \pi r^2$

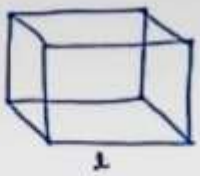
(44) Length of area of sector = $\frac{\theta}{360^\circ} \times 2\pi r$

(45) Area of segment = Area of sector − Area of Δ

(46) No. of revolutions = $\frac{\text{Distance covered}}{2\pi r}$

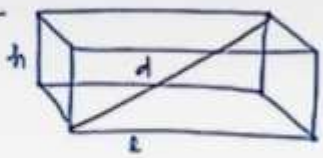
CHAPTER- SURFACE AREA AND VOLUME

(47) CUBE:-



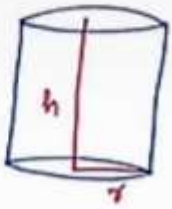
* Perimeter = 12l
* Base Area = l^2
* L·S·A = $4l^2$
* T·S·A = $6l^2$
* Volume = l^3
* d = $\sqrt{3}l$

(48) CUBOID:-



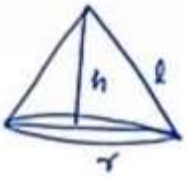
* Perimeter = 4(l + b + h)
* Volume = l×b×h
* Base Area = lb
* L·S·A = 2h(l+b)
* TSA = 2(lb+bh+lh)
* d = $\sqrt{l^2+b^2+h^2}$

(49) CYLINDER:-



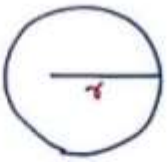
* Base Area = πr^2
* CSA = $2\pi rh$
* TSA = $2\pi r(h+r)$
* Volume = $\pi r^2 h$

(50) CONE



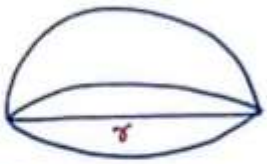
* Base Area = πr^2
* CSA = πrl
* TSA = $\pi r(r+l)$
* Volume = $\frac{1}{3}\pi r^2 h$

(51) SPHERE



* TSA = $4\pi r^2$
* Volume = $\frac{4}{3}\pi r^3$

(52) HEMISPHERE



* Base Area = πr^2
* CSA = $2\pi r^2$
* TSA = $3\pi r^2$
* Volume = $\frac{2}{3}\pi r^3$

CHAPTER:- STATISTICS

(53) MEAN

Mean

Direct Method

$$\bar{x} = \frac{\Sigma f_i x_i}{\Sigma f_i}$$

Assumed mean method

$$\bar{x} = \bar{a} + \frac{\Sigma f_i d_i}{\Sigma f_i}$$

(54) Mode $= l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$ (55) Median $= l + \left[\frac{\frac{n}{2} - CF}{f}\right] \times h$

(56) 3 Median = 2 mean + Mode

CHAPTER :- PROBABILITY

Creative Learning

(57) $P(E) = \frac{\text{No. of favourable outcome}}{\text{No. of all possible outcome}}$

(58) $P(E) + P(\bar{E}) = 1$ (59) Probability always lies between $0 \leq P(E) \leq 1$

(60) Tossing a coin – Head & Tail (Outcome-2)

(61) Tossing two coin – HH, HT, TH, TT (Outcome-4)

(62) Tossing three coin – HHH, HTH, THH, TTH, HHT, HTT, THT, TTT (Outcome-8)

(63) Throwing a die – outcome 6

(64) Throwing two die – outcome 36

(65) Face Cards :- King, Queen, Jack

(66) Playing Cards :-