

Chapter 1: Real Numbers

1. Euclid's Division Lemma:

$$a = bq + r = bq + r, \text{ where } 0 \leq r < b$$

2. LCM and HCF Relation:

$$\text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b \quad \text{HCF}(a, b) \times \text{LCM}(a, b) = a \times b.$$

Chapter 2: Polynomials

1. Sum of Zeros:

$$\text{Sum of zeros} = -\frac{\text{coefficient of } x}{\text{coefficient of } x^2}.$$

2. Product of Zeros:

$$\text{Product of zeros} = \frac{\text{constant term}}{\text{coefficient of } x^2}.$$

Expression	Expansion
$(a+b)^2$	a^2+b^2+2ab
$(a-b)^2$	a^2+b^2-2ab
$(a-b)(a+b)$	$a^2 - b^2$
$(x+a)(x+b)$	$x^2 + (a+b)x + ab$
$(x+a)(x-b)$	$x^2 + (a-b)x - ab$
$(x-a)(x+b)$	$x^2 + (b-a)x - ab$
$(x-a)(x-b)$	$x^2 - (a+b)x + ab$
$(x+y+z)^2$	$x^2 + y^2 + z^2 + 2xy + 2yz + 2xz$
$(x+y-z)^2$	$x^2 + y^2 + z^2 + 2xy - 2yz - 2xz$
$(x-y+z)^2$	$x^2 + y^2 + z^2 - 2xy - 2yz + 2xz$

Chapter 3: Pair of Linear Equations in Two Variables

1. Standard Form:

$$a_1x + b_1y + c_1 = 0, \quad a_2x + b_2y + c_2 = 0.$$

2. Conditions for Solutions:

- Unique Solution: $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$.

- Infinitely Many Solutions: $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$.
- No Solution: $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$.

3. **Cross-Multiplication Method:**

$$x = \frac{b_1c_2 - b_2c_1}{a_1b_2 - a_2b_1}, \quad y = \frac{c_1a_2 - c_2a_1}{a_1b_2 - a_2b_1}.$$

Chapter 4: Quadratic Equations

1. **Standard Form:** $ax^2 + bx + c = 0$.

2. **Roots Formula:** $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

3. **Discriminant:** $D = b^2 - 4ac$.

- $D > 0$: Real and distinct roots.
 - $D = 0$: Real and equal roots.
 - $D < 0$: Imaginary roots.
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Chapter 5: Arithmetic Progressions

1. **Nth Term:** $a_n = a + (n - 1)d$.

2. **Sum of n Terms:** $S_n = \frac{n}{2}[2a + (n - 1)d]$, or $S_n = \frac{n}{2}[a + l]$.

Chapter 6: Triangles

1. **Basic Proportionality Theorem:**

$$\frac{AB}{BC} = \frac{DE}{EF}.$$

2. **Pythagoras Theorem:**

$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Height})^2.$$

3. **Area of Similar Triangles:**

$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \left(\frac{AB}{DE}\right)^2.$$

Chapter 7: Coordinate Geometry

1. **Distance Formula:**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}.$$

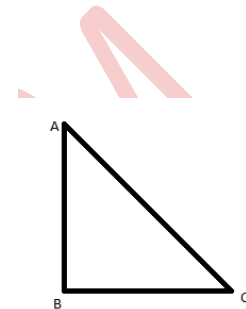
2. **Midpoint Formula:** $\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right).$

3. **Area of Triangle:** $\text{Area} = \frac{1}{2} |x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|.$

Chapter 8: Introduction to Trigonometry

1. Trigonometric Ratios:

Ratio	Formula	Value
Sin A	$\frac{\text{Perpendicular}}{\text{Hypotenuse}}$	$\frac{BC}{AC}$
Cos A	$\frac{\text{Base}}{\text{Hypotenuse}}$	$\frac{AB}{AC}$
Tan A	$\frac{\text{Perpendicular}}{\text{Base}}$	$\frac{BC}{AB}$
Cosec A	$\frac{\text{Hypotenuse}}{\text{Perpendicular}}$	$\frac{AC}{BC}$
Sec A	$\frac{\text{Hypotenuse}}{\text{Base}}$	$\frac{AC}{AB}$
Cot A	$\frac{\text{Base}}{\text{Perpendicular}}$	$\frac{AB}{BC}$



2. Reciprocal Identities:

$$\text{cosec } \theta = \frac{1}{\sin \theta}, \quad \sec \theta = \frac{1}{\cos \theta}, \quad \cot \theta = \frac{1}{\tan \theta}.$$

3. Pythagorean Identities:

$$\sin^2 \theta + \cos^2 \theta = 1, \quad 1 + \tan^2 \theta = \sec^2 \theta, \quad 1 + \cot^2 \theta = \text{cosec}^2 \theta.$$

4. Trigonometric Table:

Angles (Degrees)	0°	30°	45°	60°	90°
Angles (Radians)	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin \theta$	0	1/2	$1/\sqrt{2}$	$\sqrt{3}/2$	1
$\cos \theta$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	1/2	0
$\tan \theta$	0	$1/\sqrt{3}$	1	$\sqrt{3}$	ND
$\cot \theta$	ND	$\sqrt{3}$	1	1/	0
$\sec \theta$	1	$2/\sqrt{3}$	$\sqrt{2}$	2	ND
$\text{cosec } \theta$	ND	2	$\sqrt{2}$	$2/\sqrt{3}$	1

Chapter 9: Some Applications of Trigonometry

1. Height and Distance:

$$\tan \theta = \frac{\text{Height}}{\text{Base}}.$$

Chapter 10: Circles

1. Tangent to Circle:

The tangent to a circle is perpendicular to the radius at the point of contact.

Chapter 11: Constructions

- No specific formulas.
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Chapter 12: Areas Related to Circles

1. **Circumference:** $C = 2\pi r$.

2. **Area of Circle:** $A = \pi r^2$.

3. **Area of Sector:**

$$A_{\text{sector}} = \frac{\theta}{360^\circ} \times \pi r^2.$$

4. **Length of Arc:**

$$L_{\text{arc}} = \frac{\theta}{360^\circ} \times 2\pi r.$$

Chapter 13: Surface Areas and Volumes

1. **Sphere:**

○ *Surface Area:* $4\pi r^2$

○ *Volume:* $\frac{4}{3}\pi r^3$.

2. **Cylinder:**

○ *CSA:* $2\pi rh$, *TSA:* $2\pi r(h + r)$, *Volume:* $\pi r^2 h$.

3. **Cone:**

○ *CSA:* πrl , *TSA:* $\pi r(l + r)$, *Volume:* $\frac{1}{3}\pi r^2 h$.

4. **Hemisphere:**

○ *CSA:* πr^2 , *TSA:* $3\pi r^2$, *Volume:* $\frac{2}{3}\pi r^3$.

Chapter 14: Statistics

1. **Mean:**

$$\text{Mean} = \frac{\sum f_i x_i}{\sum f_i}.$$

2. **Median:**

$$\text{Median} = \text{Median} = l + \left(\frac{\frac{N}{2} - CF}{f} \right) h.$$

3. **Mode:**

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

Chapter 15: Probability

1. **Probability Formula:**

$$P(E) = \frac{\text{Favorable outcomes}}{\text{Total outcomes}}.$$

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