Important notes / Teacher's remarks

Algeebra

1. $(a+b)^2 = a^2+b^2+2ab$
2. $(a-b)^2 = a^2+b^2-2ab$
3. $a^2-b^2 = (a+b)(a-b)$

Number Sets

1. N - Natural No.
2. R - Real No.
3. Z - Integer.
4. W - whole No.
5. Q - Rational No.

Trigonometry

1. $\sin\theta = \frac{\text{opposit side}}{\text{Hypotness}}$
2. $\cos\theta = \frac{\text{Adjacent side}}{\text{Hypotness}}$
3. $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\text{opposit side}}{\text{Adjacent side}}$
4. $\cot\theta = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta} = \frac{\text{Adjacent side}}{\text{opposit side}}$
5. $\operatorname{cosec}\theta = \frac{1}{\sin\theta}$
6. $\sec\theta = \frac{1}{\cos\theta}$
7. $\sin[90-A] = \cos A$; $\cos[90-A] = \sin A$
8. $\operatorname{cosec}[90-A] = \sec A$; $\sec[90-A] = \operatorname{cosec} A$
9. $\tan[90-A] = \cot A$; $\cot[90-A] = \tan A$
10. $\sin^2\theta + \cos^2\theta = 1$

Important notes / Teacher's remarks

Divison Algarithm of polynomial

if $P(x)$ - Divisor
$q(x)$ - quotient
$r(x)$ - reminder
$x(x)$ - Divident then

$$\boxed{x(x) = P(x) * q(x) + r(x)}$$

* Formulae for Even No's = $2n$; where n is a natural no {0,1,2,3 - - - ∞}

* Formula for ODD No's = $2n+1$; where n is a natural no {0,1,2,3 - - - ∞}

Sets

Cardinality ; The no of elements in a finite set is called cardinality

Scanned by CamScanner

3. Polynomials

* It is a Equation having more than terms

  ex:- $ax+b$, $3x^2+2x+2$ ..... etc

* Always power of the terms in the Equation of a polynomial is non-negative integer [0, 1, 2, 3 ... etc]

* Degree = Highest power in the polynomial

* Depending on Degree following are the
  i) Linear - Degree is 1
  ii) Qudratic - " " 2
  iii) cubic - Degree is 3

* Zero's of a polynomial

  Let $\boxed{p(x) = ax^2+bx+c}$ is a quadrilateral polynomial

then the value of 'x' for which Values 'p(x)' = 0 Equals to zero are called as 'Zero's' of that polynomial

ex:- $\underset{ax^2+bx+c}{p(x) = -3x^2+2x+1}$; Sum of zeros $= \frac{-b}{a} = \frac{-2}{3}$

1st $p(x) = 0$

$$p(-2/3) = 3[-2/3]^2 + 2[-2/3] + 1$$

$$= 3\left(\frac{4}{9}\right) + \left(\frac{-4}{3}\right) + 1$$

$$= \frac{4}{3} - \frac{4}{3} - 1 = +1$$

$$p(1) = -3(1)^2 + 2(1) + 1$$

$$= -3 + 2 + 1$$

$$= 0$$

* Always Degree of the polynomial indicates max no. of zeros that are possible in that polynomial

Scanned by CamScanner

① linear polynomial [1]

Defaulty syntax is

$$P(x) = ax + b \; ; \text{ where } a \neq 0$$

$$\text{zero} = \frac{-b}{a}$$

② quadrilateral polynomial [2]

syntax :-

$$P(x) = ax^2 + bx + c \; ; \text{ where } a \neq 0$$

Realation b/w the coefficient & zeros

let zeros are α & β

a) sum of zeros $= \alpha + \beta = -\frac{b}{a} = \frac{\text{coeff. of } x}{\text{coeff of } x^2}$

b) product of zeros $= \alpha\beta = c/a = \frac{\text{Value of const}}{\text{coeff of } x^2}$

③ cubic polynomial [3]

syntax

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

a) sum of zeros $\alpha + \beta + \gamma = -b/a = -\frac{\text{coeff of } x^2}{\text{coeff of } x^3}$

b) product of zeros $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{\text{coeff } x}{\text{coeff } x^3}$

c) $\alpha\beta\gamma = \frac{d}{a} = \frac{\text{const}}{\text{coeff } x^3}$

* if 2-zeros in quadratic polynomial u can get the eqn by using following formula

$$k\left[x^2 - \left[\underset{\alpha+\beta}{\text{sum of zeros}}\right]x + \left[\underset{\text{zeros}}{\text{product of}}\right] + c\right] = 0$$

Scanned by CamScanner

Important notes / Teacher's re

Tangents & secants

① Area of circle $- \pi r^2$

② Area of sector $- \dfrac{\theta}{360} \times \pi r^2$ angle

③ Area of semicircle $= \dfrac{1}{2} \times \pi r^2$

Scanned by CamScanner

Important / Remarks / notes :

Important notes / Teacher's remarks

Pair of Linear Equation's

① To convert minutes to hours
Multiply given minutes with 1/60

ex :- $10 \text{ min} = 10 \times \frac{1}{60} = \frac{1}{6} \text{ hr}$

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

proof

$(a-b)(a-b)^2 = (a-b)^3$

$\Rightarrow (a-b)(a-b)^2 = 0$

$\Rightarrow a-b\,[a^2 - 2ab + b^2] = 0$

$\Rightarrow a^3 - \underline{2a^2b} + \underline{ab^2} - \underline{ba^2} + \underline{2ab^2} - b^3 = 0$

$= a^3 - 3a^2b + 3ab^2 - b^3 = 0$

$\Rightarrow a$

$k \cdot (x^2 - (\text{sum of 2 roots})\,x + \text{product of 2 roots}) = 0$

$(a+b)^2 = a^2 + b^2 + 2ab$

Important notes

$2ab$

Co-ordinate geometry

① Distance formula for 2-coordinates $A(x_1, y_1)$ & $B(x_2, y_2)$

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

② a point 'P' is Bisecting a line then co-ordinates of that point can be calicualated using following formulae

$m_1 : m_2$

$A(x_1, y_1)$ P $B(x_2, y_2)$

$$P[x, y] = \left[\frac{m_1 x_2 + m_2 x_1}{m_1 + m_2}, \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2}\right]$$

③ centroid formula in a Δ^{le}

$$C[x, y] = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3}\right)$$

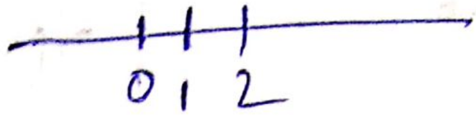
④ Area of Δ^{le} if u know height then $= 1/2 \times$ base $\times$ height

Area of Δ^{le} for 3- cordinates given

$$\text{Area } \Delta^{le} = \frac{1}{2} \times \left[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)\right]$$

Suppose if u don't know height then Herons formule where a, b, c are sides.

$$\Delta^{le} = \sqrt{s(s-a)(s-b)(s-c)}$$



Mode

The value that's going to occur frequently.

→ To calicualate Mode

arrange data in ascending order

for grouped data

$$\text{Mode} = l + \left[\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right] \times h$$

→ first choose Modal class (having higher frequency)

ex :-

3 – 5	5 – 8	8 – 10
8	2	3

Many $\boxed{\text{Poly}|\text{nomials}}$ terms

$$\text{Eqn} = \overset{①}{ax} + \overset{②}{b}$$

$ax^1 + b$

Classification [Depending on degree]

It indicates power the variable

① Linear polynomials

↳ Highest Degree 1

ex:- $3x^1+2$; $5x^1+\frac{3}{1}$, $P(x) = ax+b$ where $a \neq 0$

$5x^1$

$x=1$

5

$x=2$

10

② Quadrilateral polynomials

↳ Highest Degree -2

ex:- $p(x) = ax^2+bx+c$; $a \neq 0$

$3x^2+6x+7=0$

③ Cubic polynomials

↳ Highest Degree as -3

ex:- $p(x) = ax^3+bx^2+cx+d$

① $6x^3+3x^2+6x+4$

→ Zero's of a polynomial

↓

These are the values for which x value of x

P(x) is zero.

① Algebraic Method

② Graphical Method

↓

Zeros = No. of points

= Value of the point where it is cutting the x-axis

① $3x^2+2x+6 = p(x)$

② $3x+2 = p(x)$

step-1

$p(x) = 0$

$3x+2=0$

step 2

u have to solve for x

Relationship of coefficients & zero's

Linear polynomial

zero's = degree of polynomial.

$6x^2 + 3y$

ex:- $p(x) = ax + b$

$$\boxed{\text{zero} = -\frac{\text{constant value}}{\text{coefficient of } x}}$$

ex:- $3x + 6 = p(x)$

$$\text{zero} = \frac{-6}{3} = -2$$

proof
$p(-2) = 3(-2) + 6$

$p(-2) = -6 + 6 = 0$ ✓

Quadralateral Eqn polynomial $p(x) = ax^2 + bx + c$

let 2 zero's be α, & β

① sum of zero's $= \alpha + \beta = -\frac{\text{coefficient of } x}{\text{coefficient of } x^2}$

$$= \frac{-b}{a}$$

② product of zero's $= \alpha\beta = \frac{\text{constant value}}{\text{coefficient of } x^2}$

$$= \frac{c}{a}$$

$g(x) = ?$ ✓

$q(x) = x-2$ ✓

$r(x) = -2x+4$ ✓

$(x-2)$

$-4+2$

-2

$$\boxed{p(x) = g(x) * q(x) + r(x)}$$

Dividend Divisor Quotient reminder

$$(x^3-3x^2+x+2) = \underbrace{g(x) * (x-2)} + \underbrace{-2x+4}$$

Signs

Product

① $(+)(-) = -$

② $(-)(+) = -$

③ $(+) * (+) = +$

④ $(-) * (-) = +$

Addition

① $\underset{\text{higher}}{(+)} + (-) = +$

② $(+) + \underset{\text{higher}}{(-)} = \boxed{-}$

③ $(-)+(-) = -$ ✓

④ $+ + + = +$ ✓

Logarithms

$x^{-1} = \frac{1}{x}$

$x^{-2} = \frac{1}{x^2}$

$x^{-5} = \frac{1}{x^5}$

① $\log_b^a = k$; b - base, a - argument

always $a = b^k$

② $\log_b^{a^x} = x . \log_b^a$

③ $\log_b^{xy} = \log_b^x + \log_b^y$

④ $\log_b^{x/y} = \log^x{}_b - \log^y{}_b$

⑤ $\log_a^a = 1$

proof

$a^1 = a^k$

$(k=1)$

⑥ $\log_a^0 = 0$

18 km/h

Completing the square

$x^2 + \cancel{4}x - 4$

$p(x) = ax^2 + bx + c$ $\quad a=1;\ b=4;\ c=-4$

$p(x)=0$ $\quad ac = -4$

$\checkmark\ x^2 + x - 4 = 0$

1×4
2×2 ✓
4×1

ax^2+bx+c

$$\frac{-b \pm \sqrt{b^2 - 4(a)(c)}}{2(a)}$$

$a=1$
$\times 4$
$= 4$

2×2 $\quad x^2 + \frac{1}{4} + 2\cdot x \cdot \frac{1}{2}$

4×1 $\quad x^2 + x + 1/4$

LHS RHS

$x^2 + x = 4$

coeff of $x = 1$

half of coeff $= \left(\frac{1}{2}\right)^2 = y$

$x^2 + x + \left(\frac{1}{2}\right)^2 = 4 + (1/2)^2$

$\left(x + \frac{1}{2}\right)^2 = 4\cdot\frac{4}{4} + \frac{1}{4}$

$= \cancel{2}\cdot x\cdot\frac{1}{\cancel{2}}$

a b

$\left(x+\frac{1}{2}\right)^2 = \frac{16+1}{4}$ $=$ ✓ $(a+b)^2$

✓ $(a-b)^2$

$x + \frac{1}{2} = \sqrt{\frac{17}{4}}$

$x = \sqrt{\frac{17}{4}} + \frac{1}{2}$; $x = \pm\sqrt{\frac{17}{4}} - 1/2$

$x = \frac{\sqrt{17}}{2} + \frac{1}{2}$ / $= \frac{\sqrt{17}-1}{2}$

Scanned by CamScanner

Steps

1. Send the coeff constant term to the R.H.S
2. Take the half of the value of coefficient of x
3. square that value & add it to L.H.S & R.H.S side
4. Then you are going to found a complete square of the form $(a+b)^2/(a-b)^2$

$p(x) = 2x^2 - 5x + 9 = 6$

$p(x) = 0$

$2x^2 - 5x + 3 = 0$

$a\left[x^2 - \frac{c}{a}\right]$

$5x^2 - 6x - 2 = 0$

$a = 5;\ b = -6;\ c = -2$

$ac = 5(-2) = -10$

2×5

10×1

$5x^2 - 6x = 2$

$5\left[x^2 - \frac{6}{5}x\right] = 2$

$x^2 - \frac{6}{5}x = 2/5$

$\frac{6}{5 \times 2} = \left[\frac{6}{10}\right]^2$

$3x^2 = 2$

$x^2 = 2/3$

$x^2 - \frac{6}{5}x + \left(\frac{6}{10}\right)^2 = \frac{2}{5} + \left(\frac{6}{10}\right)^2$

$5x^2 - \cancel{5}\cdot\frac{6}{\cancel{5}}x$

$5x^2 - 6x$

$\left[x - \frac{6}{10}\right]^2 = \frac{2}{5} + \frac{36}{100}$

$\frac{a}{b} \cdot \frac{1}{2}$

$\left[x - \frac{6}{10}\right]^2 = \frac{2 \times 100 + 36 \times 5}{500}$

$= 100 \times 5$

$= 500$

$\left[x - \frac{6}{10}\right]^2 = \frac{380}{500} = \frac{38}{50} = \frac{19}{25}$

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

$x^2 + \frac{6^2}{10^2} - 2 \cdot x \frac{6}{10}$

$x - \frac{6}{10} \quad \pm\sqrt{\frac{19}{25}} = \frac{\sqrt{19}}{5}$

$x^2 - \frac{6}{5}x + \left(\frac{6}{10}\right)^2$

$x = \pm\frac{\sqrt{19}}{5} + \frac{6}{10}; \quad -\frac{\sqrt{19}}{5} + \frac{6}{10}$

$= \frac{\sqrt{19}+3}{}$

Qudratic Equations

ax^2+bx+c

② roots = $\dfrac{-b \pm \sqrt{b^2-4ac}}{2a}$

$\boxed{i^2 = -1}$

i

$\sqrt{4}$ $\sqrt{-3}$

$\sqrt{0}$

Discriminant = "b^2-4ac"

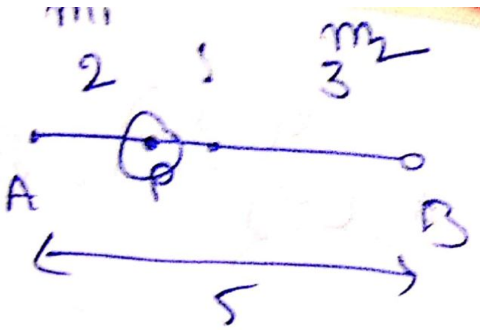
= D

i) $b^2-4ac > 0$; 2- real roots , distinct

ii) $b^2-4ac = 0$; Equal roots

iii) $b^2-4ac < 0$; imaginary roots

15

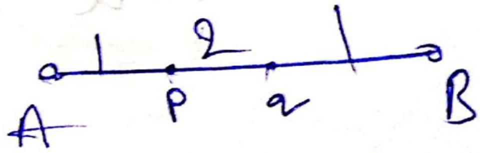


Section Formula –

$$P(x,y) = \left(\frac{m_1x_2 + m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2} \right)$$

$$x = \frac{m_1x_2 + m_2x_1}{m_1+m_2};$$

$$y = \frac{m_1y_2 + m_2y_1}{m_1+m_2};$$



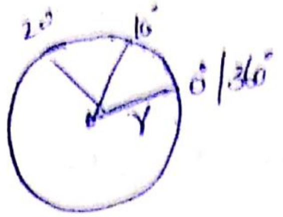
EX–7.2

1

$3x - 1 = 8 + -3$

$+8 - 3 = +$

h -> heig



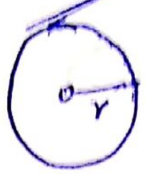
Mensuration

2-D | 3-D

Spehere | Cylinder

①

360



$A - \pi r^2$

Perimeter $- 2\pi r$

✓ $A - \pi r^2 h$

$P - 2\pi r h$

Curved Surface Area $= P = 2\pi r h$

Total Surface are $= 2\pi r h + 2\pi r^2 h$

$V - \pi r^2 h$

$= 2\pi r (h + r)$

② Rectan

$A = l \times b$

$P = 2(l+b)$

Cubiod

Lateral Surface Area

$= 2(l+b)h$

Total Surface Area $= 2[lb + bh + hl]$

Volume $= lbh$

Geometric Progression [GP]

a, ar, ar^2, ar^3 ———— ar^n

a_1 a_2 3 . . . . a_n

$C \cdot r = ?$

$\frac{a_4}{a_3}$

1. 1st term should be a nonzero no

$$\boxed{a_n = a \cdot r^{n-1}}$$

2. $2^{nd} = 1 \times C \cdot r$

3. $3^{rd} = 2^{nd} \times C \cdot r$

$C \cdot r = \frac{a_2}{a_1} = \frac{a_n}{a_{n-1}}$

a = 1st term in G.P

$r = C \cdot r$

Ex-6.4

$a = 1/64$; $r = 2$

Suppose if 1st & last terms are given in an AP But d is not given then

i] $S_n = \frac{n}{2}[a+l]$ ✓

similarly if difference is given then we have

ii) $S_n = \frac{n}{2}[2a+(n-1)d]$ ✓

Here S_n = sum of n - terms

where n = no. of term

Ex - 6.3

$\begin{array}{r}12\\+5\end{array}$ $\begin{array}{r}7\\-2\end{array}$ $\begin{array}{r}+5\\-1\\\hline +4\end{array}$

1)

Progression
(or)
or Pattern

eg

Sequence & Series

↓ | sum of sequences

$d = 3-1 = 2$

$1, 3, 5, 7, 9, 11$ ---- $d =$

$a_1, a_2, a_3, a_4, a_5, a_6$ ----

$3, 9, 27, 81$ ---- $= 3^n$, where n is a natural no

Types of progressions

1. Arithmatic progression [AP]
2. Geometric progression [GP]
3. Harmonic progression [HP]

infinite A.P

$1, 3, 5, 7, 9, 11$ ---- ∞

$a_0 \quad \underbrace{a_0+d}_{a_1} \quad \underbrace{a_1+d}_{a_2} \quad \underbrace{a_2+d}_{a_3} \quad \underbrace{a_3+d}_{a_4}$

$d=2$

Finite A.P

$15, 13, 11, 9, 7, 5, 3, 1$

$d=2$

$a_0 \quad \underbrace{(a_0-d)}_{a_1} \quad \underbrace{a_1-d}_{a_2} \quad \underbrace{a_2-d}_{a_3}$

$a_n = a+(n-1)d$

$20+(8-1)\times 2$

A.P

a_1, a_2, a_3 ---- a_n 100

$$\boxed{a_n = a+(n-1)d}$$

Scanned by CamScanner

By using Herons formula

Area of Δ ABC $= \sqrt{s(s-a)(s-b)(s-c)}$

b

c

s−a