

10th CLASS

MATHEMATICS CHAPTER WISE

KEY POINTS



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1.REAL NUMBERS వాస్తవ సంఖ్యలు

1Mark Question-1 & 8Marks Questions-1

9
Marks

LCM (Least Common Multiple) is the smallest number that is a multiple of two or more numbers, while HCF (Highest Common Factor) is the largest number that divides two or more numbers without a remainder. Both are important concepts in number theory, and their relationship can be expressed with the formula: $HCF(a,b) \times LCM(a,b) = a \times b$

Find LCM and HCF of 12,15 and 21

$$12 = 2 \times 2 \times \textcircled{3}$$

$$15 = \textcircled{3} \times 5$$

$$18 = 2 \times \textcircled{3} \times 3$$

$$HCF = 3$$

$$LCM = 2 \times 2 \times 2 \times 3 \times 3 \times 5 = 360$$

Prove that $5+\sqrt{7}$ is irrational

Assume $5+\sqrt{7}$ is rational

$$3+\sqrt{7} = \frac{a}{b} \text{ where } a \text{ and } b \text{ are coprime integers),}$$

$$\sqrt{7} = \frac{a}{b} - 5 \Rightarrow \sqrt{7} = \frac{a-5b}{b}$$

LHS irrational and RHS rational but in a irrational is not equal to rational so our exemption is wrong

$\therefore 5+\sqrt{7}$ is irrational

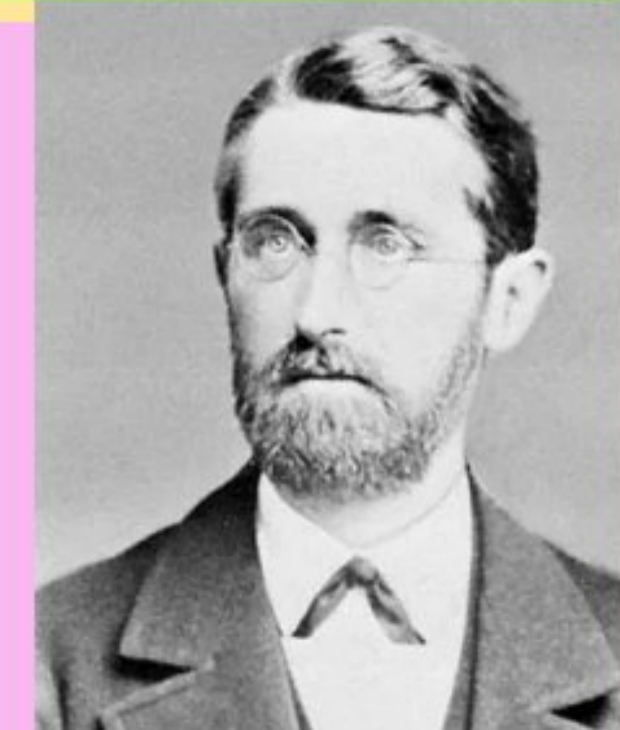
Fundamental Theorem of Arithmetic

Every composite number can be expressed as a product of primes, and this factorisation is unique, apart from the order in which the prime factors occur

$$210 = 2 \times 3 \times 5 \times 7 = 3 \times 5 \times 7 \times 2 = 7 \times 3 \times 2 \times 5$$

There is no single "father of Real numbers," but the German mathematician **Richard Dedekind** is most credited with providing the first rigorous definition of real numbers in the 19th century through his concept of Dedekind cuts .

Richard Dedekind



2. QUADRATIC POLYNOMIAL వర్గ బహుపదులు

1 Mark Question-2 2Marks Question-1 4Marrks Question -1 Total Marks = 8 Marks

General form of Quadratic Polynomial

$$ax^2 + bx + c \text{ Where } a \neq 0$$

α, β , లు వర్గ బహుపది యొక్క శూన్యాలు అయిన

Sum of Zeroes

శూన్యాల మొత్తం

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

Product of Zeroes

శూన్యాల లబ్ధం

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

Degree	Polynomial	General form in one variable
ND	Zero Polynomial	0
0	Constant Polynomial	a
1	Linear Polynomial	ax + b
2	Quadratic Polynomial	ax ² + bx + c

Here Sum of zeroes $\alpha + \beta = \sqrt{2}$

Product of zeroes $\alpha\beta = \frac{1}{3}$

The required polynomial is $x^2 - (\alpha + \beta)x + \alpha\beta$

$$= x^2 - (\sqrt{2})x + \left(\frac{1}{3}\right) = 3x^2 - 3\sqrt{2}x - 1$$

Here $\alpha = \frac{1}{2}$ and $\beta = \frac{3}{2}$

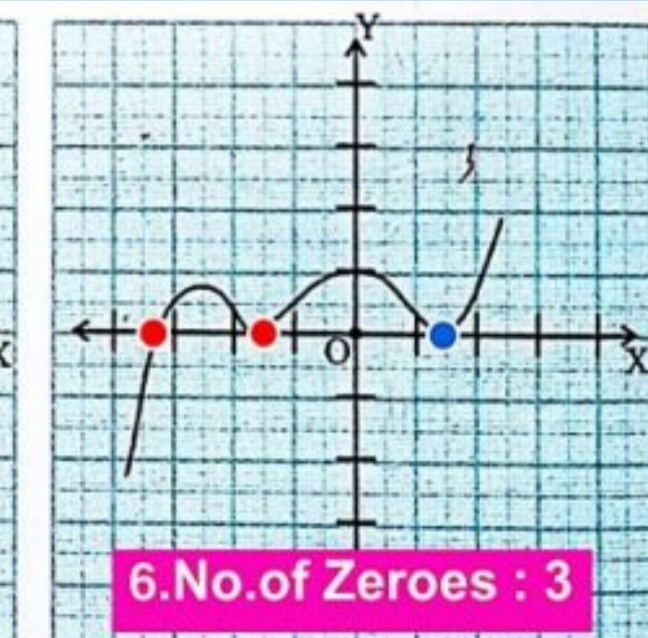
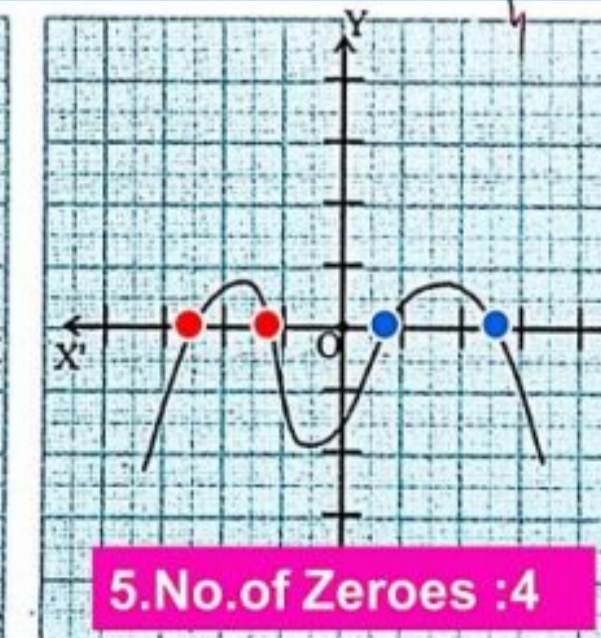
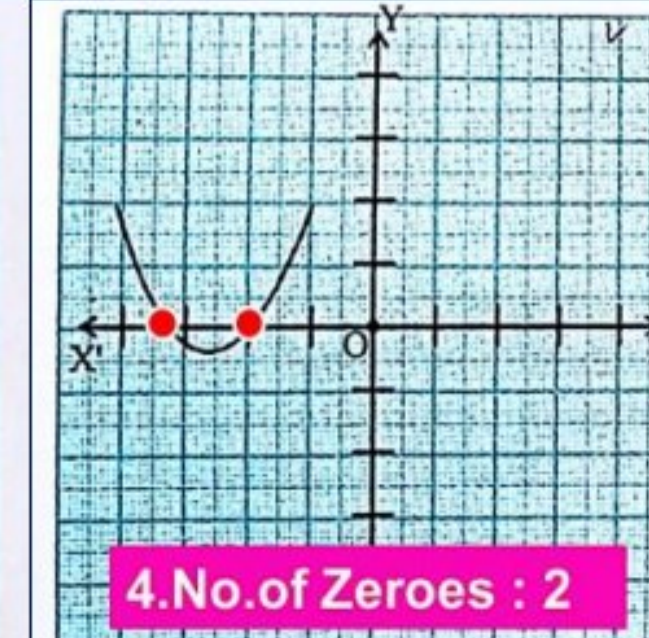
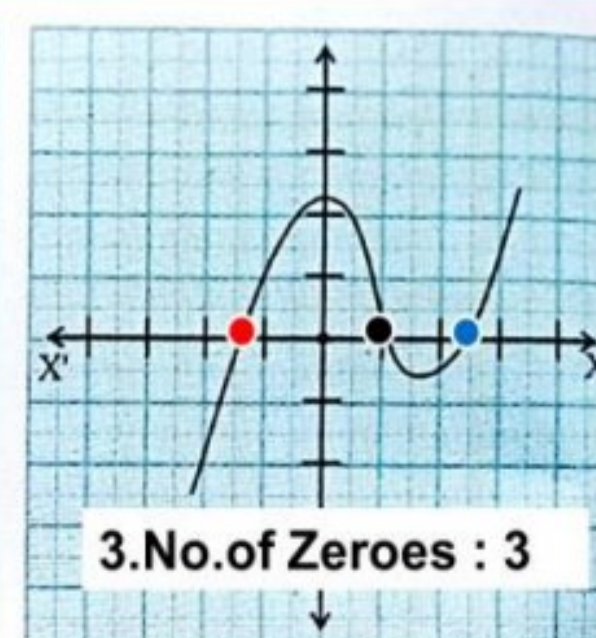
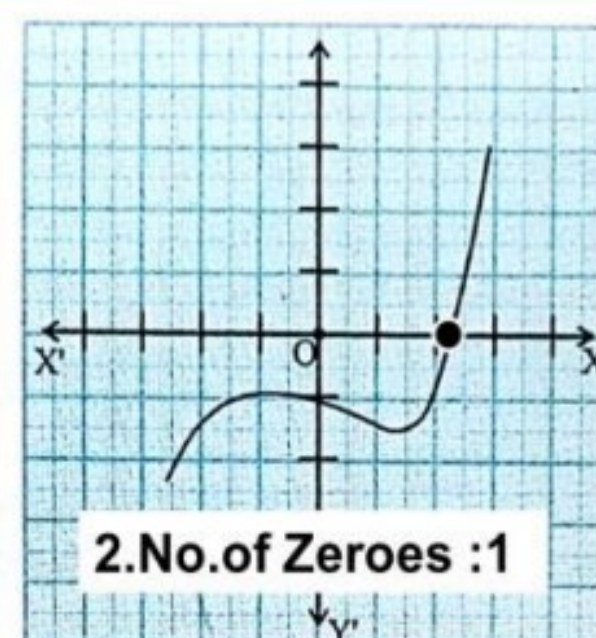
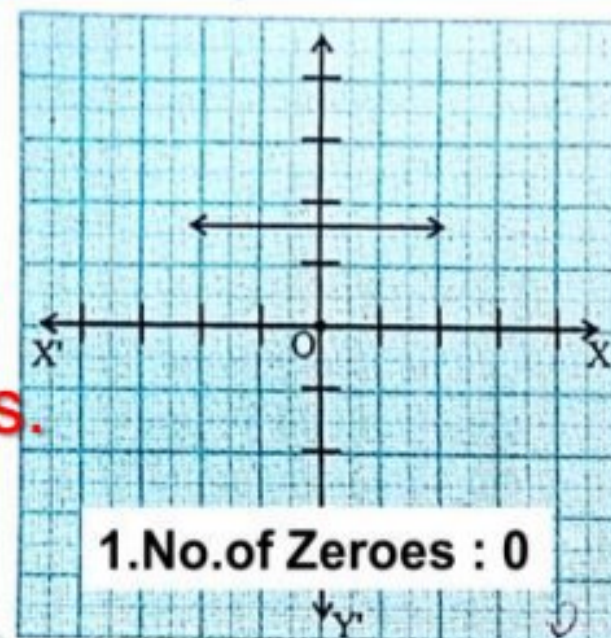
The required polynomial = $x^2 - (\alpha + \beta)x + \alpha\beta$

$$x^2 - \left[\frac{1}{2} + \frac{3}{2}\right]x + \frac{1}{2} \times \frac{3}{2} = x^2 - \left(\frac{4}{2}\right)x + \frac{3}{4} = 4x^2 - 8x + 3$$

Diophantus



Father of Polynomials.





Sir William Rowan Hamilton

3.LINEAR EQUATIONS IN TWO VARIABLES

రెండుచర రాసులలో రేఖీయ సమీకరణాల జత

1 Mark Question-2 8 Marrks Question -1 Total Marks = 9 Marks

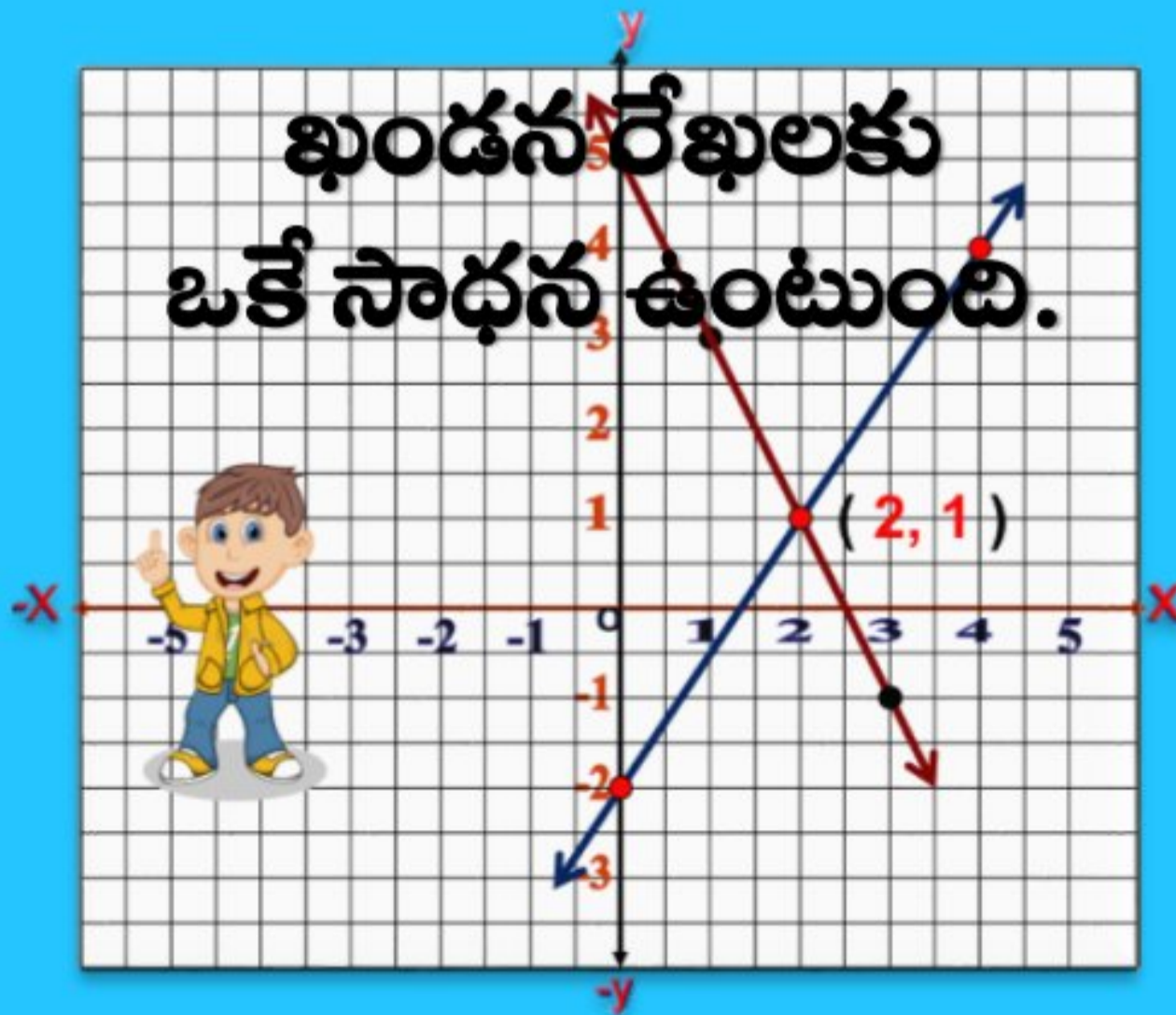
INTERSECTING LINES

Unique Solution

$$a_1x + b_1y + c = 0$$

$$a_2x + b_2y + c = 0$$

$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \text{ Consistent lines}$$



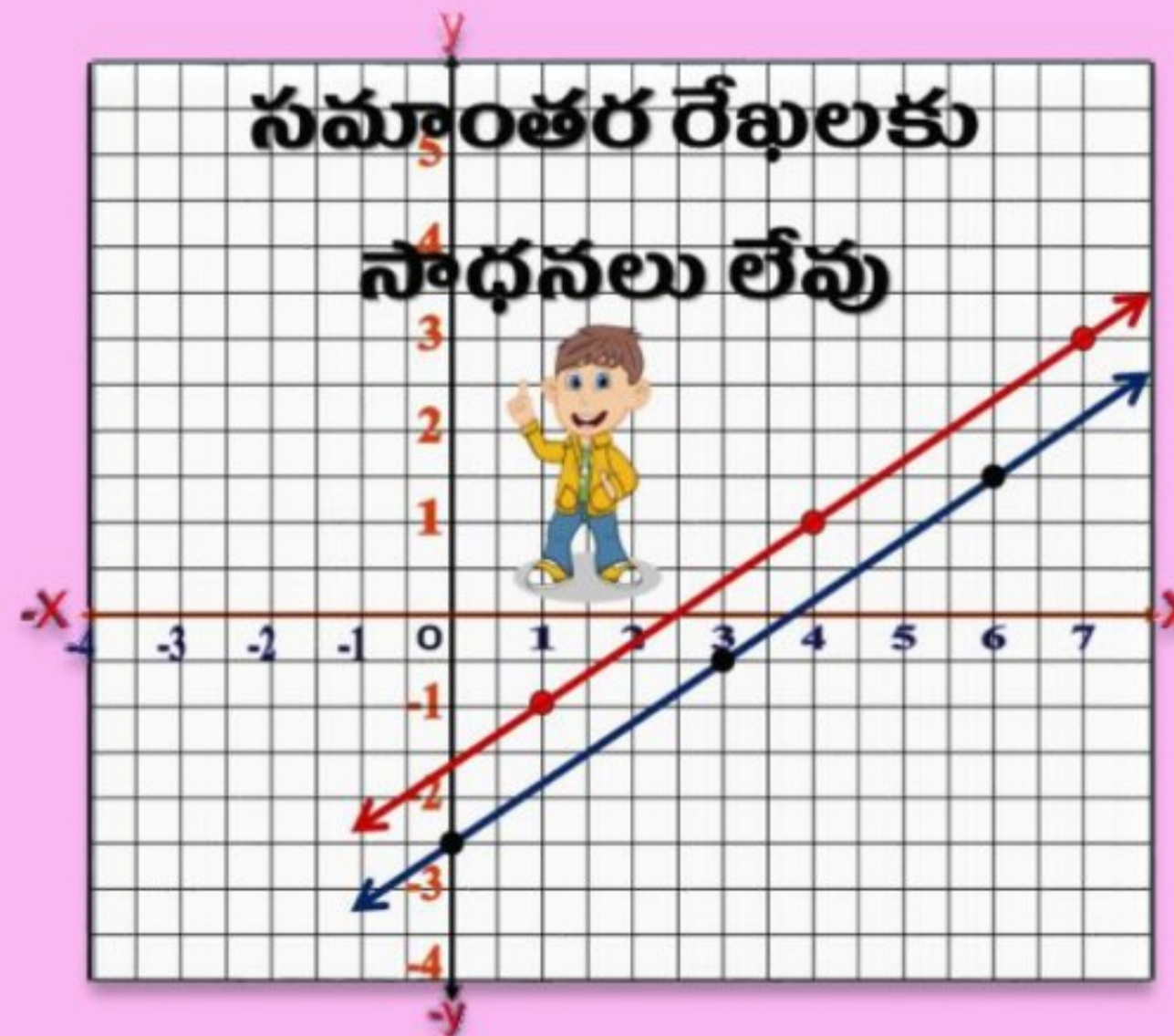
PARALLEL LINES

No Solution

$$a_1x + b_1y + c = 0$$

$$a_2x + b_2y + c = 0$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \text{ Inconsistent}$$



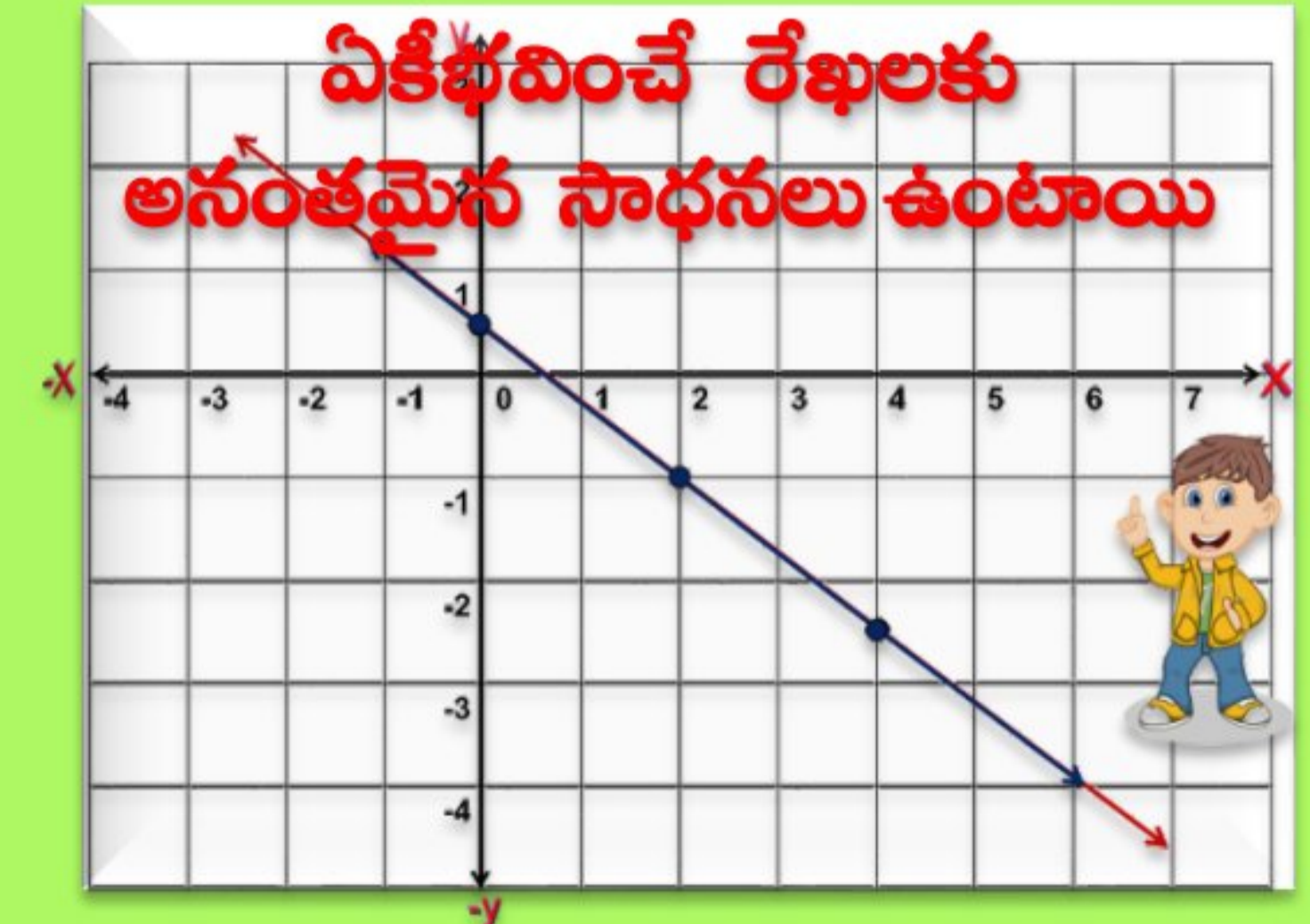
COINCIDENT LINES

Infinitely many Solution

$$a_1x + b_1y + c = 0$$

$$a_2x + b_2y + c = 0$$

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2} \text{ Consistent lines}$$



4. QUADRATIC EQUATIONS వర్గ సమీకరణాలు

1 Mark Question-1 2Marks Question-1 4Marks Question -1 Total Marks = 7 Marks

A quadratic equation is a second-order polynomial equation of the form $ax^2 + bx + c = 0$ where $a \neq 0$. It can be solved using methods like factoring, completing the square, or the quadratic formula, which gives the solutions for x as $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The roots of quadratic equation

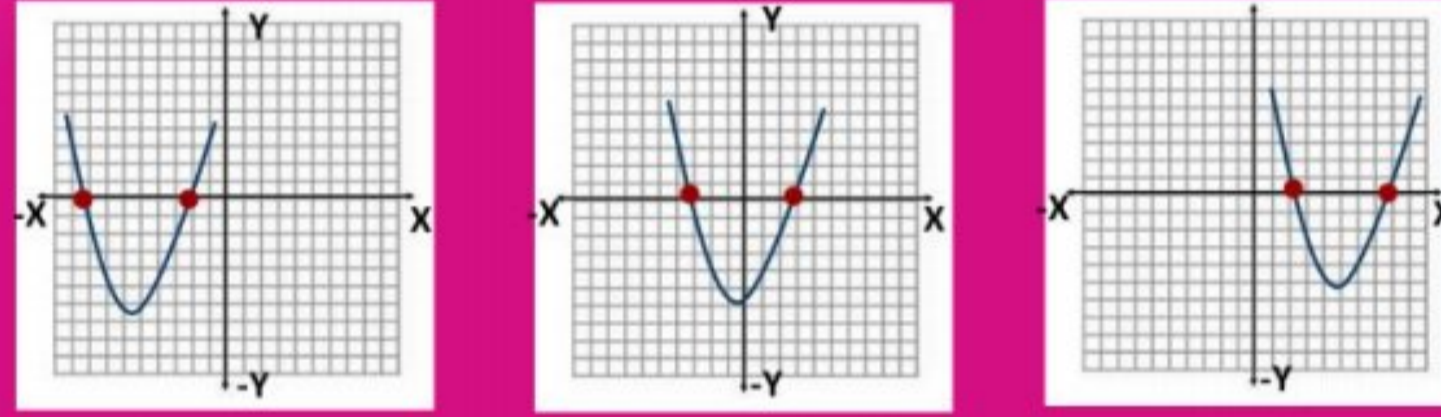
$$ax^2 + bx + c = 0 \quad a \neq 0$$

DISCRIMINANT విచక్షణి
 $= b^2 - 4ac$

విచక్షణి

DISCRIMINANT

$$b^2 - 4ac > 0$$

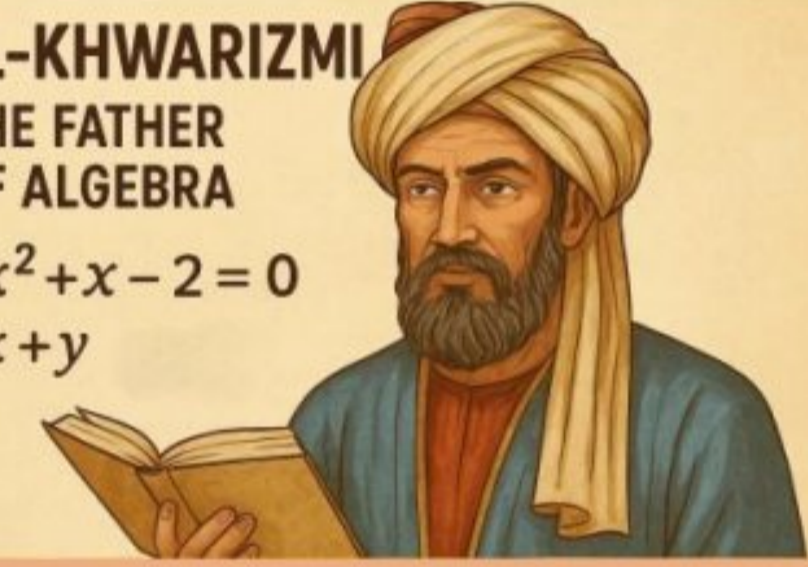


రెండు విభిన్న

వాస్తవ మూలాలు ఉంటాయి
Two different real roots

AL-KHWARIZMI
THE FATHER
OF ALGEBRA

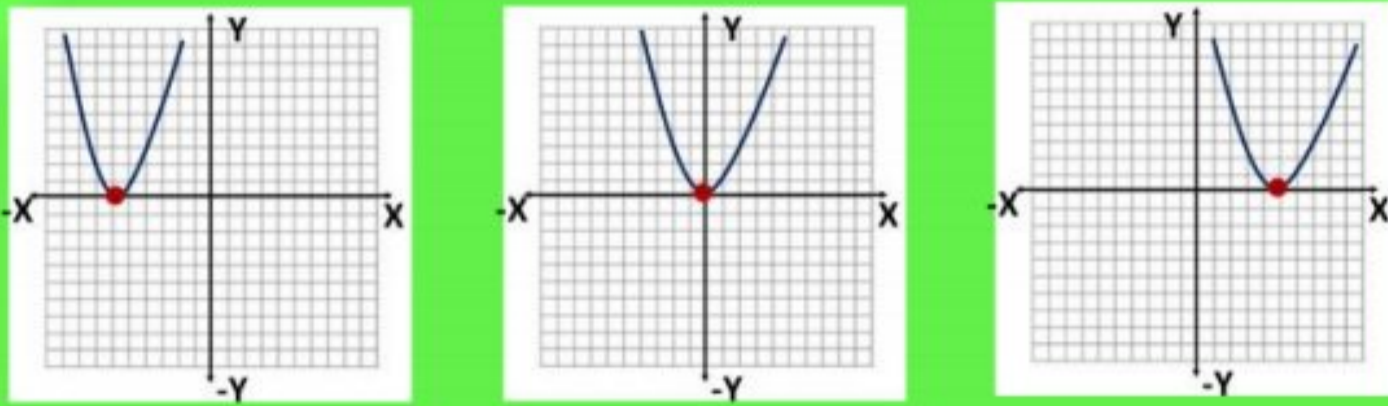
$$x^2 + x - 2 = 0$$
$$x + y$$



విచక్షణి

DISCRIMINANT

$$b^2 - 4ac = 0$$

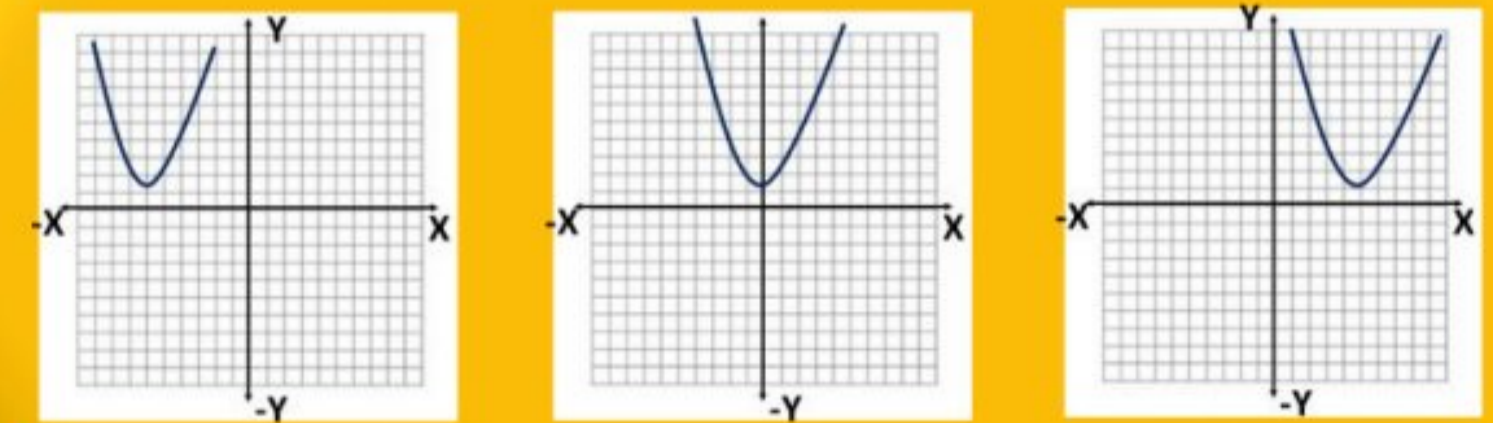


రెండు సమాన వాస్తవ
మూలాలు ఉంటాయి
Roots are Equal
and real

విచక్షణి

DISCRIMINANT

$$b^2 - 4ac < 0$$



వాస్తవ మూలాలు కావు
No Real roots

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

$$(x+3)(x+2) = 0$$

$$(x+3) = 0 \text{ OR } (x+2) = 0$$

$$x = -3 \text{ OR } x = -2$$

5. ARITHMETIC PROGRESSIONS అంక శ్రేణులు

1 Mark Question-1 4Marks Question-1 8Marks Question -1 Total Marks = **13 Marks**

The series of numbers formed by adding or subtracting a fixed number to form the preceding terms, except first term is called an arithmetic progression (A.P)

General form of an AP $a, a + d, a + 2d, a + 3d \dots a + (n-1)d$

n^{th} Term of AP $a_n = a + (n-1)d$

If l is the last term of an AP

Sum of first n terms $S_n = \frac{n}{2} [2a + (n-1)d]$

$$S_n = \frac{n}{2} [a + l]$$

The sum of first natural numbers $\Sigma n = 1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$

The sum of first n odd natural numbers = n^2

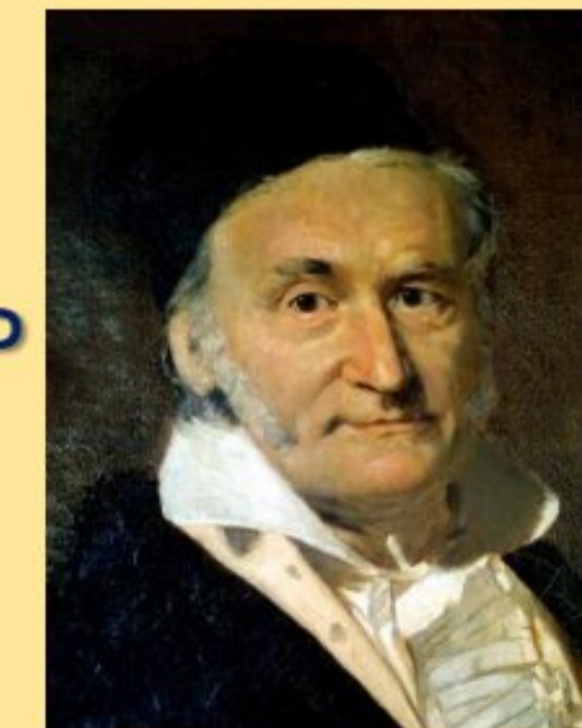
The sum of first n even natural numbers = $n(n+1)$

Given A.P. is 12, 20, 28, 36..... Find the sum of 30 terms of given A.P

Its first term is $a = 12$ Common difference is $d = 20 - 12 = 8$

The sum to 30 terms of an arithmetic progression

$$\begin{aligned} S_n &= \frac{n}{2} [2a + (n-1)d] = \frac{1}{2} \times 30 [2 \times 12 + (30-1) \times 8] = 15 [24 + 29 \times 8] \\ &= 15[24 + 232] = 15 \times 246 = 3690 \end{aligned}$$



Carl Friedrich Gauss

రెండు బహుభుజులు సరూపాలు కావాలి అంటే

- ❖ వాటి అనురూప కోణాలు సమానంగా ఉండాలి
- ❖ వాటి అనురూప భుజాలు ఒకే నిష్పత్తి లో ఉండాలి

రెండు సరూప త్రిభుజాలు వైశాల్యాలు నిష్పత్తి వాటి అనురూప భుజాలు వర్గాల నిష్పత్తికి సమానం

Two triangle are similar if they corresponding angles are equal and their corresponding sides are in the same ratio



6.TRAIANGLES

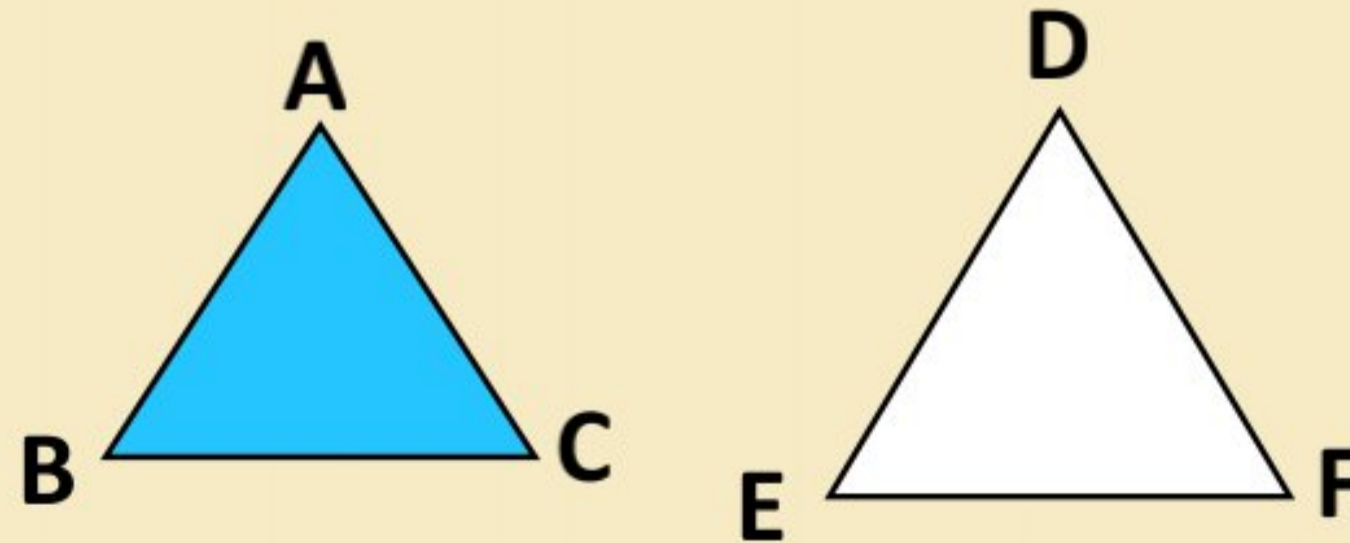
థేల్స్ సిద్ధాంతం

ఒక త్రిభుజములో ఒక భుజానికి సమాంతరంగా గీసిన రేఖ మిగిలిన రెండు భుజాలను వేరువేరు బిందువులలో ఖండించిన, ఆమిగిలిన రెండు భుజాలు ఒకే నిష్పత్తిలో విభజింపబడతాయి

Tales theorem

if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points the other two sides are divided in to the same ratio

Criteria for similarity of triangles



1.AAA (Angle–Angle–Angle) Similarity If two angles of one triangle are equal to two angles of another triangle, then the triangles are similar.

2.SSS (Side–Side–Side) Similarity If the three pairs of corresponding sides of two triangles are in the same ratio, then the triangles are similar. For example: If $AB/DE = BC/EF = CA/FD$ then $\Delta ABC \sim \Delta DEF$.

3.SAS (Side–Angle–Side) Similarity If two sides of a triangle are in proportion to two sides of another triangle, and the included angle between them is equal, then the triangles are similar. Example: $AB/DE = AC/DF$ and $\angle A = \angle D \rightarrow \Delta ABC \sim \Delta DEF$.

7. Coordinate Geometry నిరూపక రేఖాగణితం

2Marks Question-1

8Marks Question -1

Total Marks = 10 Marks

Distance between two points

$$\text{రెండు బిందువుల మధ్య దూరం} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Distance between (0,0) and (x,y)

$$\text{మూలబిందువునుండి ఒక బిందువుకు గల దూరం} = \sqrt{x^2 + y^2}$$

రేఖా ఖండం యొక్క మధ్య బిందువు

Mid point of line segment =

$$\left[\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right]$$

The coordinates of the point P(x, y) which divides the line segment joining the points A(x₁, y₁) and B(x₂, y₂), internally, in the ratio

$m_1 : m_2$ are

section formula.

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

Point of trisection : The points which divides the line segment into 3 equal parts are in the ratio of 1:2 and 2 is to 1 hour called of trisection

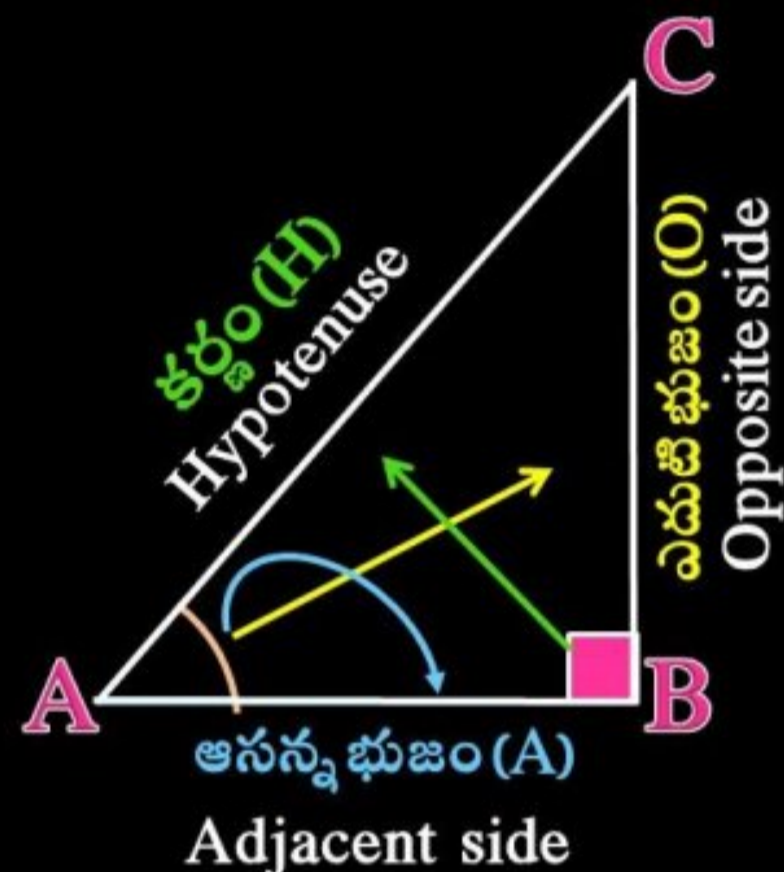


8. INTRODUCTION TO TRIGONOMETRY **త్రికోణమితి**

1 Mark Question-1 2Marks Question-1 4Marrks Question -1 Total Marks = 7 Marks

త్రికోణమితియ నిష్పత్తులు Trigonometric Ratios

$$\begin{aligned} \text{Sin A} &= \frac{\text{Opposite side}}{\text{Hypotenuse}} = \frac{BC}{AC} \\ \text{Cos A} &= \frac{\text{Adjacent side}}{\text{Hypotenuse}} = \frac{AB}{AC} \\ \text{Tan A} &= \frac{\text{Opposite side}}{\text{Adjacent side}} = \frac{BC}{AB} \end{aligned}$$



Opposite side of the angle A = BC

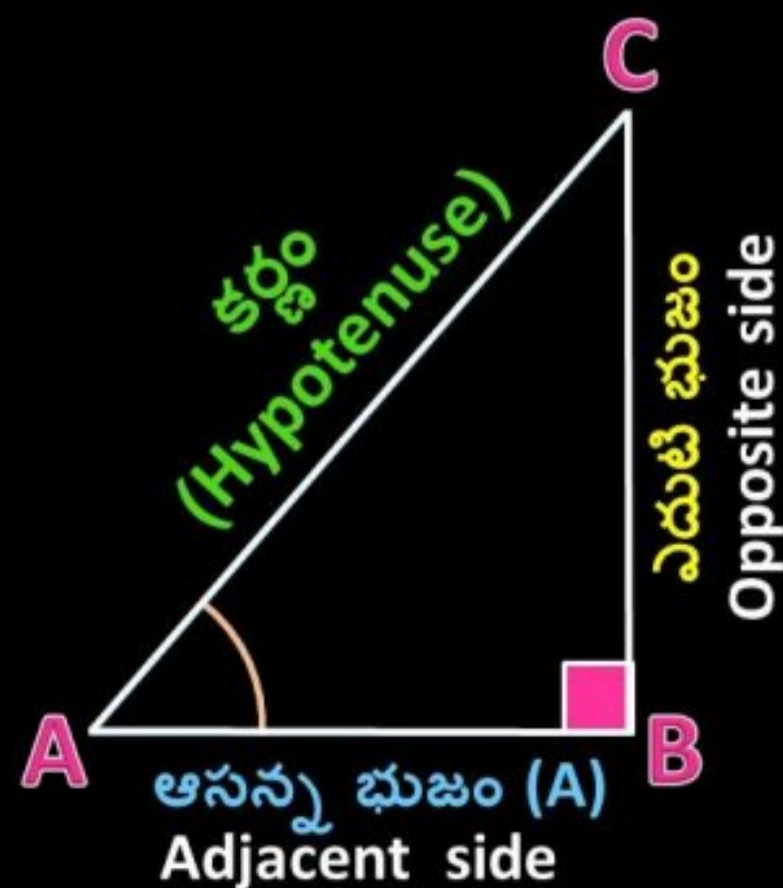
Adjacent side of the angle A = AB

$$\begin{aligned} \text{Sin A} &= \frac{1}{\text{Cosec A}} & \text{Cosec A} &= \frac{1}{\text{Sin A}} & \text{Sin A} \times \text{Cosec A} &= 1 \\ \text{Cos A} &= \frac{1}{\text{Sec A}} & \text{Sec A} &= \frac{1}{\text{Cos A}} & \text{Cos A} \times \text{Sec A} &= 1 \\ \text{Tan A} &= \frac{1}{\text{Cot A}} & \text{Cot A} &= \frac{1}{\text{Tan A}} & \text{Tan A} \times \text{Cot A} &= 1 \end{aligned}$$

$$\text{Sin}^2\text{A} + \text{Cos}^2\text{A} = 1 \quad \text{Sec}^2\text{A} - \text{Tan}^2\text{A} = 1 \quad \text{Cosec}^2\text{A} - \text{Cot}^2\text{A} = 1$$

MULTIPLICATIVE INVERSE OF THE SinA, CosA, TanA

$$\begin{aligned} \text{Cosec A} &= \frac{\text{Hypotenuse}}{\text{Opposite side}} = \frac{AC}{BC} \\ \text{Sec A} &= \frac{\text{Hypotenuse}}{\text{Adjacent side}} = \frac{AC}{AB} \\ \text{Cot A} &= \frac{\text{Adjacent side}}{\text{Opposite side}} = \frac{AB}{BC} \end{aligned}$$



Angle	0°	$\frac{\sqrt{0}}{\sqrt{4}}$	30°	$\frac{\sqrt{1}}{\sqrt{4}}$	45°	$\frac{\sqrt{2}}{\sqrt{4}}$	60°	$\frac{\sqrt{3}}{\sqrt{4}}$	90°	$\frac{\sqrt{4}}{\sqrt{4}}$
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	
Tan A	0		$\frac{1}{\sqrt{3}}$		1		$\sqrt{3}$		Not defined	
Cosec A	Not defined		2		$\sqrt{2}$		$\frac{2}{\sqrt{3}}$		1	
Sec A	1		$\frac{2}{\sqrt{3}}$		$\sqrt{2}$		2		Not defined	
Cot A	Not defined		$\sqrt{3}$		1		$\frac{1}{\sqrt{3}}$		0	

9. Applications of Trigonometry త్రికోణమితియ అనువర్తనాలు

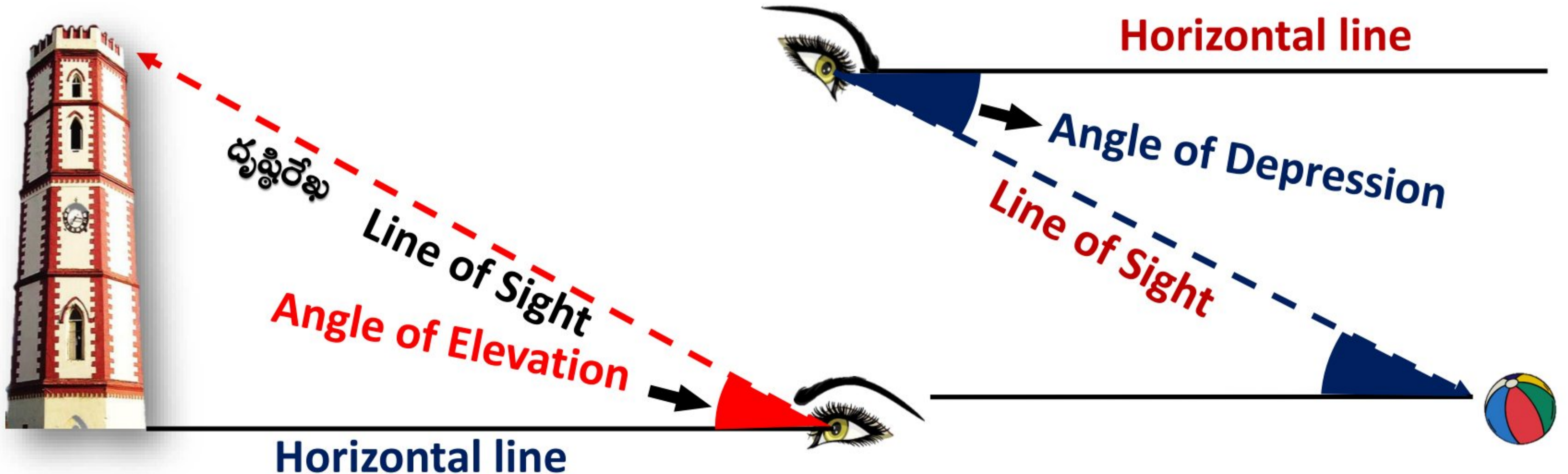
1 Mark Question-1 2Marks Question-1 8Marrks Question -1 Total Marks = 11 Marks

- క్షితిజ సమాంతర రేఖ దృష్టి రేఖకు పైన ఉన్నప్పుడు వాటి మధ్య ఏర్పడే కోణాన్ని ఊర్ధ్వ కోణం అంటారు.

The angle formed between the horizontal line and the line of sight when they are above each other is called the **Angle of elevation**.

- క్షితిజ సమాంతర రేఖకు దృష్టి రేఖకు క్రింద ఉన్నప్పుడు వాటి మధ్య ఏర్పడే కోణాన్ని నిమ్న కోణం అంటారు

The angle formed between the horizontal line and the line of sight when they are below it is called the **Angle of Depression**



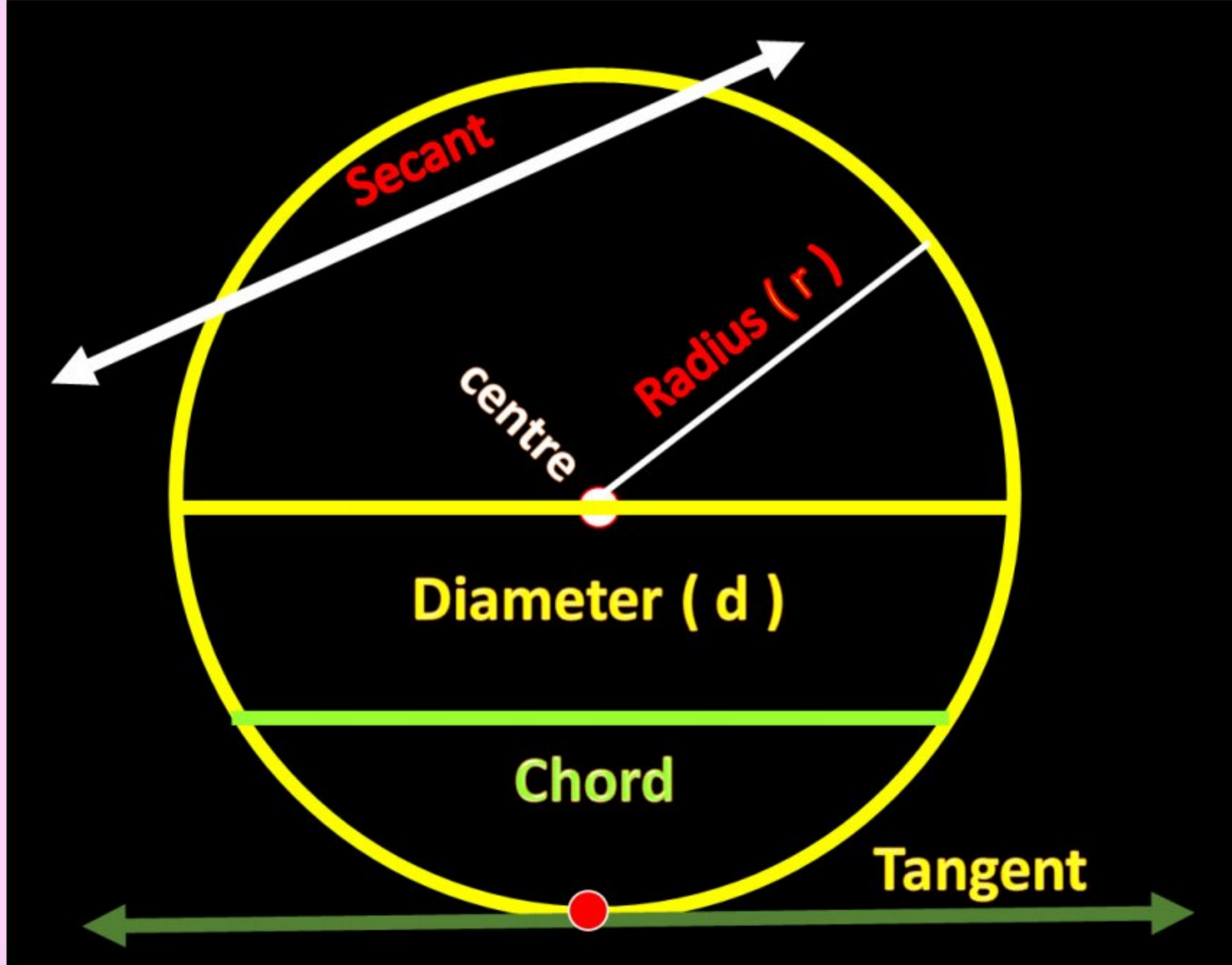
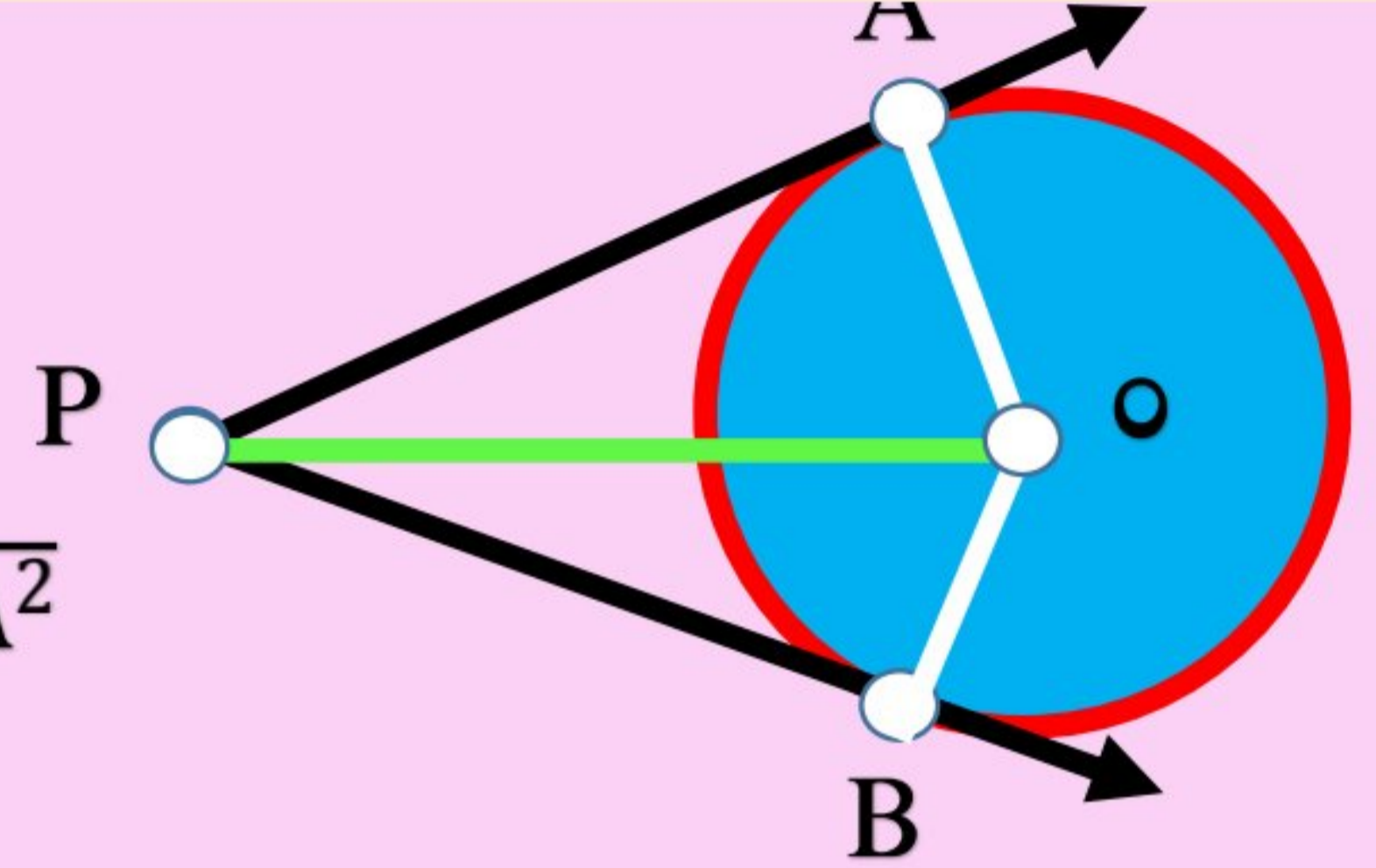
10. CIRCLES వృత్తాలు

1 Mark Question-1 2Marks Question-1 4Marrks Question -1 Total Marks = 7 Marks

బాహ్యబిందువునుండి వృత్తానికి గీచిన స్పర్శరేఖలు సమానం

The lengths of two tangents drawn from a external point and they are equal in length

స్పర్శరేఖపొడవు $AP = \sqrt{OP^2 - OA^2}$



Angle OPA = 90°

In OAP right angle triangle

$$OA^2 = AP^2 + OP^2$$

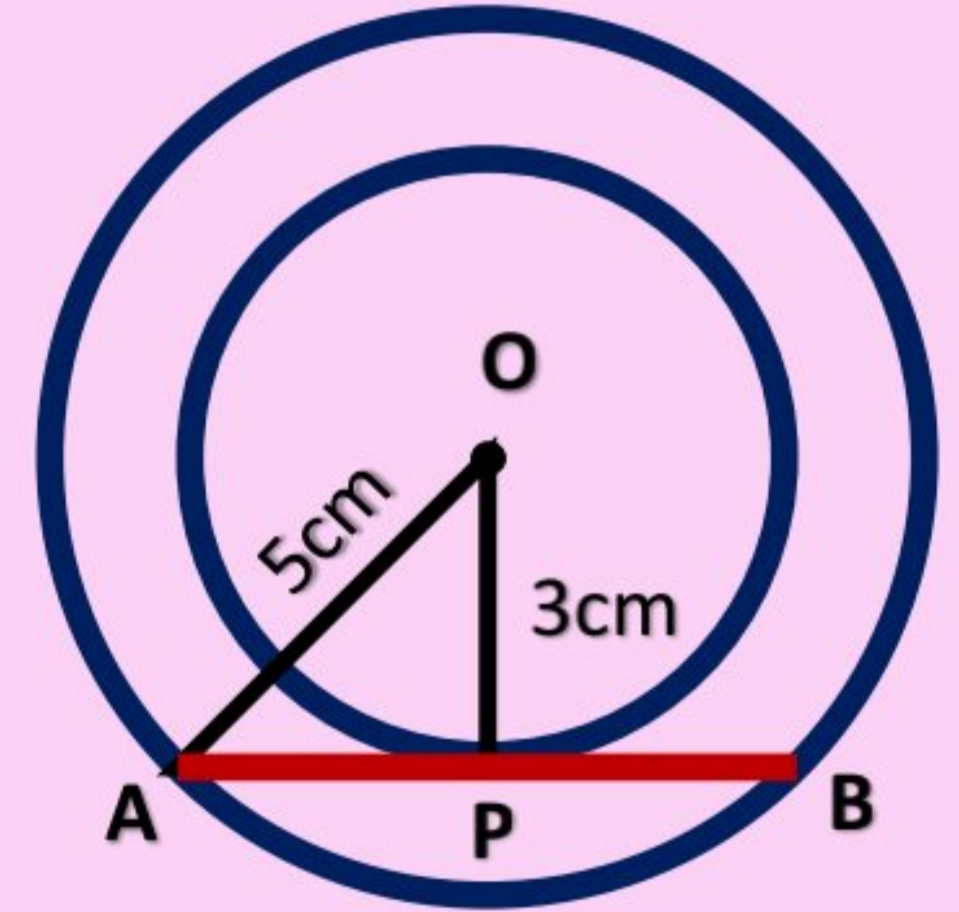
$$AP^2 = OA^2 - OP^2$$

$$AP^2 = 5^2 - 3^2$$

$$AP^2 = 25 - 9 = 16$$

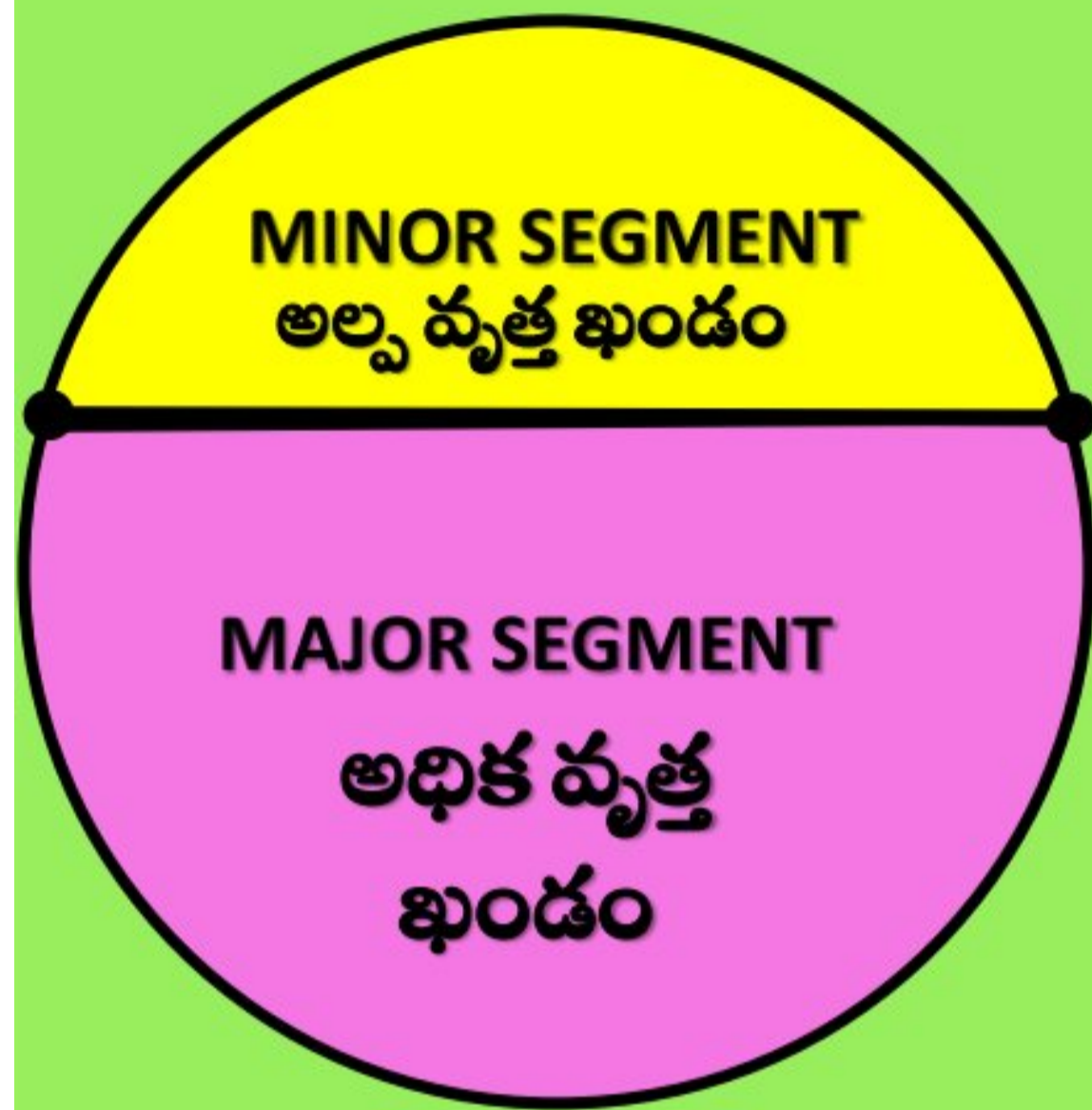
$$AP = 4$$

Length of the card AB = AP + BP = 4 + 4 = 8cm



11.AREA RELATED TO CIRCLES

8 Marrks Question -1 Total Marks = 8 Marks



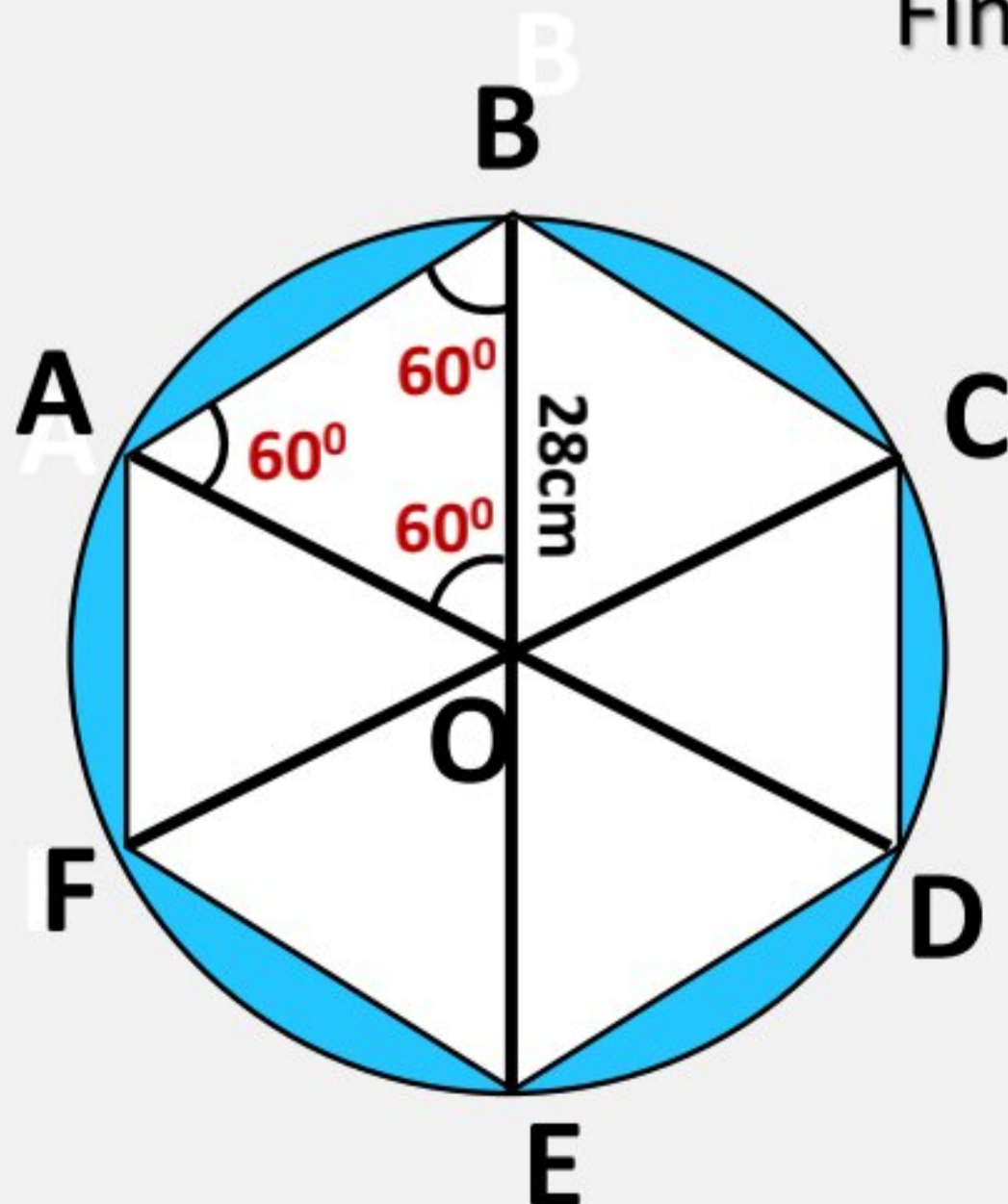
$$\text{Area of the Sector} = \frac{\theta}{360^\circ} \times \pi r^2$$

$$\text{Length of an arc of Sector} = \frac{\theta}{360^\circ} \times 2\pi r$$

Area of the major sector =
Area of the Circle – Area of the Minor Sector

$$\text{Area of an equilateral Triangle} = \frac{\sqrt{3}}{4} a^2$$

Find the shaded (Blue Color) region



Radius of the circle(r) = 28cm ABCDEF is regular Hexagon

OAB is Equilateral Triangle

$$\text{Area of Circle} = \pi r^2 = \frac{22}{7} \times 28 \times 28 = 88 \times 28 = 2464 \text{ Sq.cm}$$

$$\text{Area of Hexagon} = 6 \times \frac{\sqrt{3}}{4} a^2$$

$$\text{Area of Hexagon} = 6 \times \frac{1.7}{4} \times 28 \times 28$$

Area of Shaded region =

$$= 1999.2 \text{ Sq.cm}$$

$$\text{Area of Circle} - \text{Area of Hexagon} = 2464 - 1999.2 = 464.8 \text{ Sq.cm}$$

12. Surface Area and Volumes

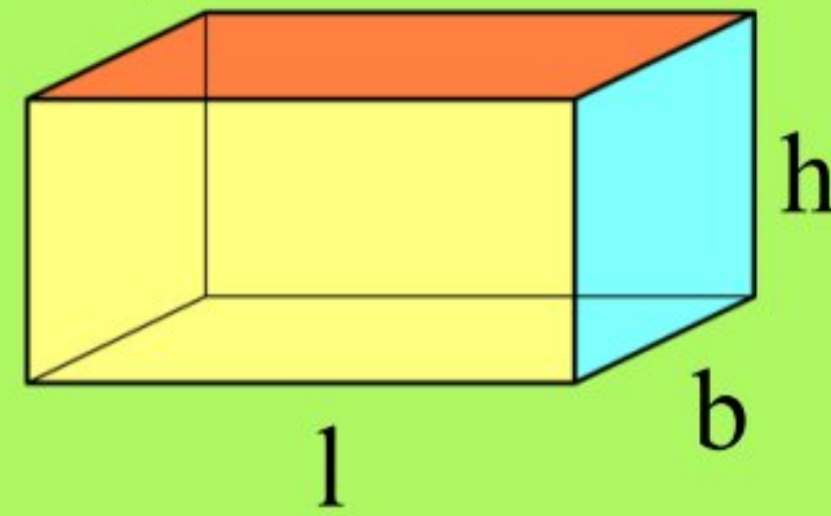
1 Mark Question-1 2Marks Question-1 4Marrks Question -1 Total Marks = 7 Marks

CUBOID

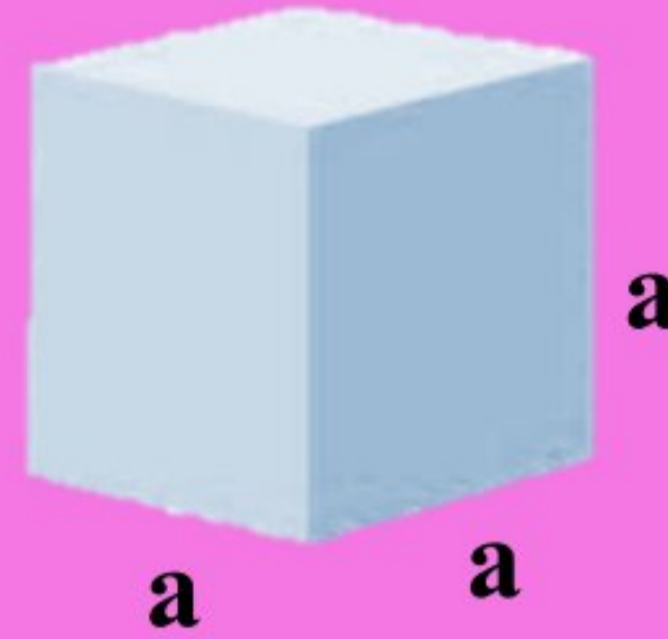
Lateral Surface Area = $2h(l+b)$

TSA = $2(lb+bh+hl)$

Volume of Cuboid = lbh



CUBE

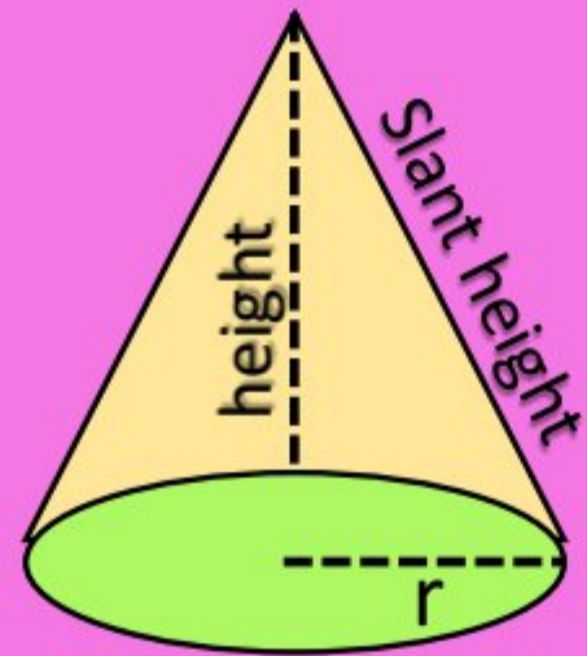


Lateral Surface Area = $4a^2$

Total Surface Area = $6a^2$

Volume of Cube = a^3

CONE



CSA = $\pi r l$

TSA = $\pi r l + \pi r^2$
 $= \pi r (l + r)$

Volume = $\frac{1}{3} \pi r^2 h$

SPHERE



Curved Surface Area = $4\pi r^2$

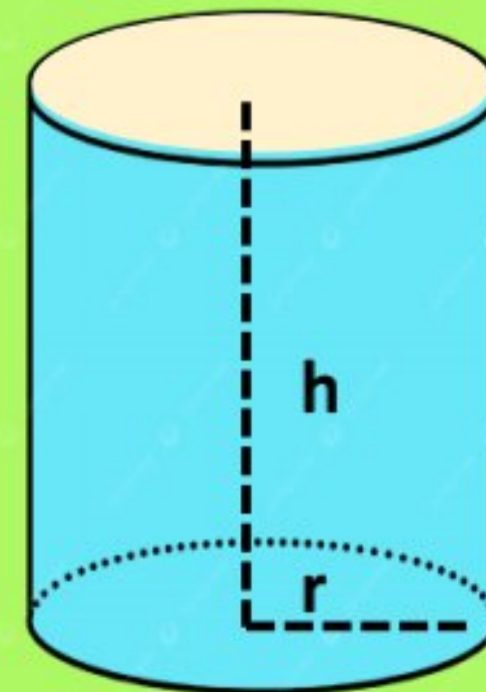
Volume = $\frac{4}{3} \pi r^3$

HEMI SPHERE CSA = $2\pi r^2$
 Volume = $\frac{2}{3} \pi r^3$

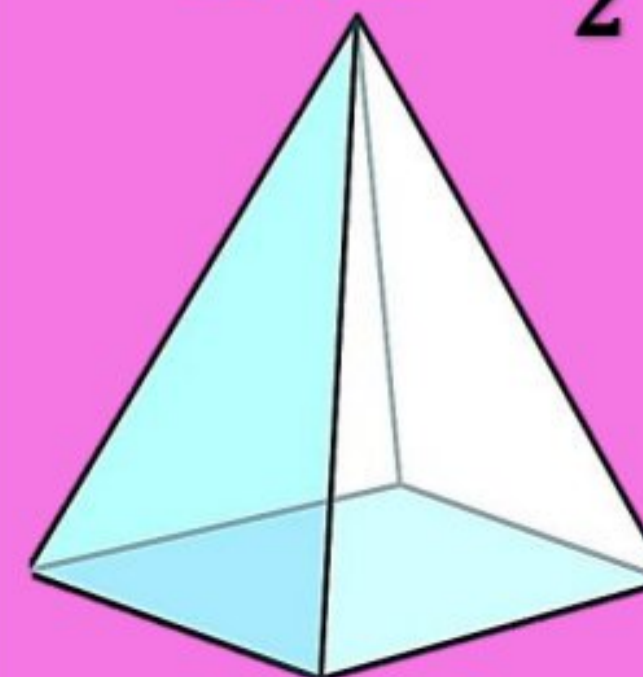


CYLINDER

CSA = $2\pi r h$
 TSA = $2\pi r h + \pi r^2 + \pi r^2$
 $= 2\pi r (h + r)$
 Volume = $\pi r^2 h$



LSA = $\frac{1}{2} \times \text{Base perimeter} \times \text{Slant height}$



TSA = LSA + Base Area

Volume = $\frac{1}{3} \text{Base Area} \times \text{Height}$

13. STATISTICS

4Marks Question-1 8 Marrks Question -1 Total Marks = 12 Marks

Arithmetic mean

$$\text{అంకగణిత సగటు} = \frac{\text{రాశుల మొత్తము}}{\text{రాశుల సంఖ్య}} = \frac{\text{Sum of Observations}}{\text{No. Observations}}$$

$$AM = \frac{\sum f_i \cdot x_i}{\sum f_i} \quad AM = a + \frac{\sum f_i \cdot d_i}{\sum f_i} \quad AM = a + \left[\frac{\sum f_i \cdot u_i}{\sum f_i} \right] \times h$$



Mode

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

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_0 = frequency of the class preceding the modal class,

f_2 = frequency of the class succeeding the modal class.

Median

$$\text{మధ్యగతం} = l + \left[\frac{\frac{n}{2} - cf}{f} \right] \times h$$

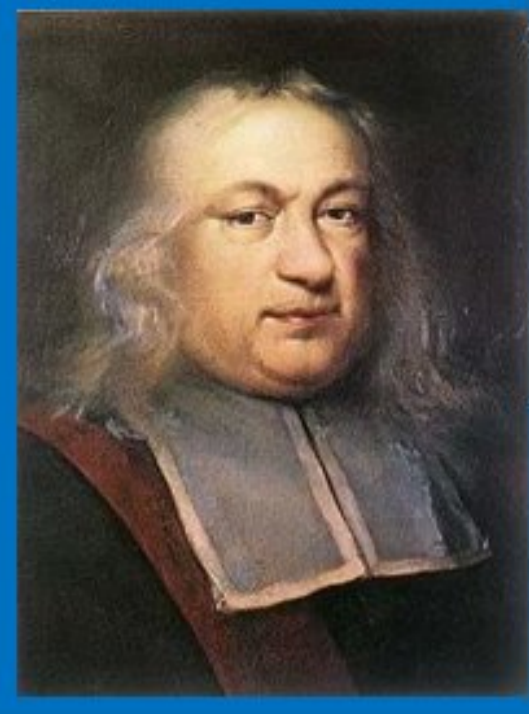
l = lower limit of median class,

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)



14. PROBABILITY సంభావ్యత



No. Favourable outcome

అనుకూల పర్యవసానాలు సంఖ్య

Total No. Possible Outcomes

సాధ్యమయ్యే మొత్తం పర్యవసానాలు సంఖ్య

1 Mark Question-1 4Marks Question-1 8Marrks Question -1 Total Marks = 13Marks

పాచిక సంభావ్యత PROBABILITY OF DICE



Total No. Possible Outcomes = 6
If you throw the dice once

ప్రధాన సంఖ్య / సరి / బేసి సంఖ్య పడే సంభావ్యత

Probability of Prime number or Even number or Odd number

$$\text{number} = \frac{3}{6} = \frac{1}{2}$$

నాణెం సంభావ్యత PROBABILITY OF COIN



Total Number of Possible Outcomes = 2

నాణాన్ని ఒకసారి ఎగురవేస్తే బొమ్మ లేదా బొరుసు పడే సంభావ్యత = $\frac{1}{2}$

If you toss a coin once, Probability of Head or Tail = $\frac{1}{2}$

52 పేకముక్కల సంభావ్యత Probability of Playing cards

52 Cards



HEART SPADE DIAMOND CLUB

Total Number of Possible Outcomes = 52

పేక ముక్కల కట్ట నుండి తీసిన ముక్క

$$\text{రాజు / రాణి అయ్యే సంభావ్యత} = \frac{4}{52} = \frac{1}{13}$$

$$\text{Probability of King / Queen} = \frac{1}{13}$$