ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ರಾಮನಗರ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್

ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ, ಸಾರ್ವಜನಿಕ ಶಿಕ್ಷಣ ಇಲಾಖೆ, ರಾಮನಗರ.

ಯಶಸ್ಸು

ಎಸ್ ಎಸ್ ಎಲ್ ಸಿ ಗಣಿತ ಪ್ರಶ್ನೋತ್ತರ ಮಾಲಿಕೆ:2018-19

ಮಾರ್ಗದರ್ಶಕರು : **ಶ್ರೀ ಎಂ.ಹೆಚ್. ಗಂಗಮಾರೇಗೌಡರವರು**

ಮಾನ್ಯ ಉಪನಿರ್ದೇಶಕರು (ಆಡಳಿತ)

ಸಾ.ಶಿ.ಇಲಾಖೆ, ರಾಮನಗರ ಜಿಲ್ಲೆ

ಸಂಪನ್ಮೂಲ ತಂಡ :

1. **ಶ್ರೀ ಪಿ. ಸೋಮಲಿಂಗಯ್ಯ,** ಶಿಕ್ಷಣಾಧಿಕಾರಿಗಳು, ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ, ರಾಮನಗರ, ರಾಮನಗರ ಜಿಲ್ಲೆ.
2. **ಶ್ರೀಮತಿ ಇಶ್ರತ್ ಜಹಾನ್,** ವಿಷಯ ಪರಿವೀಕ್ಷಕರು– ಗಣಿತ, ಉಪನಿರ್ದೇಶಕರ ಕಛೇರಿ, ರಾಮನಗರ, ರಾಮನಗರ ಜಿಲ್ಲೆ.
3. **ಶ್ರೀ ರಾಮಚಂದ್ರ ಬಿ ಕೆ,** ಸಹ ಶಿಕ್ಷಕರು, ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಅರಸನಕುಂಟೆ, ಮಾಗಡಿ ತಾ|| ಮತ್ತು ರಾಮನಗರ ಜಿ||
4. **ಶ್ರೀ ಎಲ್.ಸಿ. ಮಹದೇವಯ್ಯ,** ಸಹ ಶಿಕ್ಷಕರು, ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಬಿಳಗುಂಬ, ರಾಮನಗರ ತಾ|| ಮತ್ತು ಜಿ||
5. **ಶ್ರೀ ಚಕ್ರಪಾಣಿ ಬಿ.ಎ,** ಸಹ ಶಿಕ್ಷಕರು, ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಹೂಕುಂದ, ಕನಕಪುರ ತಾ|| ಮತ್ತು ರಾಮನಗರ ಜಿ||
6. **ಶ್ರೀ ಸಿ.ಎನ್. ಅನಿಲ್ ಕುಮಾರ್,** ಸಹ ಶಿಕ್ಷಕರು, ಸರ್ಕಾರಿ ಪ್ರೌಢಶಾಲೆ, ಅರಳಾಳುಸಂದ್ರ, ರಾಮನಗರ ತಾ|| ಮತ್ತು ಜಿ||
7. **ಶ್ರೀ ವಿನಯ ಕುಮಾರ್ ಎಸ್,** ಸಹ ಶಿಕ್ಷಕರು, ಕರ್ನಾಟಕ ಪಬ್ಲಿಕ್ ಸ್ಕೂಲ್, ಅರಳಾಳುಸಂದ್ರ, ಚನ್ನಪಟ್ಟಣ ತಾ||, ರಾಮನಗರ ಜಿ||

2018–19th Unitwise allotment of marks

SL. No.	UNIT	Marks Alloted
1*	ARITHMETIC PROGRESSIONS	6
2*	TRIANGLES	8
3*	PAIR OF LINEAR EQUATIONS IN TWO VARIABLES	8
4*	CIRCLES	4
5	AREAS RELATED TO CIRCLES	3
6	CONSTRUCTIONS	5
7*	COORDINATE GEOMETRY	5
8*	REAL NUMBERS	4
9*	POLYNOMIALS	6
10*	QUADRATIC EQUATIONS	6
11*	INTRODUCTION TO TRIGONOMETRY	5
12	SOME APPLICATIONS OF TRIGONOMETRY	4
13*	STATISTICS	6
14	PROBABILITY	3
15*	SURFACE AREAS AND VOLUMES	7
	TOTAL	**80**

(* **indicates units of internal choice**)

ಪ್ರಿಯ ವಿದ್ಯಾರ್ಥಿಗಳೇ ಮುಂದೆ ನೀಡಿರುವ ಗಣಿತದ ಸೂತ್ರಗಳು ಹಾಗೂ ಮಾದರಿ ಲೆಕ್ಕಗಳನ್ನು ನಿಯಮಿತವಾಗಿ ಅಭ್ಯಾಸ ಮಾಡುವ ಮೂಲಕ ಗಣಿತವನ್ನು ಸುಲಭವಾಗಿ ಕಲಿತು ಮಾರ್ಚ್ – 2019ರ ವಾರ್ಷಿಕ ಪರೀಕ್ಷೆಗೆ ಉತ್ತಮವಾಗಿ ಪೂರ್ವಸಿದ್ಧತೆ ಮಾಡಿಕೊಳ್ಳಿ. ಸಮರೂಪ ತ್ರಿಭುಜಗಳು ಮತ್ತು ಸ್ಪರ್ಶಕಗಳ ರಚನೆಗಳು, ಪ್ರಮೇಯ, ಗ್ರಾಫ್, ಓಜೀವ್, ಬಹುಲಕ/ಮಧ್ಯಾಂಕದ ಟೇಬಲ್ ಲೆಕ್ಕ, ಹಾಗೂ ಕೆಲವು ಆಯ್ದ ಮುಖ್ಯ ಪರಿಕಲ್ಪನೆಗಳಿಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಅಭ್ಯಾಸದ ಹಿತ ದೃಷ್ಟಿಯಿಂದ ಸೂತ್ರಗಳು ಮತ್ತು ಮಾದರಿ ಪ್ರಶ್ನೆಗಳನ್ನು ನೀಡಲಾಗಿದೆ. ಇವುಗಳನ್ನು ಬಿಡಿಸಿ, ಪುನರಾವರ್ತನೆ ಮಾಡಿಕೊಳ್ಳಿ. ಕೆಲವು ಲೆಕ್ಕಗಳಿಗೆ ಮಾದರಿ ಉತ್ತರಗಳನ್ನು ನೀಡಲಾಗಿದೆ. ಲೆಕ್ಕಗಳನ್ನು ಬಿಡಿಸುವಾಗ 2, 3 ಮತ್ತು 4 ಅಂಕದ ಪ್ರಶ್ನೆಗಳಿಗೆ ಹಂತಗಳನ್ನು ಅನುಸರಿಸಿ. ಇದರಿಂದ ಅಂಕ ಗಳಿಕೆಗೆ ಸಹಕಾರಿ ಆಗುತ್ತದೆ. ಜೊತೆಗೆ ಪಠ್ಯ ಪುಸ್ತಕದ ಉದಾಹರಣೆ ಲೆಕ್ಕಗಳು ಮತ್ತು ಅಭ್ಯಾಸ ಲೆಕ್ಕಗಳನ್ನು ಚನ್ನಾಗಿ ಅಭ್ಯಸಿಸುವುದು. ಗಣಿತದಲ್ಲಿ ಪರ್ಯಾಯ ವಿಧಾನದ ಸರಿಯಾದ ಉತ್ತರಗಳಿಗೆ ಪೂರ್ಣ ಅಂಕಗಳನ್ನು ನೀಡಲಾಗುತ್ತದೆ. ಈ ಬಗ್ಗೆ ಗೊಂದಲ ಬೇಡ. ಬರೆದು ಅಭ್ಯಾಸ ಮಾಡುವ ರೂಢಿಯಿದ್ದರೆ ಪರೀಕ್ಷೆಯಲ್ಲಿಯೂ ಸುಲಭವಾಗಿ ಬರೆಯಬಲ್ಲಿರಿ. ನಿಮ್ಮ ಪ್ರಯತ್ನಕ್ಕೆ ಉತ್ತಮ ಪ್ರತಿಫಲ ಸಿಗಲಿ ಎಂದು ಆಶಿಸುತ್ತೇವೆ.

ಧನ್ಯವಾದಗಳೊಂದಿಗೆ,

ಸಂಪನ್ಮೂಲ ತಂಡ

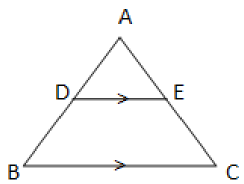
VERY IMPORTANT FORMULAE / STATEMENTS

ARITHMETIC PROGRESSIONS

1) General form of arithmetic progression $\mathbf{a, (a+d), (a+2d), \ldots\ldots.. a+(n-1)d}$.
2) $\mathbf{n^{th}}$ term of arithmetic progression $\mathbf{a_n = a + (n-1)d}$
3) $\mathbf{n^{th}}$ term from last of an AP is $= \boldsymbol{l} - \mathbf{(n-1)d}$
4) Common difference of AP, $\mathbf{d = \frac{a_p - a_q}{p - q}}$ (when any 2 terms are given)
5) Common difference of AP, $\mathbf{d = a_2 - a_1}$ or $\mathbf{d = \frac{a_n - a}{n-1}}$
6) The sum of first n positive integers $\mathbf{S_n = \frac{n(n+1)}{2}}$
7) The sum of first n odd natural numbers $\mathbf{S_n = n^2}$
8) The sum of first n even natural numbers $\mathbf{S_n = n(n+1)}$
9) Sum of first n terms of an AP $\mathbf{S_n = \frac{n}{2}[2a + (n-1)d]}$
10) Sum of first n terms of an AP $\mathbf{S_n = \frac{n}{2}[\,a + a_n]}$ or $\mathbf{S_n = \frac{n}{2}[\,a + \boldsymbol{l}\,]}$
11) In any progression $\mathbf{S_n - S_{n-1} = a_n}$
12) If a, b, c are in AP, then the arithmetic mean between a and c is given by $\mathbf{b = \frac{a+c}{2}}$

SIMILAR TRIANGLES

13) In $\mathbf{\Delta ABC}$ if $\mathbf{DE \parallel BC}$ then

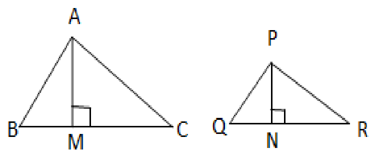


$\mathbf{\frac{AD}{DB} = \frac{AE}{EC}}$ (Thales theorem)

$\mathbf{\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}}$ (corollary of Thales theorem)

$\mathbf{\frac{DB}{AB} = \frac{EC}{AC}}$ (corollary of Thales theorem)

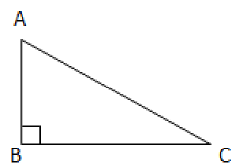
14) In the given fig.if $\Delta \boldsymbol{ABC} \sim \Delta \boldsymbol{PQR}$ then



$\mathbf{\frac{\mathit{ar}\,(\Delta ABC)}{\mathit{ar}(\Delta PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2 = \left(\frac{AM}{PN}\right)^2}$

15) In right angled Δ ABC if $\angle$ABC $= \mathbf{90^o}$ then

$\mathbf{AC^2 = AB^2 + BC^2}$ (Pythagoras Theorem)



16)

Pythagorean Triplets	Details		Pythagorean Triplets	Details
$3,4,5$	$3^2 + 4^2 = 5^2$		$8,15,17$	$8^2 + 15^2 = 17^2$
$6,8,10$	$6^2 + 8^2 = 10^2$		$12,16,20$	$12^2 + 16^2 = 20^2$
$5,12,13$	$5^2 + 12^2 = 13^2$		$10,24,26$	$10^2 + 24^2 = 26^2$

t

PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

17) Standard form of linear equation in one variable $ax + b = 0$ (here $a \neq 0$)

18) Standard form of linear equation in two variables $ax + by + c = 0$ (here $a^2 + b^2 \neq 0$)

19) The general form for a pair of linear equations in two variables x and y is

$$\left.\begin{aligned} a_1x + b_1y + c_1 &= 0 \\ a_2x + b_2y + c_2 &= 0 \end{aligned}\right\} \text{Here } a_1,\ b_1,\ c_1,\ a_2,\ b_2,\ c_2 \text{ are all real numbers and } {a_1}^2 + {b_1}^2 \neq 0\ , \quad {a_2}^2 + {b_2}^2 \neq 0$$

20) $a_1x + b_1y + c_1 = 0$

$a_2x + b_2y + c_2 = 0$ The lines represented by these equations

- Intersect if $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ and pair of equations has a unique solution
- Coincide if $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ and pair of equations has infinitely many solutions
- Are parallel if $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ and pair of equations has no solution

21) For the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ the equation used to find solutions by Cross Multiplication Method is

$$\frac{x}{b_1c_2 - b_2c_1} = \frac{y}{c_1a_2 - c_2a_1} = \frac{1}{a_1b_2 - a_2b_1}$$

CIRCLES

22) A line that intersects a circle at two distinct points is called a secant.

23) A line that intersects a circle at only one point is called a tangent.

24) The tangent to a circle is a special case of the secant,when the two end points of its corresponding chord coincide.

25) The tangent at any point of a circle is perpendicular to the radius through the point of contact.

26) The length of tangents drawn from an external point to a circle are equal.

27) The length of the tangent drawn from an external point at a distance of d units from the center of the circle of radius r is given by $t = \sqrt{d^2 - r^2}$

AREAS RELATED TO CIRCLES

28) Length of the circumference of a circle of radius r $= 2\pi r$

29) **Length of the circumference of a circle of diameter d $= \pi d$**

30) Area of a circle of radius r $= \pi r^2$ sq.units

31) **Area of the quadrant of a circle of radius** r $= \frac{1}{4}\pi r^2$ sq.units

32) Area of the sector of angle θ $= \frac{\theta}{360} \times \pi r^2$ sq.units

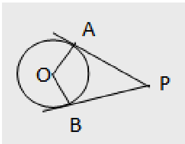
33) **Length of an arc of a sector of angle θ** $= \frac{\theta}{360} \times 2\pi r$ units

34) Area of the segment of a circle = Area of the corresponding sector – Area of the corresponding triangle.

CONSTRUCTIONS

35) In the given fig.the angle between the tangents

$\angle APB = 180^\circ - \angle AOB$



36) In a circle the point of intersection of the perpendicular bisectors of two non-parallel chords is the center of the circle.

COORDINATE GEOMETRY

37) Distance between the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ is $PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

38) Distance of a point $P(x, y)$ from the origin is given by $\sqrt{x^2 + y^2}$

39) The coordinates of the point $P(x, y)$ which divides the line segment joining the points $A(x_1, y_1)$ and $B(x_2, y_2)$ internally in the ratio $m_1 : m_2$ are $\left(\frac{m_1x_2+m_2x_1}{m_1+m_2}, \frac{m_1y_2+m_2y_1}{m_1+m_2}\right)$

40) The coordinates of the mid-point of the line segment joining the points $P(x_1, y_1)$ and $Q(x_2, y_2)$ are $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

41) Area of the triangle whose vertices are (x_1, y_1), (x_2, y_2) and (x_3, y_3) is

$\frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)]$ sq.units

REAL NUMBERS

42) Euclid's Division Lemma : Given positive integers a and b, there exist unique integers q and r satisfying $a = bq + r$, $0 \leq r < b$.

43) For any two positive integers a and b , HCF $(a, b) \times$ LCM $(a, b) = a \times b$.

44) If $x = \frac{p}{q}$ (here p , q are co-primes) is a rational number which has a terminating decimal expansion then q is of the form $2^n \times 5^m$ (n, m are non-negative integers)

POLYNOMIALS

45) A polynomial of degree 1 is called a linear polynomial.

46) A polynomial of degree 2 is called a quadratic polynomial.

47) A polynomial of degree 3 is called a cubic polynomial.

48) *The general form of a linear polynomial in x is of the form* $ax + b$, where a , b are real numbers and $a \neq 0$

49) *The general form of a quadratic polynomial in x is of the form*

$ax^2 + bx + c$, where a , b , c are real numbers and $a \neq 0$

50) *The general form of a cubic polynomial in x is of the form*

$ax^3 + bx^2 + cx + d$, where a , b , c , d are real numbers and $a \neq 0$

51) The zero of a linear polynomial $ax + b$ is $= \frac{-b}{a}$

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

- ❖ Sum of zeroes $\alpha + \beta = \frac{-b}{a}$
- ❖ Product of zeroes $\alpha\beta = \frac{c}{a}$

53) *If* α, β, γ *are the zeroes of a cubic polynomial* $ax^3 + bx^2 + cx + d$ then

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

- $\alpha\,\beta\gamma = \dfrac{-d}{a}$.

54) Quadratic polynomial with α and β as its zeroes is $x^2 - (\alpha + \beta)x + \alpha\,\beta$.

55) A linear polynomial has only one zero .

56) A quadratic polynomial can have atmost 2 zeroes .

57) A cubic polynomial can have atmost 3 zeroes .

58) $A\ polynomial\ of\ degree\ n$ has atmost n zeroes .

59) Division Algorithm for polynomials is given by $\mathbf{p}(x) = \mathbf{g}(x)\mathbf{q}(x) + \mathbf{r}(x)$

60) In polynomial division Divisor $\mathrm{g}(x) = \dfrac{\mathrm{p}(x) - \mathrm{r}(x)}{\mathrm{q}(x)}$

QUADRATIC EQUATIONS

61) $The\ standard\ form\ of\ a\ quadratic\ equation\ in\ x\ is\ \mathbf{a}x^2 + \mathbf{b}x + \mathbf{c} = \mathbf{0}$

$here\ a, b, c\ are\ real\ numbers\ and\ a \neq 0$

62) Formula used to find the roots of a quadratic equation is $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

63) Discriminant of a quadratic equation is $b^2 - 4ac$

64) $A\ quadratic\ equation\ ax^2 + bx + c = 0$ has

- $two\ distinct\ real\ roots\ ,\ if\ b^2 - 4ac > 0$,
- two equal real roots , if $b^2 - 4ac = 0$,
- $no\ real\ roots\ ,\ if\ b^2 - 4ac < 0$.

65) In quadratic equation $ax^2 + bx + c = 0$ if $b^2 - 4ac = 0$

66) $then\ the\ roots\ of\ the\ equation\ are\ x = \dfrac{-b}{2a}$ or $x = \dfrac{-b}{2a}$

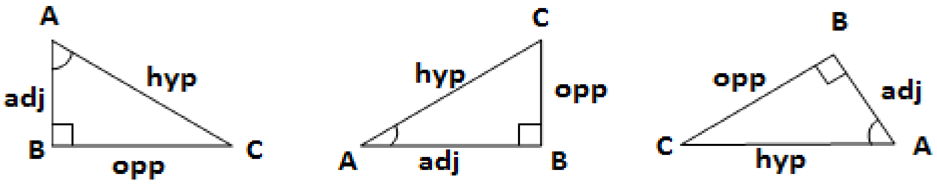
67) $In\ quadratic\ equation\ ax^2 + bx + c = 0$ if $b = 0$ then the roots are additive inverse.

68) $In\ quadratic\ equation\ ax^2 + bx + c = 0$ if $a = c$ then the roots are reciprocals to each other .

69) $In\ quadratic\ equation\ ax^2 + bx + c = 0$ if $c = 0$ then one of the roots will be zero

INTRODUCTION TO TRIGONOMETRY

70) The trigonometric ratios of acute angle $\angle A$ in the given right triangles .



Trigonometric ratios of acute angle $\angle A$		
$\sin A = \frac{opp}{hyp}$	$\cos A = \frac{adj}{hyp}$	$\tan A = \frac{opp}{adj}$
$\text{cosec } A = \frac{hyp}{opp}$	$\sec A = \frac{hyp}{adj}$	$\cot A = \frac{adj}{opp}$
Reciprocals of trigonometric ratios		
$\sin A = \frac{1}{\text{cosec } A}$	$\cos A = \frac{1}{\sec A}$	$\tan A = \frac{1}{\cot A}$
$\text{cosec } A = \frac{1}{\sin A}$	$\sec A = \frac{1}{\cos A}$	$\cot A = \frac{1}{\tan A}$

71) $\tan A = \frac{\sin A}{\cos A}$ and $\cot A = \frac{\cos A}{\sin A}$

72) Trigonometric ratios of some specific angles

$\angle A$	0^0	30^0	45^0	60^0	90^0
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	$\sqrt{3}$	N. D
cosec A	N. D	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	N. D
cot A	N. D	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0

73) $\boldsymbol{Trigonometric\ Ratios\ of\ Complementary\ angles}$

$\sin(90^\circ - A) = \cos A$ or $\cos(90^\circ - A) = \sin A$

$\tan(90^\circ - A) = \cot A$ or $\cot(90^\circ - A) = \tan A$

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

Trigonomtric Identities

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

75) $1 + \tan^2 A = \sec^2 A$ or $\sec^2 A - \tan^2 A = 1$

76) $1 + \cot^2 A = \operatorname{cosec}^2 A$ or $\operatorname{cosec}^2 A - \cot^2 A = 1$

77) $\sin^2 A = 1 - \cos^2 A = (1 + \cos A)(1 - \cos A)$

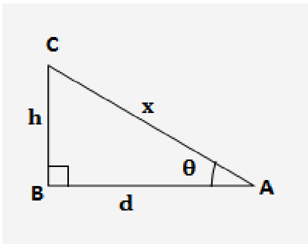
78) $\cos^2 A = 1 - \sin^2 A = (1 + \sin A)(1 - \sin A)$

79) $\sin A = \sqrt{1 - \cos^2 A}$

80) $\cos A = \sqrt{1 - \sin^2 A}$

SOME APPLICATIONS OF TRIGONOMETRY

81) In right triangle ABC if $\angle A = \theta$ is an acute angle then



- Height $h = \tan\theta \times d$
- distance $d = \cot\theta \times h$
- slant height $x = \dfrac{h}{\sin\theta}$ or $x = \dfrac{d}{\cos\theta}$

STATISTICS

82) Mid-point or Class mark $= \dfrac{Upper\ class\ limit + Lower\ class\ limit}{2}$

83) Formula to find the Mean of Grouped data

- Direct Method : Mean $\bar{x} = \dfrac{\sum f_i x_i}{\sum f_i}$
- Assumed Mean Method : Mean $\bar{x} = a + \dfrac{\sum f_i d_i}{\sum f_i}$
- Step-deviation Method : Mean $\bar{x} = a + \left(\dfrac{\sum f_i u_i}{\sum f_i}\right) \times h$

84) Formula to find the Mode of Grouped data

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

85) Formula to find the Median of Grouped data

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

86) Empirical relationship between the three measures of central tendency :
- 3 Median = Mode + 2 Mean.
- Mode = 3 Median - 2 Mean.
- 2 Mean = 3 Median - Mode.

PROBABILITY

87) Probability of an event $P(E) = \dfrac{n(E)}{n(S)}$

- here $n(E)$ is number of outcomes favourable to E and
- $n(S)$ is number of all possible outcomes .

88) The probability of a sure event (or certain event) is **1**.

89) The probability of an impossible event is 0.

90) The probability of an event E is a number P(E) such that $0 \leq P(E) \leq 1$.

91) An event having only one outcome is called an elementary event.

92) The sum of the probabilities of all the elementary events of an experiment is 1 .

93) If E and $(\overline{E})$ *are complementary events , then* $P(E) + P(\overline{E}) = 1$.

94) If a coin is tossed once then the sample space $S = \{H, T\}$ $\therefore n(S) = 2$

95) If two coins are tossed simultaneously then the sample space

$S = \{HH, HT, TH, TT\}$ $\therefore n(S) = 4$

96) If three coins are tossed simultaneously then the sample space
$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$ $\therefore n(S) = 8$

97) If two unbiased dice are thrown simultaneously then the total outcomes $n(S) = 36$.

SURFACE AREAS AND VOLUMES

98) Table containing the formulae used to find the surface areas and volumes of solids

SOLIDS	LSA	TSA	VOLUME
CUBE	$4a^2$	$6a^2$	a^3
CUBOID	$2h(l+b)$	$2(lb+bh+hl)$	$l\times b\times h$
CYLINDER	$2\pi rh$	$2\pi r(h+r)$	πr^2h
CONE	πrl	$\pi r(l+r)$	$\frac{1}{3}\pi r^2h$
SPHERE	$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$
HEMISPHERE	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$
FRUSTUM of a CONE	$\pi l(r_1+r_2)$	$\pi l(r_1+r_2)+\pi(r_1^{\ 2}+r_2^{\ 2})$	$\frac{1}{3}\pi h\,(r_1^{\ 2}+r_2^{\ 2}+r_1r_2)$

99) Perimeter of the base of cyclinder / cone / hemisphere = $2\pi r$

100) Slant height of a Cone $l=\sqrt{r^2+h^2}$

101) Slant height of frustum of a cone $l=\sqrt{h^2+(r_1-r_2)^2}$

UNIT – 1 : ARITHMETIC PROGRESSION

1 Mark Questions (MCQ)

1) Which of the following is an AP ?

A) 2, 4, 8, 16 …………….. B) 2, $\frac{5}{2}$, 3, $\frac{7}{2}$, ……………..

C) 1, 3, 9, 27 …………….. D) 1, 3, 4, 6 ……………..

2) If a, b and c are in AP ,then $\frac{b-a}{c-b}$ is

A) $\frac{b}{a}$ B) 0 C) 1 D) 2a

3) $\frac{3}{2}, \frac{1}{2}, -\frac{1}{2}, -\frac{3}{2}$, …………….. Common difference of this AP

A) -1 B) $\frac{1}{2}$ C) $-\frac{1}{2}$ D) $\frac{2}{3}$

4) 10, 7, 4, … … … … …. 30^{th} term of this AP
A) 97 B) 77 C) -77 D) -87

5) $-3,\ -\frac{1}{2},\ 2,$ … … … … …. 11^{th} term of this APÀ
A) 28 B) 22 C) – 38 D) $-48\frac{1}{2}$

6) In an AP if $a_n = 3 + 4n$ *then the value of*É a_3 *is*
A) 15 B) 9 C) 12 D) 13

7) In an AP if $S_n = 4n - n^2$ *then* d *is*
A) 2 B) 1 C) – 2 D) – 1

8) In an AP if $S_5 = 30$ *and* $S_4 = 20$ *then* a_5 is
A) 10 B) 50 C) 20 D) 9

9) If $a_7 = 6$ in an AP of 13 terms then the value of S_{13} *is*
A) 42 B) 24 C) 87 D) 78

10) The sum of first 50 odd natural numbers is
A) 250 B) 500 C) 2500 D) 5000

1 Mark Questions (VSA)

11) Write the n^{th} term of an AP whose first term is a and common difference is d .
12) In an AP if $a_n = 3 + 2n$ then find a_4 .
13) *If* $-3,\ a,\ 2$ *are* the three consecutive terms of an AP then find a .
14) $\sqrt{2},\ \sqrt{8},\ \sqrt{18},$ .... write the next term of this AP.
15) Who is the famous mathematician who easily calculated the sum of first 100 natural numbers ?

<table>
<tr><td rowspan="2">Ans</td><td>1) B</td><td>2) C</td><td>3) A</td><td>4) C</td><td>5)B</td><td>6) A</td><td>7) C</td><td>8) A</td><td>9) D</td><td>10) C</td></tr>
<tr><td colspan="4">11) $a_n = a + (n-1)d$</td><td colspan="2">12) $a_4 = 11$</td><td>13) $-\frac{1}{2}$</td><td colspan="2">14) $\sqrt{32}$</td><td>15) Gauss</td></tr>
</table>

2 Marks Questions (SA)

16) **In an AP 2 , 7, 12 , ...find the 10^{th} term.**
SolutionÀ :In this AP $a = 2$ and $d = a_2 - a_1 = 7 - 2 = 5,\ a_{10} = ?$

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

$$a_{10} = 2 + (10-1)5$$

$$a_{10} = 2 + 9 \times 5$$

$a_{10} = 2 + 45$

$\therefore\ a_{10} = 47$

17) In an AP 21 , 18, 15 , ………… find 35th term .
18) In an AP 3 ,8, 13 , ……………..find 10th term .
19) In an AP 10, 7, 4, ……………..find 30th term .
20) In an AP $-3,\ -\frac{1}{2},\ 2,$ ……………..find 11th term .
21) **In an AP 10, 7, 4, ……………-62 find 11th term from last .**

Solution : In this AP $d = a_2 - a_1 = 7 - 10 = -3\ and\ l = -62$

11th term from last = ?

nth term of an AP from lastÀ $= l - (n-1)d$

11th term of this AP from lastÀ $= -62 - (11-1)(-3)$

$= -62 - (10)(-3)$

$= -62 + 30$

$\therefore$ 11 th term of this AP from last $= -32$

22) In an AP 3, 8, 13, ……………253 find 20th term from last .
23) In an AP 21, 18, 15, ………… -81 find 28th term from last .
24) **Which term of the AP 21, 18, 15, ………… is -81 ?**

Solution : Here $a = 21$ and $d = a_2 - a_1 = 18 - 21 = -3,\ a_n = -\mathbf{81}, \boldsymbol{n} = ?$

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

$-81 = 21 + (n-1)(-3)$

$-81 = 21 - 3n + 3$

$3n = 24 + 81$

$3n = 105$

$n = \frac{105}{3}$

$\therefore n = 35$

$\therefore$ 35th term of the given AP is -81 .

25) Which term of the AP 3, 8, 13, ………… is 78 ?
26) Which term of the AP 7, 13, 19, …………is 205 ?
27) **Find the sum of the AP 8, 3, -2, …………upto 22 terms** .

Solution : $a = 8$, $S_{22} = ?$

$d = a_2 - a_1 = 3 - 8 = -5$

$S_n = \frac{n}{2}\,[\,2a + (n-1)\,d\,]$

$$S_{20} = \frac{22}{2}[2(8) + (22-1)(-5)\,]$$

$$S_{20} = 11[16 + 21(-5)]$$

$$S_{20} = 11[16 - 105]$$

$$S_{20} = 11 \times -89$$

$$S_{20} = -979$$

28) Find the sum of the AP 2, 7, 12, ...upto 10 terms .

29) Find the sum of the AP $-37,\ -33, -29,$ ....upto 12 terms .

3 Marks Questions (LA-1)

30) In an AP if the first term is 38 and 16th term is 73 then find its 31st term .

Solution : Here $a_1 = 38$ and $a_{16} = 73$ then $a_{31} = ?$

In an AP $d = \frac{a_p - a_q}{p-q}$

$$d = \frac{a_{16} - a_1}{16-1}$$

$$d = \frac{73-38}{15} = \frac{35}{15} = \frac{7}{3}$$

$$a_{31} = a_1 + 30d$$

$$a_{31} = 38 + 30(\tfrac{7}{3})$$

$$a_{31} = 38 + 70$$

$$a_{31} = 108$$

31) In an AP if the 3rd term is 12 and 50th term is 106 then find its 29th term .

32) In an AP if the 3rd term is 4 and 9th term is -8 then find its 5th term .

33) **Find the sum of first 40 positive integers divisible by 6**

Solution : 6, 12, 18, ... 240 ($\because$ 40th term is $40 \times 6 = 240$)

$$S_n = 6 + 12 + 18 + \ldots\ldots\ldots\ldots + 240$$

$$S_n = 6\,(1 + 2 + 3 + \ldots\ldots\ldots\ldots + 40\,)$$

$$S_n = 6\left[\frac{40 \times (40+1)}{2}\right] \quad (\because \text{sum of first n natural numbers } S_n = \frac{n(n+1)}{2}\ )$$

$$S_n = 6 \times 20 \times 41$$

$$S_n = 120 \times 41$$

$$S_n = 4920$$

$\therefore$ the sum of first 40 positive integers divisible by 6 is 4920.

Alternate Method

Solution : 6, 12, 18, ………… (upto 40 terms)

$a = 6$, $S_{40} = ?$

$d = a_2 - a_1 = 12 - 6 = 6$

$S_n = \frac{n}{2} [\, 2a + (n-1)\, d\,]$

$S_{40} = \frac{40}{2} [2(6) + (40-1)(6)\,]$

$S_{20} = 20[12 + 39(6)]$

$S_{20} = 20[12 + 234]$

$S_{20} = 20 \times 246$

$S_{20} = 4920$

$\therefore$ the sum of first 40 positive integers divisible by 6 is 4920.

34) Find the sum of first 15 multiples of 8 .

35) ***Find the sum of multiples of* 7 *between* 100 *and* 200** .

Solution : S_n = 105+112+119+……………..+ 196

S_n = 7(15+16+17+……………..+ 28)

$S_n = 7\left[\frac{28\times(28+1)}{2} - \frac{14\times(14+1)}{2}\right]$ ($\because$ sum of first n natural numbers $S_n = \frac{n(n+1)}{2}$)

$S_n = 7[14 \times 29 - 7 \times 15]$

$S_n = 7[406 - 105]$

$S_n = 7 \times 301$

$S_n = 7 \times 301$

$S_n = 2107$

$\therefore$ the sum of multiples of 7 between 100 and 200 is 2107 .

Alternate Method

Solution : 105 + 112 + 119 + ………… + 196

$a = 105$, $l = a_n = 196$, $S_n = ?$

$d = a_2 - a_1 = 112 - 105 = 7$

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

$196 = 105 + (n-1)7$

$196 - 105 = 7n - 7$

$91 + 7 = 7n$

$98 = 7n$

$n = 14$

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

$S_{14} = \frac{14}{2}[105 + 196]$

$S_{14} = 7[301]$

$S_{14} = 2107$

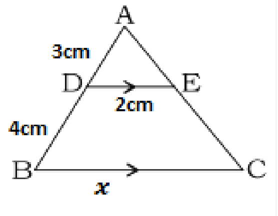
$\therefore$ the sum of multiples of 7 between 100 and 200 is 2107 .

36) Find the sum of odd numbers between 0 and 50 .

UNIT – 2 : TRIANGLES

1 Mark Questions (MCQ)

1) In fig. if DE ∥ BC then the value of x is



A) 3.36 cm B) 4.34 cm

C) 7.41 cm D) 4.66 cm

2) If perimeters of two similar triangles are in the ratio 5:4 then the ratio of their corresponding sides is ,

A) 5:4 B) 4:5 C) 10:2 D) 2:10

3) The sides of a triangle are 3, 4, 6 units . The corresponding sides of another triangle similar to this are (in units)

A) 8, 6, 12 B) 9, 12, 18 C) 8, 4, 9 D) $2, 4\frac{1}{2}, 4$

4) At a certain time of the day , a man 6 feet tall , casts his shadow 8 feet long . At the same time the length of the shadow cast by a building 45 feet high is

A) 90 B) 60 C) 48 D) 54

5) The ratio of corresponding sides of two similar triangles is 2 : 1 . The ratio of their areas is

A) 2 : 1 B) 4 : 2 C) 4 : 1 D) 1 : 4

6) If the ratio of areas of two similar triangles is 16 : 81 then the ratio of their corresponding sides is

A) 2 : 3 B) 7 : 9 C) 4 : 9 D) 81 : 61

7) Among the following measures which one does not represent the sides of a right triangle ?

A) 9, 12, 15 B) 3, 4, 5 C) $2, 1, \sqrt{5}$ D) 5, 7, 9

8) The side of a square is 12cm .The length of its diagonal is

A) 12 cm B) $12\sqrt{2}$ cm C) $\sqrt{12}$ cm D) $\sqrt{2}$ cm

9) The length of the diagonal of a square is $\sqrt{50}$ m . Its side is

A) $\sqrt{10}$ m B) $5\sqrt{2}$ m C) $2\sqrt{5}$ m D) 5 m

10) In ΔABC *if* $AB = 6\sqrt{3}$, $AC = 12$cm and $BC = 6$cm then $\angle B$ is

A) 120° B) 60° C) 90° D) 45°

11) Height of an equilateral triangle whose side is 2a units is

A) $\sqrt{3}$ a units B) $\sqrt{3}$ units C) $3\sqrt{a}$ units D) $\sqrt{2}$ a units

1 Mark Questions (VSA)

12) State Thales Theorem .

13) State Pythagoras Theorem .

14) State Converse of Pythagoras Theorem .

15) Write the two conditions for two polygons of same number of sides to be similar .

Ans	1)D	2)A	3)B	4)B	5)C	6)C	7)D	8)B	9) B	10)C	11) A

12) If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points , the other sides are divided in the same ratio .

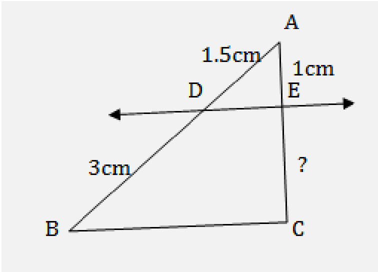
13) In a right triangle , the square of the hypotenuse is equal to the sum of the squares of the other two sides .

14) In a triangle if square of one side is equal to the sum of the squares of the other two sides , then the angle opposite to the first side is a right angle .

15) All the corresponding angles of polygons are equal and all the corresponding sides are in the same proportion .

2 Marks Questions (SA)

16) **In the given fig. if DE ∥ BC then find EC .**



Solution : In ΔABC $DE \parallel BC$

$AD = 1.5cm, \quad DB = 3cm \quad and \quad AE = 1cm$

$\frac{AD}{DB} = \frac{AE}{EC}$ (Thales theorem)

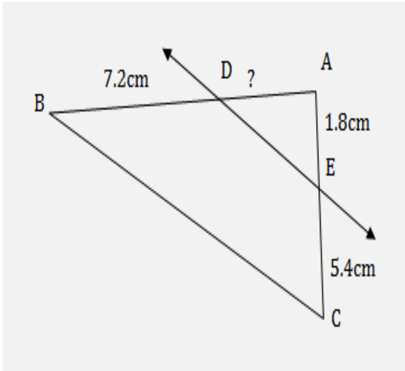
$\frac{1.5}{3} = \frac{1}{EC}$

$\frac{15}{30} = \frac{1}{EC}$

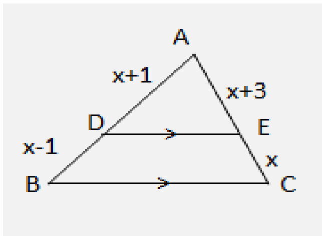
$\frac{1}{2} = \frac{1}{EC}$

$EC = 2cm$

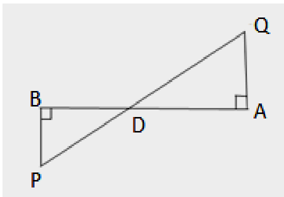
17) In the given fig. if $DE||BC$ then find AD .



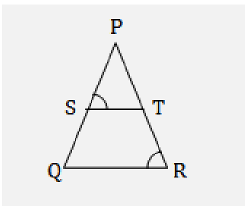
18) In ΔABC , $DE||BC$, $AD = x + 1$, $DB = x - 1$
$AE = x + 3$ and $EC = x$, find x .



19) In the given fig. if $AQ \perp AB$, $PB \perp AB$, $AD = 20$ cm
$BD = 12$ cm *and* $PB = 18$ cm then find AQ .



20) In the fig. if $\frac{PS}{SQ} = \frac{PT}{TR}$ *and* $\angle PST = \angle PRQ$ then
prove that ΔPQR is an isosceles triangle .



21) A vertical pole of height 6m casts a shadow 4m long on the ground and at the same time a tower casts a shadow 28m long . Find the height of the tower .

22) **Let $\Delta ABC \sim \Delta DEF$ and their areas be respectively , $64cm^2$ *and* $121cm^2$. If $EF = 15.4cm$, find BC .**

Solution : $\Delta ABC \sim \Delta DEF$

$$\frac{ar(\Delta ABC)}{ar(\Delta DEF)} = \left(\frac{BC}{EF}\right)^2 \text{ [Theorem on areas]}$$

$$\frac{64}{121} = \left(\frac{BC}{15.4}\right)^2$$

$$\left(\frac{8}{11}\right)^2 = \left(\frac{BC}{15.4}\right)^2$$

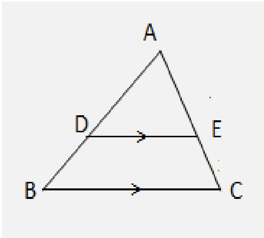
$$\frac{8}{11} = \frac{BC}{15.4}$$

$$11 \times BC = 15.4 \times 8$$

$$BC = \frac{15.4 \times 8}{11}$$

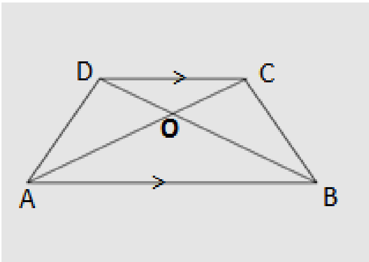
$$BC = 1.4 \times 8 = 11.2cm$$

23) In the fig. if $DE \parallel BC$ and $AD:DB = 5:4$, then find the ratios of areas of ΔADE and ΔABC .



24) **Diagonals of a trapezium ABCD with $AB \parallel CD$ intersect each other at the point O. If $AB = 2\ CD$, find the ratio of the areas of ΔAOB and ΔCOD .**

Solution : *In trapezium* ABCD , $AB \parallel DC$
and diagonals intersect at O .



$\Rightarrow AB = 2\ CD \quad \frac{AB}{CD} = \frac{2}{1}$ ----> (1)

In Δ AOB and Δ COD

$\angle A = \angle C$ [alternate angles]

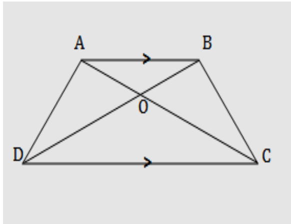
$\angle B = \angle D$ [alternate angles]

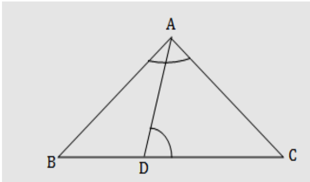
$\Delta AOB \sim \Delta COD$ [AA similarity criterion]

$$\frac{ar(\Delta AOB)}{ar(\Delta COD)} = \left(\frac{AB}{CD}\right)^2 \text{ [Theorem on areas]}$$

$$\frac{ar(\Delta AOB)}{ar(\Delta COD)} = \left(\frac{2}{1}\right)^2 \quad \frac{ar(\Delta AOB)}{ar(\Delta COD)} = \frac{4}{1}$$

25) **Diagonals AC and BD of a trapezium ABCD with AB ∥ CD intersect each other at the point O.**
Prove that $\frac{OA}{OC} = \frac{OB}{OD}$.



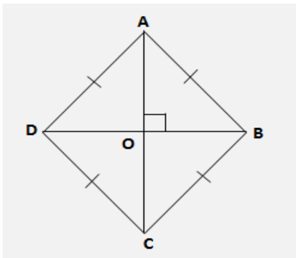


26) In ΔABC , D is a point on BC such that $\angle ADC = \angle BAC$. Prove that $CA^2 = CB.CD$.

27) The diagonals of a rhombus are 16 cm and 12 cm .Find its area .

3 Marks Questions (LA 1)

28) **Prove that the sum of the squares of the sides of a rhombus is equal to the sum of the squares of its diagonals .**



Solution: In rhombus ABCD , $AB = BC = CD = AD$ [sides of rhombus are equal]

Diagonals AC and BD intersect perpendicularly at O .

$\angle AOB = 90^{\circ}$

In right ΔAOB

$AB^2 = AO^2 + BO^2$ [Pythagoras theorem]

$AB^2 = (\frac{1}{2}AC)^2 + (\frac{1}{2}BD)^2$ [$\because AO = \frac{1}{2}AC, \quad BO = \frac{1}{2}BD$]

$AB^2 = \frac{1}{4}AC^2 + \frac{1}{4}BD^2$

$4AB^2 = AC^2 + BD^2$ [Multiplying by 4]

$\Rightarrow AB^2 + AB^2 + AB^2 + AB^2 = AC^2 + BD^2$

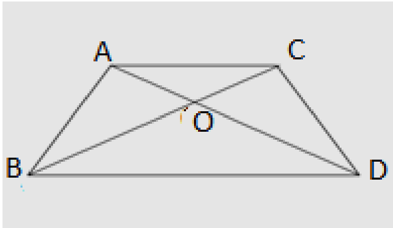
$\therefore AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$ [$\because$given $AB = BC = CD = AD$].

29) *Two poles of heights 6m and* 11m stand on a play ground. If the distance between the feet of the poles is 12 m , find the distance between thier tops .

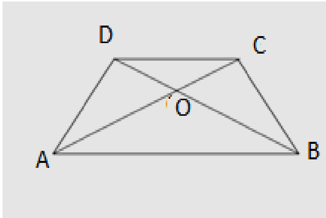
30) The perimeter of a right triangle is 20cm and the sides containing the right angle are in the ratio 4 ∶ 3 then find the sides .

31) ABC is an isosceles triangle with $AC = BC$. If $AB^2 = 2AC^2$, , prove that ΔABC is a right triangle .

32) In fig. ABC and DBC are two triangles on the same base BC . If AD intersects BC at O , show that $\frac{ar(\Delta ABC)}{ar(\Delta DBC)} = \frac{AO}{DO}$.

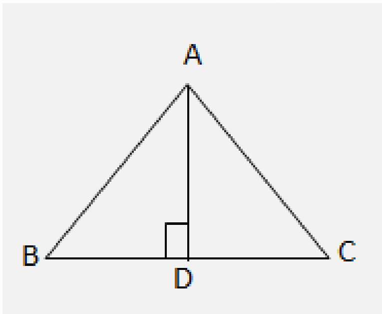


33) In a quadrilateral ABCD the diagonals intersect at O. If $\frac{AO}{BO} = \frac{CO}{DO}$ then prove that ABCD is a trapezium.
(Hint : Draw a parallel line to AB at O)



34) **In an equilateral triangle , prove that three times the square of one side is equal to four times the square of one of its altitude .**

Data : In equilateral triangle ABC , AB = BC = AC and AD is a perpendicular height . $\angle ADB = 90^\circ$



To Prove : $3AB^2 = 4AD^2$

Proof : In Δ ABD and Δ ADC

$\angle D = \angle D = 90^\circ$[given]

$AB = AC$ [given]

$AD = AD$ [common side]

$\Delta ABD \cong \Delta ADC$ [RHS Postulate]

$\therefore BD = CD = \frac{1}{2}BC$ ----->(1)

In right triangle ABD

$AB^2 = AD^2 + BD^2$ [Pythagoras theorem]

$AB^2 = AD^2 + \left(\frac{1}{2}BC\right)^2$ [$\because BD = \frac{1}{2}BC$]

$AB^2 = AD^2 + \frac{1}{4}AB^2$ [$\because BC = AB$]

$4 \times AB^2 = 4 \times AD^2 + AB^2$ [Multiplying by 4]

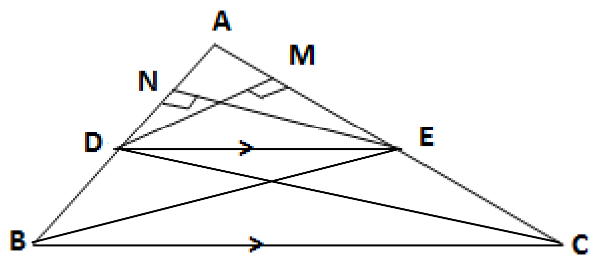
$4AB^2 - AB^2 = 4AD^2$

$3AB^2 = 4AD^2$. Hence Proved

4 Marks Questions (LA-2)

35) State and prove Thales theorem (Basic Proportionality 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 the same ratio .



Data : In ΔABC DE ∥ BC.

To Prove : $\frac{\text{AD}}{\text{DB}} = \frac{\text{AE}}{\text{EC}}$

Construction : *Draw* DM ⊥ AC and EN ⊥ AB .

Join BE and CD .

Proof :

$$\frac{ar(\Delta\text{ADE})}{ar(\Delta\text{BDE})} = \frac{\frac{1}{2} \times \text{AD} \times \text{EN}}{\frac{1}{2} \times \text{DB} \times \text{EN}} \quad (Area\ of\ \ \Delta\ = \frac{1}{2} \times \text{base} \times \text{height}\ )$$

$$\frac{ar(\Delta\text{ADE})}{ar(\Delta\text{BDE})} = \frac{\text{AD}}{\text{DB}} \text{ ---------->} (1)$$

$$\frac{ar(\Delta\text{ADE})}{ar(\Delta\text{CED})} = \frac{\frac{1}{2} \times \text{AE} \times \text{DM}}{\frac{1}{2} \times \text{EC} \times \text{DM}} \quad (\ Area\ of\ \ \Delta\ = \frac{1}{2} \times \text{base} \times \text{height}\ )$$

$$\frac{ar(\Delta\text{ADE})}{ar(\Delta\text{CED})} = \frac{\text{AE}}{\text{EC}} \text{ ---------->} (2)$$

But ΔBDE and ΔCED are standing on the same base DE and between DE ∥ BC .
$ar(\Delta\text{BDE}) = ar(\Delta\text{CED})$ ----------> (3)

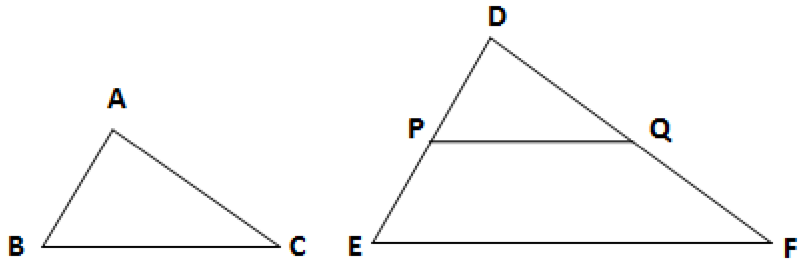
$\therefore$ *from equations* (1), (2) and (3)

$$\frac{\text{AD}}{\text{DB}} = \frac{\text{AE}}{\text{EC}}$$

Hence the proof .

36) **AAA Similarity Criterion .**

If in two triangles , corresponding angles are equal , then their corresponding sides are in the same ratio (or proportional) .Hence prove that the two triangles are similar.



Data : In ΔABC *and* ΔDEF

$\angle A = \angle D$

$\angle B = \angle E$

$\angle C = \angle F$

To Prove : $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

Construction : *Mark points P and Q on DE and DF such that* DP = AB and DQ = AC . Join PQ .

Proof : ***In*** ΔABC and ΔDPQ

$\angle A = \angle D$ (Data)

$AB = DP$ (Construction)

$AC = DQ$ (Construction)

$\Delta ABC \cong \Delta DPQ$ (*SAS Postulate*)

$\therefore BC = PQ$ (CPCT) ----------> (1)

$\left.\begin{array}{l}\angle B = \angle P \quad (\text{ CPCT }) \\ \angle B = \angle E \quad (\text{ Data })\end{array}\right\}$

$\therefore \angle P = \angle E$ (Axiom - 1)

$\Rightarrow PQ \parallel EF$

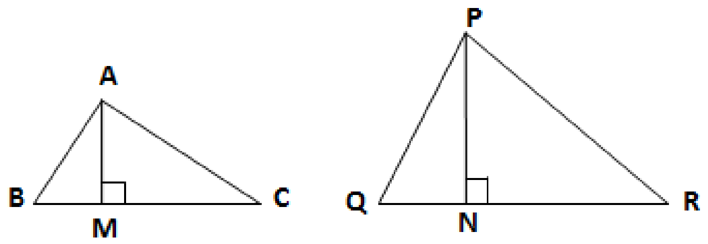
$\frac{DP}{DE} = \frac{PQ}{EF} = \frac{DQ}{DF}$ (Corollary of Thales theorem)

$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ [from eq. (1) and construction]

Hence the theorem .

37) **Areas of Similar Triangles**

The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides .



Data : $\Delta ABC \sim \Delta PQR$

$\Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$

To Prove : $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$

Construction : Draw AM $\perp$ BC and PN $\perp$ QR .

Proof : $\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{\frac{1}{2} \times BC \times AM}{\frac{1}{2} \times QR \times PN}$ $\quad$ ($\mathit{Area\ of}\ \Delta = \frac{1}{2} \times$ base $\times$ height)

$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{BC \times AM}{QR \times PN}$ ----------> (1)

In ΔABM and ΔPQN

$\angle B = \angle Q$ $\quad$ ($\Delta ABC \sim \Delta PQR$)

$\angle M = \angle N = 90^\circ$ $\quad$ (Construction)

$\therefore \Delta ABM \sim \Delta PQN$ $\quad$ (AA Similarity criterion)

$\therefore \frac{AM}{PN} = \frac{AB}{PQ}$ --------> (2)

But $\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$ ------> (3) (Data)

$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \frac{AB}{PQ} \times \frac{AB}{PQ}$ $\quad$ (substituting eqs.(2) and (3) in (1))

$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \left(\frac{AB}{PQ}\right)^2$

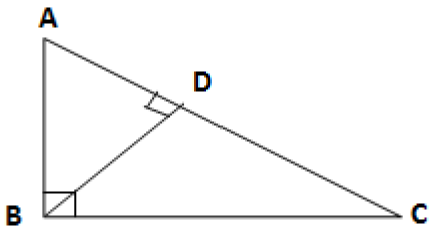
Now from eq.(3)

$\frac{ar(\Delta ABC)}{ar(\Delta PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{BC}{QR}\right)^2 = \left(\frac{AC}{PR}\right)^2$

Hence the theorem .

38) **State and and Prove Pythagoras Theorem .**

" In a right angled triangle , the square on the hypotenuse is equal to the sum of the squares on other two sides " .



Data : ΔABC *is a right triangle and* $\angle B = 90^\circ$

To Prove : $AC^2 = AB^2 + BC^2$

Construction : Draw $BD \perp AC$

Proof : *In* ΔADB and ΔABC

$\angle D = \angle B = 90^\circ$ (Data and Construction)

$\angle A = \angle A$ (Common angle)

$\Delta ADB \sim \Delta ABC$ (AAA Similarity Criterion)

$\therefore \frac{AD}{AB} = \frac{AB}{AC}$ (Proportional sides)

$AC.AD = AB^2$ ------> (1)

Similarly

In ΔBDC *and* ΔABC

$\angle D = \angle B = 90^\circ$ (Data and Construction)

$\angle C = \angle C$ (Common angle)

$\Delta BDC \sim \Delta ABC$ (AAA Similarity Criterion)

$\therefore \frac{DC}{BC} = \frac{BC}{AC}$ (Proportional sides)

$AC.DC = BC^2$ ------> (2)

$AC.AD + AC.DC = AB^2 + BC^2$ [By adding (1) and (2)]

$AC\,(AD + DC) = AB^2 + BC^2$

$AC \times AC = AB^2 + BC^2$ (from fig. $AD + DC = AC$)

$AC^2 = AB^2 + BC^2$

Hence the theorem ..

UNIT – 3 : PAIR OF LINEAR EQUATIONS IN TWO VARIABLES

1 Mark Questions (MCQ)

1) If the pair of linear equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ has infinitely many solutions then which of the following condition is correct

   A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$ B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

   C) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ D) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

2) If the lines representing the equations $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ intersect at one point, then which of the following condition is correct

   A) $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ B) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

   C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ D) $\frac{b_1}{b_2} \neq \frac{c_1}{c_2}$

3) *The straight lines representing the equations* $x - 2y = 0$ *and* $3x + 4y - 20 = 0$ are

   A) Parallel B) Intersect C) Coincide D) Does not intersect

4) *Pair of the equations* $2x + 3y - 9 = 0$ *and* $4x + 6y - 18 = 0$ *has*

   A) No solution B) Unique solution.

   C) Only two solutions D) Infinitely many solutions

5) The solutions of equations $x + 3y = 6$ *and* $2x - 3y = 12$ are

   A) $x = 0, \ y = 6$ B) $x = 6, \ y = -6$

   C) $x = 6, \ y = 0$ D) $x = 0, \ y = 0$

6) *If the equations* $2x + y = 3$ *and* $y = mx + 3$ represent the same straight line then the value of m is

   A) -3 B) -2 C) 2 D) 3

7) *If* $x = -y$ *and* $y > 0$, then which of the following statement in not correct ?

   A) $x^2y > 0$ B) $x + y = 0$ C) $xy < 0$ D) $\frac{1}{x} - \frac{1}{y} = 0$

8) *If the equations* $x + 5y = 7$ *and* $4x + 20y = -k$ *represent coinciding straight lines then the value of k is*

   A) -28 B) 24 C) 28 D) -24

9) The equations $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$ represent parallel lines. So the equations has

   A) No solution B) Unique solution

C) Only two solutions D) Infinitely many solutions

10) *The intersecting point of the graphs of the equations* $y = 2x - 2$ *and* $y = 4x - 4$ is

A) $(1, 0)$ B) $(-1, 0)$ C) $(0, 1)$ D) $(0, -1)$

1 Mark Questions (VSA)

11) Write the coordinates of the origin .

12) Write the general form of a linear equation in one variable .

13) Write the general form of a linear equation in two variables .

Ans	1) A	2) C	3) B	4) D	5) C	6) B	7) D
	8) A	9) A	10) A	11) $(0, 0)$			
	12) $ax + b = 0$ (Here $a \neq 0$ and a, b are real numbers)						
	13) $\left.\begin{array}{l} a_1x + b_1y + c_1 = 0 \\ a_2x + b_2y + c_2 = 0 \end{array}\right\}$ Here $a_1, b_1, c_1, a_2, b_2, c_2$ are real numbers and $a_1^2 + b_1^2 \neq 0$, $a_2^2 + b_2^2 \neq 0$						

2 Marks Questions (SA)

14) **Solve the given pair of linear equations .**

$x + y = 14$

$x - y = 4$

Solution :

$x + y = 14 \longrightarrow (1)$

$x - y = 4 \longrightarrow (2)$

$2x = 18$ [Adding eq.(1) and eq.(2)]

$x = \frac{18}{2}$

$\therefore x = 9$

Substituting the value of x *in eq.* (1) .

$9 + y = 14$

$y = 14 - 9$

$\therefore y = 5$

Solution is $x = 9$ and $y = 5$

15) Solve the following pairs of linear equations .

(i) $2x + 3y = 11$, $2x - 4y = -24$ (ii) $x - y = 26$, $x - 3y = 0$ (iii) $x + y = 180$, $x - y = 18$

16) **The difference between two numbers is 26 and one number is three times the other Find them .**

Solution : Let the two numbers be x and y .

Given $x - y = 26 \longrightarrow (1)$

and $x = 3y \longrightarrow (2)$

Substitute eq. (2) in eq.(1)

$3y - y = 26$

$2y = 26$

$y = \frac{26}{2}$

$y = 13$

$Substituting\ the\ value\ of\ y\ in\ eq.(2)$

$x = 3(13)$

$x = 39$

$\therefore The\ numbers\ are\ 39\ and\ 13$.

17) The larger of two supplementary angles exceeds the smaller by 18 degrees. Find them .

18) The coach of a cricket team buys 7 bats and 6 balls for Rs 3800 . Later she buys 3 bats and 5 balls for Rs 1750 . Find the cost of each bat and each ball .

19) A fraction becomes $\frac{9}{11}$, if 2 is added to both the numerator and the denominator. If 3 is added to both the numerator and the denominator it becomes $\frac{5}{6}$. Find the fraction .

20) Five years hence , the age of Jacob will be three times that of his son . Five years ago , Jacob's age was seven times that of his son . What are their present ages?

21) Five years ago , Nuri was thrice as old as Sonu . Ten years later , Nuri will be twice as old as Sonu . How old are Nuri and Sonu ?

4 Marks Questions (LA-2)

22) **Solve the given linear equation graphically .**

$\boldsymbol{x - 2y = 0}$

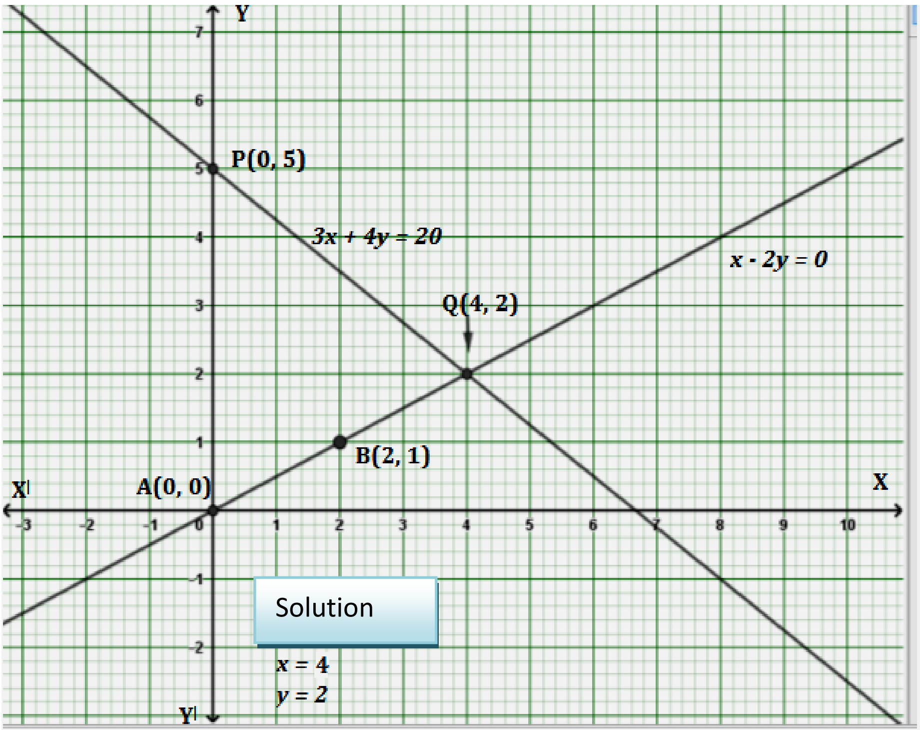
$\boldsymbol{3x + 4y = 20}$

Solution : $x - 2y = 0$ $\qquad$ $3x + 4y = 20$

x	0	2	4
$y = \frac{x}{2}$	0	1	2

x	0	4	-4
$y = \frac{20-3x}{4}$	5	2	8

Scale : X axis : 1cm = 1 unit and Y axis : 1cm = 1 unit



23) Solve the following linear equations graphically .

(i) $2x - y = 2$
$4x - y = 4$

(ii) $x + 3y = 6$
$2x - 3y = 12$

(iii) $x + y = 1$
$x - y = 5$

(iv) $2x + y - 6 = 0$
$4x - 2y - 4 = 0$

(v) $2x - 2y - 2 = 0$
$4x - 3y - 5 = 0$

(vi) $x - 2y = 0$
$x + y = 6$

(vii) $x + y - 6 = 0$
$2x - y - 3 = 0$

(viii) $x - y + 4 = 0$
$3x + y + 4 = 0$

(ix) $x + y = -4$
$x - y = 0$

24) Draw the graphs of the equations $x - y + 1 = 0$and $3x + 2y - 12 = 0$ determine the coordinates of the vertices of the triangle formed by these lines and the $x - axis$ and shade the triangular region.

UNIT – 4: CIRCLES

1 Mark Questions (MCQ)

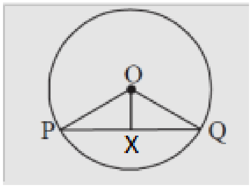
1) When the secant coincides with two end points of corresponding chord.
   A) Secant B) Tangent C) line Segment D)diameter
2) Number of tangent drawn at a point on a circle is

   A) 2 B) 1 C) Infinite D) 3

3) The straight line which intersects the circle at only one point is
   A) Radius B) tangent C) Secant D) line segment
4) A straight line which passes through any points of a circle
   A) Tangent B) diameter C) secant D)line segment
5) Maximum number of tangents drawn to a circle from an external point
   A) 1 B) 3 C) 2 D) infinite

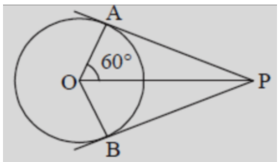
6) In the adjoining figure OX is perpendicular to a circle of radius 5cm. OX=3cm then the length of the chord PQ is

   A) 5 cm B) 4 cm C) 8 cm D) 10 cm

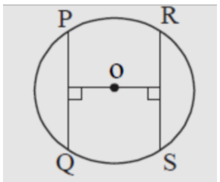


7) In the adjoining figure if $\angle AOP = 60^{\circ}$ then $\angle APO=$

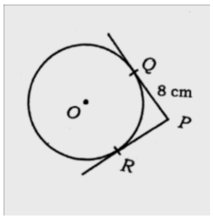
   A) 120° B) 90° C) 60° D) 30°



8) In the figure PQ and RS is chord which are equidistant from the centre. If PQ=6cm then RS=.
   A) 5 cm B) 6 cm C) 8 cm D) 3 cm

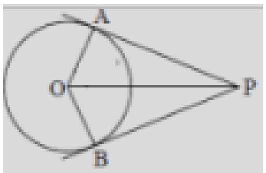


9) PQ and PR are drawn to a circle as shown in figure if $\angle APO = 90°$and PQ=8cm then radius of circle is
   A) 5 cm B) 6 cm C) 8 cm D) 3 cm



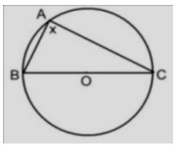
10) In the figure if PA and PB are tangent to a circle with centre O. If $\angle APB = 40^{\circ}$ then, $\angle AOB$ is,

   A) 90° B) 50° C) 140° D) 150°



11) In the figure if BC is the diameter, the value of X is

   A) 90° B) 50° C) 180° D) 160°



12) The length of the tangent drawn at a distance 5cm from the Centre of a radius 3cm is

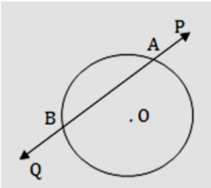
A) 4 cm B) 3.5 cm C) 4.5 cm D) 5.5 cm

13) The length of the tangent is 24cm which is drawn to a circle of centre O at a distance 25cm from its centre, then its radius is

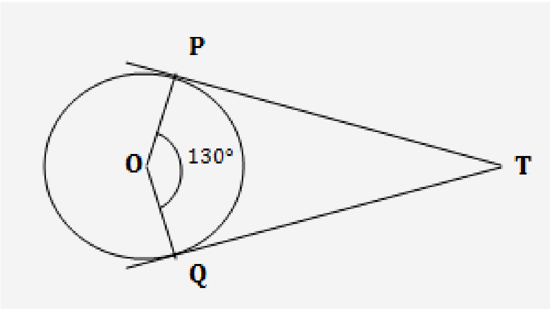
A) 7 cm B) 12 cm C) 15 cm D) 24.5 cm

1 Mark Questions (VSA)

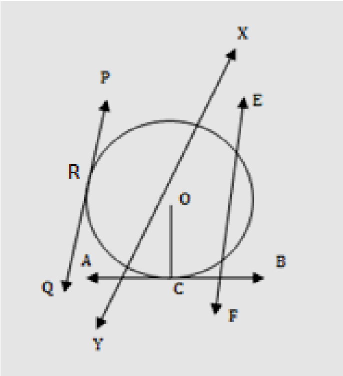
14) In the figure, name PQ



15) In the figure if $\angle POQ = 130^{\circ}$ TP and TQ are tangents to a circle of centre 'o' then what is the measure of $\angle PTQ$



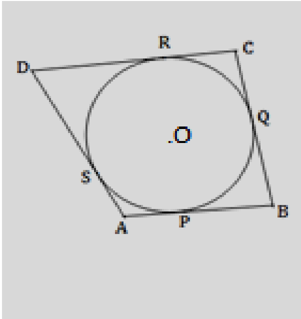
16) In the figure name the tangents.



Ans	1) A	2) B	3) B	4) C	5) C
6) C	7) D	8) B	9) C	10) C	11) A
12) A	13) A	14) Secant	15) $\angle PTQ = 50^{\circ}$	16) PQ And AB	

2 Marks Questions (SA)

17) In the adjoining figure quadrilateral ABCD is inscribed in a circle.
Show that **AB + CD = AD + BC.**



Solution:- In fig AP = AS ----> (1) (Theorem)

BP = BQ ----> (2) (Theorem)

CQ = CR ----> (3) (Theorem)

DR = DS ----> (4) (Theorem)

LHS = AB + CD

= (AP + BP)+(DR+CR) (from fig)

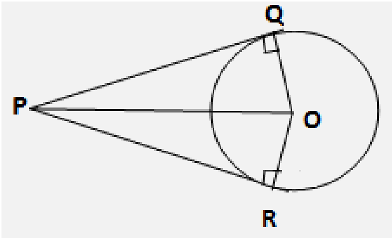
= (AS + BQ) + (DS+CQ)

= (AS + DS) + (BQ+CQ)

= AD + BC =RHS

3Marks Questions (LA 1)

18) Theorem :- "The tangents drawn to a circle from an external point are equal" prove this



Data: - O is the centre and P is an external point, PQ and PR are the tangents from an external point P.

To prove: PQ = PR

Construction: Draw OP, OQ andOR.

Proof: InΔOQP andΔORP

OQ = OR (∵Radii of same circle)

OP = OP (∵Common side)

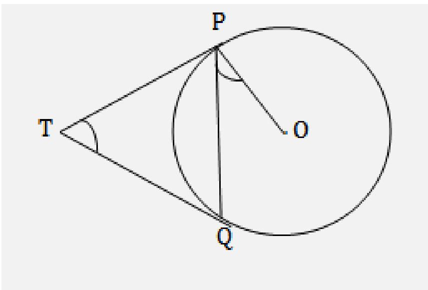
$\angle Q = \angle R = 90^\circ$ (∵tangent ⊥radius)

$\Delta OQP \cong \Delta ORP$ (RHS criteria)

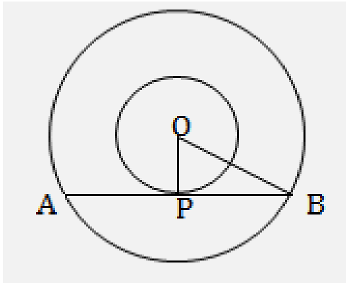
PQ = PR (CSCT)

∴ Hence the proof.

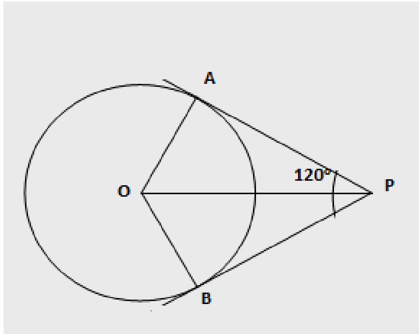
19) In the figure, to a circle with centre 'O', TP and TQ are the tangents drawn from T, show that$\angle PTQ = 2\angle OPQ$



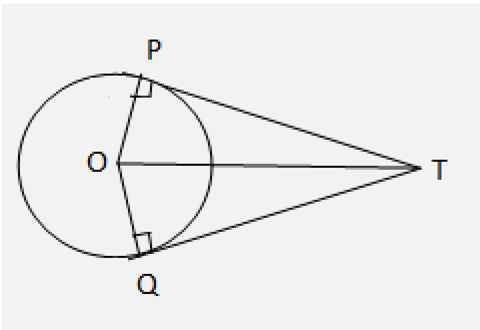
20) 3cm and 5cm are the radii of two concentric circle with centre ‘O’. the length of the chord which touch the smaller circle is .



21) PA and PB are the tangents to a circle with centre ‘O’ drawn from an external point P if $\angle APB = 120°$ then show that OP=2AP.
(Hint: InΔOAP, $\cos 60^{\circ} = \frac{AP}{OP}$)



22) In the figure ‘O’ is the Centre of the circle and T is an external point, TP and TQ are tangents from T show that $\angle PTQ + \angle POQ = 180^{\circ}$



UNIT– 5: AREA RELATED TO CIRCLES

1 Mark Questions (MCQ)

1) The region bounded by two radii and corresponding arc of a circle is

A) Segment B) Sector C) Area D) Perimeter

2) The region bounded by chord and corresponding arc of a circle is

A) Perimeter B) Sector C) Area D) Segment

3) Area of sector with sector angle x and radius of circle P is

A) $\frac{\pi p x^2}{360}$ B) $\frac{\pi p x^2}{270}$ C) $\frac{\pi x p^2}{270}$ D) $\frac{\pi x p^2}{360}$

4) Angle of the sector is 90° then the ratio of Area of circle to area of sector is

A) 1:4 B) 1:2 C) 4:1 D) 2:3

5) Area of square inscribed in a circle of unit radius is

A) $\frac{\pi}{2}$ Sq. units B) π Sq. units

C) $\sqrt{2}$ Sq. units D) 2 Sq. units

6) Length of an arc of a sector of angle θis.

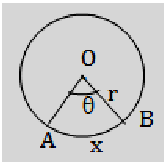
A) $\frac{\theta}{360} \times \pi r$ Units B) $\frac{\theta}{360} \times 2\pi r$ Units

C) $\frac{\theta}{360} \times 2\pi$ Units D) $\frac{\theta}{360} \times \pi$ Units

7) If the perimeter and the area of a circle are numerically equal, then the radius of the circle is .

A) 2Units B) π Units C) 4Units D) 7Units

1 Mark Questions (VSA)



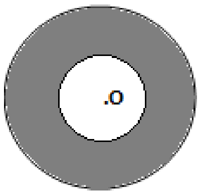
8) In the figure, If θ is the sector angle and r is the radius of the sector. The length of arc AXB is.

9) What is the area of the sector of circle with radius r which makes an angle 360°?

10) If the angle formed at the centre of a circle with radius r is 1°. What is the area of sector?

11) If the angle formed at the centre of a circle with radiusr is 90°, what is the area of the sector?

12) Area of circle is $154 cm^2$, and Area of minor sector is $7.7 cm^2$,then calculate area of major sector of circle.



13) In the figure, area of two concentric circles is $154\ cm^2$and $1386\ cm^2$ respectively. Find the area of shaded portion?

14) The radii of two concentric circle are 7cm and 14cm. What is the ratio of their circumference?

15) The radii of two concentric circle are 7cm and 14cm. What is the ratio of their areas?

16) The circumference of two concentric circles are 28π and 42π respectively. What is the numerical sum of their radii?

Ans	1) B	2) D	3) D	4) C	5) C
6) B	7) A	8) $\frac{\theta}{360} \times 2\pi r$Units		9) πr^2	10) $\frac{\pi r^2}{360}$
11) $\frac{\pi r^2}{4}$	12) 146.3cm^2	13) 1232cm^2	14) 1:2	15) 1:4	16) 35

2 Marks Questions (SA)

(Unless stated take $\pi = \frac{22}{7}$.)

17) **The radii of two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has circumference equal to the sum of the circumferences of the two circles.**

Solution:- Radii $r_1 = 19$ cm and $r_2 = 9$ cm

$2\pi R = 2\pi r_1 + 2\pi r_2$

$2\pi R = 2\pi(r_1 + r_2$

$R = (r_1 + r_2)$

$R = 19 + 9$

$R = 28$ cm

18) **The radii of two circles are 8 cm and 6 cm respectively. Find the radius of the circle having area equal to the sum of the areas of the two circles.**

Solution:- Radius $r_1 = 8$ cm and $r_2 = 6$ cm

$\pi R^2 = \pi {r_1}^2 + \pi {r_2}^2$

$\pi R^2 = \pi({r_1}^2 + {r_2}^2)$

$R^2 = ({r_1}^2 + {r_2}^2)$

$R^2 = ({r_1}^2 + {r_2}^2)$

$R^2 = (8^2 + 6^2)$

$R^2 = 64 + 36 = 100$

$R^2 = 10^2$

$R = 10$ cm

19) **Find the area of a sector of a circle with radius 4cm if angle of the sector is 30°.**

Solution:- Radius $r = 4$ cm

Angle of the sector $\theta = 30^\circ$

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

$= \frac{30^\circ}{360} \times \frac{22}{7} \times 4^2$

$= \frac{1}{12} \times \frac{22}{7} \times 16$

$= \frac{1}{3} \times \frac{22}{7} \times 4$

$= \frac{88}{21}$

$= 4.19\text{cm}^2$

20) If radius is 4cm and angle of sector is 30°,find the area of corresponding major sector.

21) Find the area of a sector of a circle with radius 6cm and if angle of the sector is 60°.

22) Find the area of a quadrant of a circle whose circumference is 22cm .

23) **In a circle of radius 21cm,if an arc subtends an angle of 60° at the centre , find the length of the arc.**

Solution :- radiusr $= 21$ cm

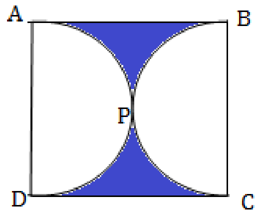
Angle of sector$\theta = 60^\circ$

Length of an arc of a sector $= \frac{\theta}{360} \times 2\pi r$

$= \frac{60^\circ}{360} \times 2 \times \frac{22}{7} \times 21$

$= \frac{1}{6} \times 2 \times 22 \times 3$

$\therefore$Length of arc $= 22$ cm



24) **Find the area of the shaded region in figure, if ABCD is a square of side 14 cm APD and BPC are semicircles.**

Solution:- Length of side of square $= 14$ cm

Area of square $= 14 \times 14 = 196\ \text{cm}^2$ --------> (1)

Radius r $= \frac{14}{2} = 7$ cm

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

Area of semicircle $= \frac{1}{2} \times \frac{22}{7} \times 7^2$

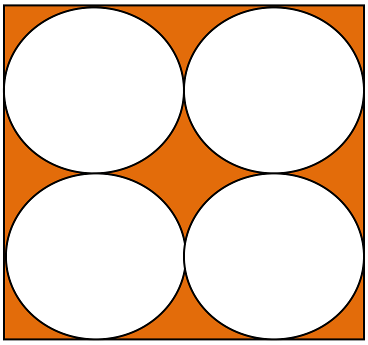
Area of semicircle $= 11 \times 7 = 77\text{cm}^2$ -----> (2)

Area of shaded portion = Area of square– 2 ×Area of semicircle

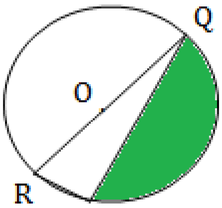
$= 196 - 2 \times 77$

$= 196 - 154 = 42\text{cm}^2$

25) Find the area of the shaded region in figure where ABCD is a square of side14 cm.



26) Find the area of the shaded region in figure, if PQ= 24 cm, PR= 7 cm and 'O' is the centre of the circle.



3 Marks Questions (LA 1)

27) **The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour .**

Solution:- Diameter of wheel of a car = d =80 cm

Radius $r = \frac{80}{2} = 40$ cm

Distance covered by the wheel in one rotation = $2\pi r$

$= 2 \times \frac{22}{7} \times 40$ cm ----> (1)

Distance covered in 10 minutes $= \frac{66}{60} \times 10 = 11$ km (according to data)

Distance covered by the wheel in 10 min = $11 \times 1000 \times 100$ cm ----> (2)

Number of rotations of wheels $= \frac{11\times1000\times100}{2\times\frac{22}{7}\times 40}$

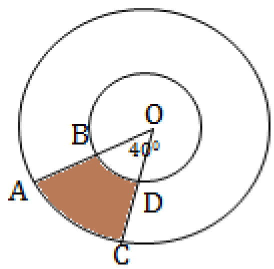
$= \frac{11\times1000\times100\times7}{2\times 22 \times 40}$

$= \frac{11\times500\times10\times7}{2\times 11 \times 4}$

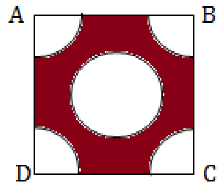
$= \frac{500\times10\times7}{2\times 4} = 125 \times 5 \times 7$

Number of rotation of wheel of a car = 4375

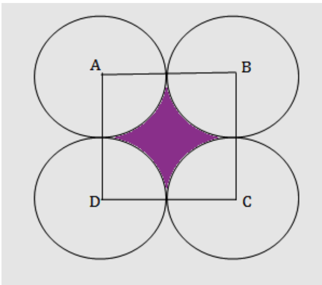
28) Find the area of the shaded region in figure, if radii of the two concentric circle with centre O are 7cm and 14cm respectively and $\angle AOC = 40^{\circ}$.



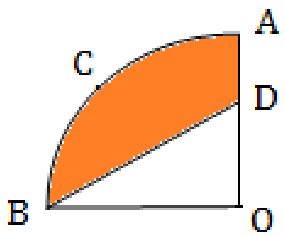
29) In figure each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a circle of diameter 2 cm is cut as shown in figure. Find the area of the remaining portion of the square.



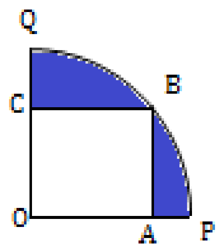
30) In figure ABCD is a square of side 14 cm. with centres A, B, C and D, four circles are drawn such that each circle touch externally two of the remaining three circles find the area of the shaded region.



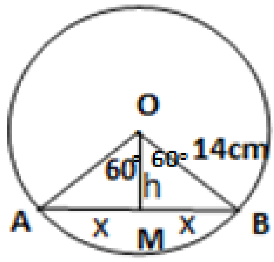
31) In figure OACB is a quadrant of a circle with centre O and radius 3.5cm, if $OD = 2$ cm, Find the area of the
(i) quadrant OACB (ii) Shaded region .



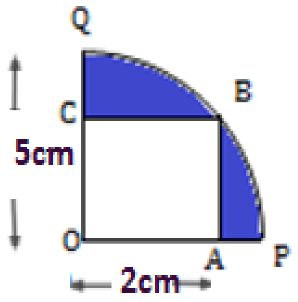
32) In figure a square OABC is inscribed in a quadrant OPBQ.
If $OA = 20$ cm, find the area of the shaded region.

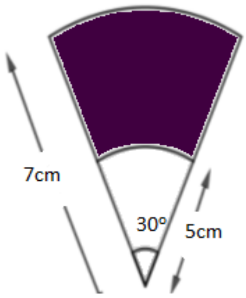


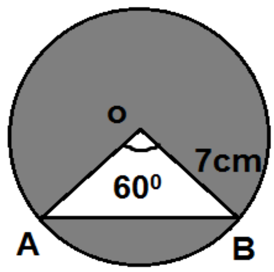
33) Find the area of segment AMB ,shown in figure if radius of the circle is 14cm and $\angle AOB = 120^{\circ}$.

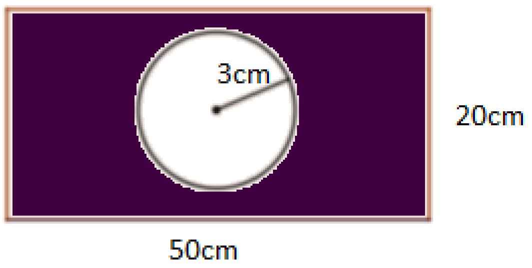


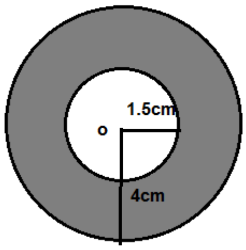
34) Find the area of the shaded region in the following figure.











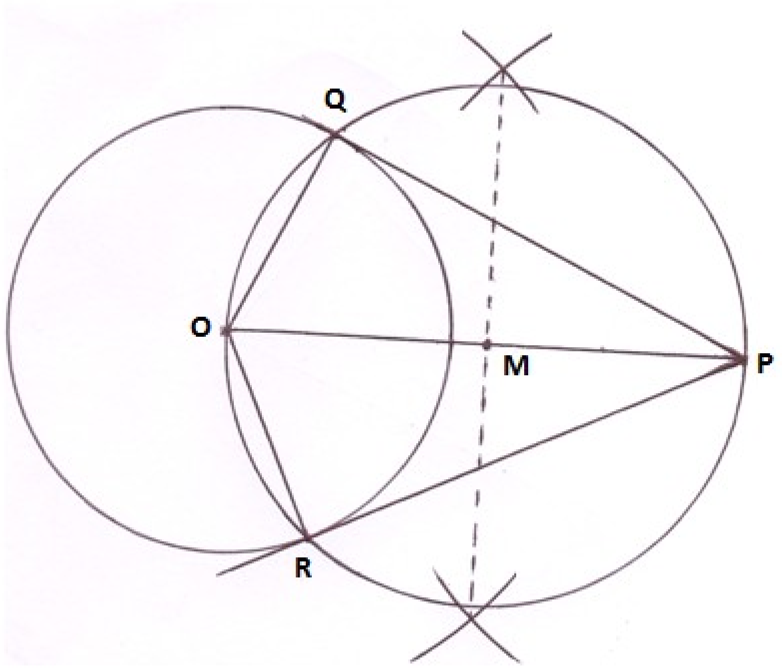
UNIT– 6 :CONSTRUCTIONS

2 Marks Questions (SA)

1) **Draw a circle of radius 3cmfrom a point 7cm away from its centre. Contruct a pair of tangents to the circle and measure their lengths.**

   Solution : radius r = 3 cm

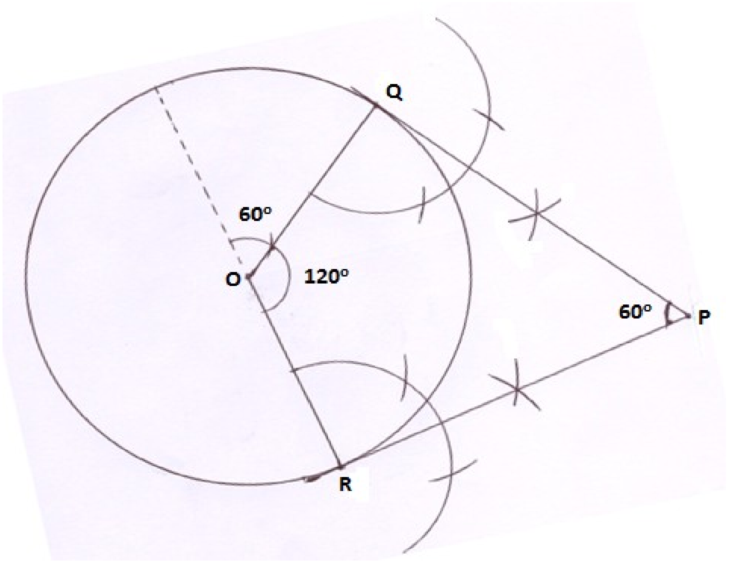
   OP = 7 cm



Tangents PQ = PR = 6.3 cm

2) Draw a circle of radius 3.5cm from a point 7cmaway from its centre. Contruct the pair of tangents to the circle and measure their lengths.
3) Draw a circle of radius 2.5cm from a point 8 cmaway from its centre, construction the pair of tangents to the circle and measure their length.
4) Draw a circle of diameter 5cm from a point 8cm away from its centre construct the pair of tangents to the circle and measure their length.
5) 3.5cmDraw a circle of radius 3.5cm from a point 4cm away from the circle construct the pair of tangent to the circle and measure their length.
6) Draw a circle of radius 3cm take two point P and Q on one of its extended diameter each at a distance of 7cm from its centre. Draw tangents to the circle from these two points P and Q and measure their lengths.
7) Draw two concentric circle of radii 2cm and 4cm from a point 7cm away from its centre. contruct the tangents to the circle.

8) **Draw a pair of tangents to a circle of radius 3cm which are inclined to each other at an angle of 60^{o}.**
Solution : radius r = 3cm
Angle between the tangents = 60^{o}
Angle between the radii = $180^{o} - 60^{o} = 120^{o}$



Tangents are PQ and PR

9) Draw a pair of tangents to a circle of diameter 6cm which are inclined to each other at an angle of 120°.

10) Draw a pair of tangents to a circle of radius 3cm which are inclined to each other at an angle of 60°.

11) Draw a pair of tangents to a circle of radius 4cm which are inclined to each other at an angle of 90°.

12) Draw a pair of tangents to a circle of diameter 5cm and the angle between their radii is 120°.

3 Marks Questions (LA 1)

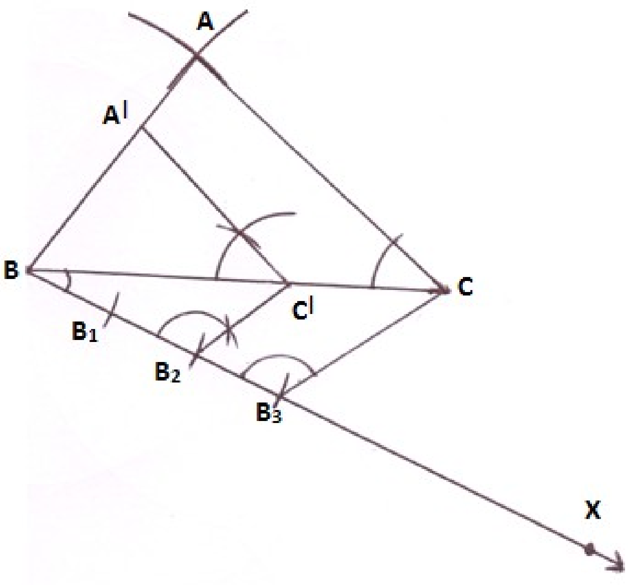
13) Construct a triangle of sides 6cm, 7cm and 9 cm, then a triangle similar to its whose sides are $\frac{2}{3}$ of the corresponding sides of the first triangle.

14) **Draw a triangle ABC with sides AB = 4 cm, AC = 5 cm and BC= 6 cm. then construct a triangle whose sides are $\frac{2}{3}$ of the corresponding sides of the triangle ABC.**

AB = 4 cm
AC = 5 cm
BC = 6 cm

$\Delta A^{I}BC^{I} \sim \Delta ABC$

$\frac{A^{I}B}{AB} = \frac{BC^{I}}{BC} = \frac{A^{I}C^{I}}{AC} = \frac{2}{3}$



15) Draw a triangle ABC with sides BC= 6 cm, AB = 5 cm and $\angle ABC = 60^o$, then construct a triangle whose sides are $\frac{4}{5}$ of the corresponding sides of the Δ ABC.

16) Draw a triangle ABC with side BC= 7cm, $\angle A = 45^o$and $\angle B = 105^o$, then construct a triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the Δ ABC.

17) Draw a triangle ABC with sides(other than hypotenuse)are of lengths 3 cm and 4 cm then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the given triangle.

18) Construct a triangle with sides 5 cm, 6 cm and 7cm. and then another triangle whose sides are $\frac{7}{5}$ of the corresponding sides of the first triangle.

19) Construct an isosceles triangle whose base is 8 cm and altitude4 cm and then another triangle whose sides are $1\frac{1}{2}$ times the corresponding sides of the isosceles triangle.

UNIT – 7 : COORDINATE GEOMETRY

1 Mark Questions (MCQ)

1) Distance between point $P(x,\ y)$ and the origin is .

A) $\sqrt{x^2+y^2}$B) $\sqrt{x+y}$ C) $\sqrt{x-y}$ D) $\sqrt{(x^2+y^2)^2}$

2) Distance between the points $P(x_1,\ y_1)$and$P(x_2,\ y_2)$ is

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

C) $(x_2+x_1)^2-(y_2+y_1)^2$ D) $(x_2-x_1)^2+(y_2-y_1)^2$

3) Distance between the points $(4, 6)$and $(6, 8)$is
A) $\sqrt{2}$Units B) 2 Units C) $2\sqrt{2}$Units D) 4Units

4) Distance between the points $(0, 5)$ and $(-5, 0)$ is
A) $5\sqrt{2}$Units B) 5Units C) $2\sqrt{5}$Units D) $\sqrt{10}$Units

5) Distance between origin and the point $(4, -3)$is
A) 1UnitB) 5Units C) 7Units D) -1Unit

6) Distance between the points $P(-6, 8)$and $Q(0, 0)$is
A) 2Units B) 4Units C) 10Units D) 14Units

7) The distance of point $P(x, \ y)$from the origin is 5 Units then the co-ordinates of point $P$are.
A) $(-2, \ 3)$ B) $(1, \ 2)$ C) $(3, \ 3)$ D) $(3, \ 4)$

8) Co-ordinates of origin are.

A) $(1, 1)$ B) $(-1, \ 0)$ C) $(0, 1)$ D) $(0, \ 0)$

9) The coordinates of the mid points of points $(2, 3)$and $(4, 7)$are$(3, \ b)$ then the value of b is
A) 2 B) 4 C) 5 D) 10

10) $\left(\frac{a}{3}, \ 4\right)$ are the co-ordinates of the midpoint of line joining the points $(-6, 5)$ and $(-2, 3)$then the value of 'a' is
A) -4 B) -12 C) 12 D) -6

11) $(-1, \ 1)$are the co-ordinates of the mid point of line AB joining the points $A(-3, \ b)$ and $B(1, \ b + 4)$, then the value of b is
A) 1 B) -1 C) 2 D) 0

12) The perpendicular distance of point A (3, 5) from the x–axis is
(A) 3 Units (B) 5Units (C) 6Units (D) 8Units

1 Mark Questions (VSA)

13) Write the coordinates of the midpoint of the line joining the points $P(x_1, y_1)$ and $Q(x_2, y_2)$.
14) Find the distance between points $(2, 3)$and $(4, 1)$
15) Find the distance between the origin and $(12, -5)$.
16) Find the co-ordinates of the midpoint of the line joining the points $(2, 3)$and $(4, 7)$
.

Ans	1) A	2) B	3) C	4) A	5)B	6) C	7) D	8) D	9) C
10) B	11) B	12) B	13) $\left(\frac{x_1+x_2}{2}, \ \frac{y_1+y_2}{2}\right)$		14) $2\sqrt{2}$Units		15) 13 Units		16)(3, 5)

17) Find the distance of the following points from the origin.

i) $(6,-8)$ ii) $(4,-3)$ iii) $(5,-5)$ iv) $(12,-5)$ v) $(-6,\ 8)$

2 Marks Questions (SA)

18) Find the co-ordinates of the midpoint of the line segment joining the points $(8,5)$ and $(6,3)$.

Solution: $(x_1, y_1) = (8,5)(x_2, y_2) = (6,3)$

The co-ordinates of midpoint $(x,y) = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$$(x,y) = \left(\frac{8+6}{2}, \frac{5+3}{2}\right)$$

$$(x,y) = \left(\frac{14}{2}, \frac{8}{2}\right)$$

$$(x,y) = (7,4)$$

19) Find the co-ordinates of the midpoint of the line segment joining $(-3,\ 10)$ and $(6,-8)$.

20) Find the co-ordinates of the midpoint of the line segment joining $(4,-5)$ and $(6,3)$.

21) Find the co-ordinates of the midpoint of the line segment joining $(-2,8)$ and $(-6,-4)$.

22) Find the co-ordinates of the midpoint of the line segment joining by the following pairs of points.

i) $(8,3)(8,-7)$ ii) $(6,5)(4,4)$ iii) $(2,0)(0,3)$

iv) $(2,8)(6,8)$ v) $(4,6)\ (6,-3)$

23) Find the distance between the points $(0,0)$ and $(36,15)$.

Solution: $(x_1, y_1) = (0,0)(x_2, y_2) = (36,15)$

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

$$d = \sqrt{(36-0)^2 + (15-0)^2}$$

$$d = \sqrt{(36)^2 + (15)^2}$$

$$d = \sqrt{1296 + 225}$$

$$d = \sqrt{1521}$$

$$d = 39 \text{ units}$$

24) Find the distance between $(-5,-7)$ and $(-1,3)$.

25) Find the distance between (a,b) and $(-a,-b)$.

26) Find the distance between the following pairs of points.

i) $(6,4)\&(3,1)$ ii) $(8,6)\&(3,1)$ iii) $(6,4)\&(3,1)$

iv) $(1,7)\&(4,2)$ v) $(-1,-1)\&\ (-4,4)$

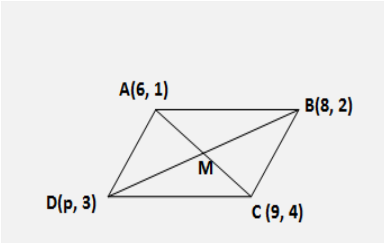
27) If the distance between $P(2,-3)$and $Q(10,\ y)$is 10 units find the value ofy.

28) **Find the point on the x –axis from which $(7,\ 6)$ and $(-3,\ 4)$ are equidistant .**

Solution:- $(7,\ 6)$ and $(-3,\ 4)$
The point $(x,\ 0)$ is equidistant from them.
$(x-7)^2+(0-6)^2=[(x-(-3)]^2+(0-4)^2$
$(x-7)^2+36=(x+3)^2+16$
$x^2-14x+49+36=x^2+6x+9+16$
$85-25=20x$
$20x=60$
$x=3$
The point on x – axis is $(x,\ 0)=(3,\ 0)$

29) Find the point on the x –axis which is equidistant from points $(2,-5)$ and $(-2,\ 9)$.

30) **$A(6,\ 1), B(8,\ 2),\ C(9,\ 4)$ and $D(p,\ 3)$ are the vertices of a parallelogram .find the value of 'p'.**
Solution :-The diagonals of a parallelogram bisect each other.
the co-ordinates of the mid point of AC = the coordinates of the midpoint of BD



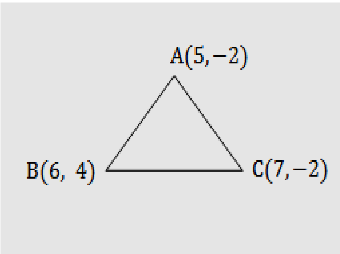
$$M(x,y)=\left(\frac{6+9}{2},\frac{1+4}{2}\right)=\left(\frac{p+8}{2},\frac{3+2}{2}\right)$$
$$M(x,y)=\left(\frac{15}{2},\frac{5}{2}\right)=\left(\frac{p+8}{2},\frac{5}{2}\right)$$
$$\frac{p+8}{2}=\frac{15}{2}$$
$$p+8=15$$
$$p=15-8$$
$$p=7$$

3 Marks Questions (LA 1)

31) **Show that the following points form an isosceles triangle .**

$A(5,-2),\ \ B(6,\ 4)$ and $C(7,-2)$

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



$AB=\sqrt{(6-5)^2+[4-(-2)]^2}$

$AB=\sqrt{(1)^2+(6)^2}$

$AB=\sqrt{1+36}=\sqrt{37}$ Units

$BC=\sqrt{(6-7)^2+[4-(-2)]^2}$

$BC=\sqrt{(-1)^2+(6)^2}$

$BC = \sqrt{1+36} = \sqrt{37}$ Units

$AC = \sqrt{(7-5)^2 + [-2-(-2)]^2}$

$AC = \sqrt{(2)^2 + (-2+2)^2}$

$AC = \sqrt{4+0} = 2$ Units

$\therefore AB = BC = \sqrt{37}$ Units

The given points form an isosceles triangle.

32) Show that $(3, 0)\ (6, 4)\ (-1, 3)$are the vertices of a right angled triangle.

33) Show that $(9,\ 0)(9,\ 6)(-9,\ 6) and\ (-9,\ 0)$are the vertices of a rectangle.

34) **Find the area of a triangle whose vertices are$(10, -6)(2,\ 5) and (-1,\ 3)$.**

Solution: $x_1 = 10,\quad x_2 = 2,\quad x_3 = -1,$

$y_1 = -6,\quad y_2 = 5,\quad y_3 = 3$

The area of a triangle$= \frac{1}{2}|x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)|$

$= \frac{1}{2}|10(5-3) + 2(3-(-6) + \ -1(-6-5)|$

$= \frac{1}{2}|10(2) + 2(9) + -1(-11)|$

$= \frac{1}{2}|20 + 18 + 11|$

$= \frac{1}{2}[49]$

$= \frac{49}{2} =$ 24.5 square units.

35) Find the area of the triangle having the following vertices.

i) $(2, -2),\ (-2,\ 1),\ (5,\ 2)$ ii) $(2,\ 3),\ (-1,\ 0),\ (2,\ -4)$

iii) $(-5,\ 7), (-4,\ -5), (4,\ 5)$ iv) $(-5, -1), (3, -5), (5, 2)$

v) $A(3,\ 8)\ B(-4,\ 2),\ C(5,\ -1)$ vi) $A(1, -1),\ B(-4,\ 6),\ C(-3,\ -5)$

36) **If the points $(-3,\ 12),\ (7,\ 6), and\ (x\ ,\ 9)$ are collinear find the value of x**

Solution: $x_1 = -3,\quad x_2 = 7,\quad x_3 = x,$

$y_1 = 12,\quad y_2 = 6,\quad y_3 = 9$

If the points are collinear then the area of the triangle is zero.

$\therefore \frac{1}{2}[x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)] = 0$

$\frac{1}{2}[-3(6-9)+7(9—12)+\ x(12-6)]=0$

$\frac{1}{2}[-3(-3)+7(-3)+x(6)]=0$

$\frac{1}{2}[9-21+6x]=0$

$\frac{1}{2}[-12+6x]=0$

$-12+6x=0$

$6x=12$

$x=2$

37) Find the value of 'P' if the following points are collinear.

i) $(3,\ 2),\ (4,\ p),\ (5,\ 3)$ ii) $(-3,\ 9),\ (2,\ p),\ (4,-5)$

38) Show that the points $(1,-1), (5,2)$ and $(9,5)$ are collinear using distance formula.

39) Find the co-ordinates of the points which divides the line segment joining the points$(-5,\ 11)$ and $(4,\ -7)$ in the ratio $7:2$.

Solution: - $(x_1\,,y_1\,)=(-5,\ 11)$, $(x_2\,,y_2\,)=(4,-7)$, $\mathrm{m}_1:\mathrm{m}_2=7:2$

$$P(x,y)=\left(\frac{\mathrm{m}_1x_2+\mathrm{m}_2x_1}{\mathrm{m}_1+\ \mathrm{m}_2},\qquad \frac{\mathrm{m}_1y_2+\mathrm{m}_2y_1}{\mathrm{m}_1+\ \mathrm{m}_2}\right)$$

$$P(x,y)=\left(\frac{7(4)+2(-5)}{7+2},\qquad \frac{7(-7)+2(11)}{7+2}\right)$$

$$P(x,y)=\left(\frac{28-10}{9},\qquad \frac{-49+22}{9}\right)$$

$$P(x,y)=\left(\frac{18}{9},\qquad \frac{-27}{9}\right)$$

$P(x,y)=(2,-3)$

40) Find the ratio in which the point (2, 5) divides the line segment joining (8, 2) and (-6, 9).

41) Find the ratio in which (-6, a) divides the line segment joining (-3,-1) and (-8, 9) and find the value of 'a'.

Unit-8: REAL NUMBERS

ONE MARKS QUESTIONS (MCQ)

1) 72 and 28 can be expressed using Euclid's division algorithm as
A) $28 = (72 - 16) \times 2$ B) $72 = (28 \times 2) + 16$
C) $72 = (28 \times 2) - 16$ D) $16 = 72 - (28 + 2)$

2) The HCF of 26 and 91 is ________
A) 7 B) 13 C) 20 D) 26

3) If the HCF of 6 and 20 is 2 then the LCM is ________
A) 40 B) 120 C) 60 D) 240

4) Which of the following number is not a product of prime factors
A) 35 B) 26 C) 23 D) 15

5) If $x = \frac{p}{q} (q \neq 0)$ is a rational number having terminating decimal expression then the factor of 'q' are,
A) $2^n.5^m$ m, n are, non negative integers
B) $3^n.5^m$ m, n are non positive integers
C) $5^n.7^m$ m, n are non negative integers
D) $2^n.7^m$ m, n are non positive integers

1 Mark Questions (VSA)

6) If the HCF of 14 and 21 is 7. Find their LCM.
7) Find the LCM of 18 and 45.
8) Express 156 as a product of prime factors.
9) State Euclid's division algorithm.

<table>
<tr><td rowspan="3">**Ans**</td><td>1) B</td><td>2) B</td><td>3) C</td><td>4) C</td><td>5) A</td><td>6) L.C.M = 42</td></tr>
<tr><td colspan="2">7) L.C.M = 90</td><td colspan="4">8) $156 = 2 \times 2 \times 3 \times 13 = 2^2 \times 3 \times 13$</td></tr>
<tr><td colspan="6">9) Given positive integers a and b, there exist unique integers q and r satisfying $a = bq + r \quad (0 \leq r < b)$</td></tr>
</table>

3 Express the following numbers as a product of prime factors
i) 140 ii) 120 iii) 1173 iv) 404 v) 210 vi) 715 vii) 336

2 Marks Questions (SA)

4 **Find the HCF of 135 and 125 using Euclid's division.**

Solution: - Applying Euclid's division algorithm

Step 1: $225 = (135 \times 1) + 90$

Step 2: $135 = (90 \times 1) + 45$

Step 3: $90 = (45 \times 2) + 0$

Now the remainder is 0

$\therefore$ The H.C.F= 45

5 Find the H.C.F of the following numbers using Euclid's division algorithm.

(i) 255 And 867 (ii) 42 and 455

6 Find the LC.M And H.C.F of 8, 9 and 25using prime factorization method.

Solution:- $8 = 2 \times 2 \times 2 = 2^3$

$9 = 3 \times 3 = 3^2$

$25 = 5 \times 5 = 5^2$

H.C.F = 1

L.C.M. $= 2^3 \times 3^2 \times 5^2$

$= 8 \times 9 \times 25$

$= 1800$

7 Find the H.C.F and L.C.M of 12, 15 and 21using prime factorization method.

8 **There is a circular path around a sports field Sonia takes 18 minutes to drive one round of the field, while Ravi takes 12 minutes for the same. Suppose they both start at the same point and at the same time, and go in the same direction. After how many minutes will they meet again at the starting point?**

Solution: - they will meet again after a time equal to L.C.M of the time taken.

$18 = 2 \times 3 \times 3 = 2 \times 3^2$

$12 = 2 \times 2 \times 3 = 2^2 \times 3$

L.C.M. $= 2^2 \times 3^2 = 36$

$\therefore$ They meet again after 36 minutes

9 **Prove that $5 - \sqrt{3}$ is an irrational number.**

Solution: - Let us assume that $5 - \sqrt{3}$ is a rational number.

That is $5 - \sqrt{3} = \frac{p}{q}$ $(p, q \in z$ and $q \neq 0)$ p, q are co- primes

$5 - \frac{p}{q} = \sqrt{3}$

$\sqrt{3} = \frac{5q-p}{q}$

$\Rightarrow \sqrt{3}$ is a rational numbers [$\because \frac{5q-p}{q}$ is a rational numbers]

$\therefore$ $\sqrt{3}$ is a contradiction.

$\therefore$ our assumption is wrong ,

Hence $5-\sqrt{3}$ is an irrational number.

10 Prove that the following are irrational numbers.

i) $6+\sqrt{2}$ ii) $5+\sqrt{3}$ iii) $3+2\sqrt{5}$ iv) $3-2\sqrt{5}$

11 Show that $\frac{35}{50}$ has terminating decimal expension without long division.

Solution :- $50 = 2\times 5\times 5 = 2^1\times 5^2$

$$\frac{35}{50}=\frac{35}{2^1\times 5^2}$$

The denominator is in the form $2^n\times 5^m$ and $n=1, m=2$ are non negative integers

∴ this is a terminating decimal expansion.

12 Without long method of division show that $\frac{77}{210}$ has non terminating recurring decimal expansion .

Solution :- $210 = 2\times 3\times 5\times 7$

$$\frac{77}{210}=\frac{77}{2\times 3\times 5\times 7}$$

The denominator is not in the form$2^n\times 5^m$.

∴ this is a non terminating recurring decimal expansion.

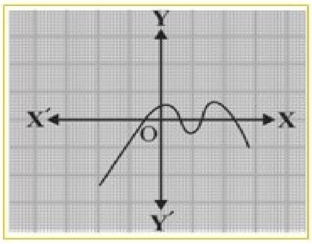
13 Without long division method find whether the following rational numbers have terminating decimal expansions.

i) $\frac{17}{8}$ ii) $\frac{64}{455}$ iii) $\frac{29}{343}$ iv) $\frac{23}{200}$

UNIT – 9 : POLYNOMIALS

1 Mark Questions (MCQ)

1) A graph of a polynomial is given here the number of years of the polynomial is



A) 1 B) 2

C) 3 D) 4

2) Which of the following is a zero of the polynomial x^2+4x+4 ?

A) 2 B) -2 C) 4 D) -4

3) The degree of the polynomial $-4x^2+5x^3+x-\sqrt{2}$ is

A) 0 B) 1 C) 2 D) 3

4) f$(x) = x^2 - 9x + 20$ is a quadratic polynomial. The value of f(0) is
A) 20 B) 11 C) -20 D) 29

5) If the zero of the polynomial $x^2 + kx + 4$ is -2, then the value of 'k' is
A) 4 B) -2 C) -4 D) 2

6) Which of the following is zero of the polynomial $x^2 - 3$?
A) 3 B) -3 C) $\sqrt{3}$ D) 9

7) If $x^5 + a^5$is divided $(x + a)$ the remainder is
A) a^5 B) $2a^5$ C) 0 D) 5

8) If $x^5 + a^5$is divided $(x - a)$ the remainder is
A) a^5 B) $2a^5$ C) 0 D) 5

9) If $(x - 7)$ is the factor of $(x^2 - k)$ then the value of 'k' is
A) 49 B) 7 C) -7 D) -49

1 Mark Questions (VSA)

10) What is the maximum number of zeros of the polynomial $x^3 + x + 2 + 4x^5$?

11) Write the degree of the polynomial $2 - x^3$.

12) If p$(x) = 2x^2 + 3x + 2$then find the value of p(2).

13) If f$(x) = x^2 - 4$ then find the value of f(4).

14) If f$(x) = 7x^2 + 2x + 14$then find the value of f(-1).

15) Write the general form of a linear polynomial.

16) What is the degree of a linear polynomial ?

17) Write the general form of a quadratic polynomial.

18) What is the degree of a quadratic polynomial?

19) Write the general form of a Cubic polynomial.

20) What is the degree of a cubic polynomial?

21) f$(x) = 10$, which type of a polynomial is this?

22) Find the zero of the polynomial f(x)= $3x$+1.

Ans	1) D	2) B	3) D	4) A	5) A	6) C	7) C	8) B	9) A
10) 5	11) 3	12) 16	13) 12	14) 19	15) $ax + b$ $(a \neq 0)$				16) 1
17) $ax^2 + bx + c(a \neq 0)$			18) 2	19) $ax^3 + bx^2 + cx + d(a \neq 0)$					20) 3
21) Constant polynomial			22)$\frac{-1}{3}$						

2 Marks Questions (SA)

23) **If the sum of zero is $\sqrt{2}$ and the product of zeroes is $\frac{1}{3}$ find the polynomial.**

Solution:- Let the zeroes be α and ß.

$\alpha + ß = \sqrt{2}$ and $\alpha ß = \frac{1}{3}$

the desired polynomial is $x^2 - (\alpha + ß)x + \alpha ß$

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

$= 3x^2 - 3\sqrt{2}x + 1$ (multiply each term by 3)

∴ the required polynomial is $3x^2 - 3\sqrt{2}x + 1$

24) Find the polynomial whose sum of zeroes is $\frac{1}{4}$ and the product of the zeroes is -1.

25) Find the polynomial whose sum of zeroes is $\frac{1}{4}$ and the product of the zeroes is $-\frac{1}{4}$.

26) Find the polynomial whose sum of zeroes is -3 and the product of the zeroes is2.

27) **Find a polynomial whose zeroes are $\sqrt{3}$ and $-\sqrt{3}$.**

Solution:- Let the zeroes be α and ß.

$\alpha = \sqrt{3}$

$ß = -\sqrt{3}$

$\alpha + ß = \sqrt{3} + (-\sqrt{3}) = 0$

$\alpha ß = (\sqrt{3})(-\sqrt{3}) = -(\sqrt{3})^2 = -3$

the desired polynomial is $x^2 - (\alpha + ß)\, x + \alpha ß$

$= x^2 - (0)\, x + (-3)$

$= x^2 - 3$

∴ the required polynomial is $x^2 - 3$.

3 Marks Questions (LA-1)

28) **Find the zeroes of the polynomial $6x^2 - 3 - 7x$ Also verify the relation between zeroes and the co-efficient.**

Solution:- $6x^2 - 3 - 7x$

$= 6x^2 - 7x - 3$

$= 6x^2 - 9x + 2x - 3$

$= 3x(2x - 3) + 1(2x - 3)$

$= (3x + 1)(2x - 3)$

$6 \times 3 = 18$

$9 \times 2 = 18$

$-9 + 2 = -7$

$\Rightarrow$The zeroes, $x = -\frac{1}{3}$ and $x = \frac{3}{2}$

The sum of the zeroes $= -\frac{1}{3} + \frac{3}{2} = \frac{-2+9}{6} = \frac{7}{6} = \frac{-(-7)}{6} = \frac{-(Co-efficient\ of\ x)}{(Co-efficient\ of x^2)}$

The product of the zeroes $= -\frac{1}{3} \times \frac{3}{2} = \frac{-1}{2} = \frac{-3}{6} = \frac{\text{Constant}}{Co-efficient\ of x^2}$

29) Find the zeroes of the polynomial $4s^2 - 4s + 1$. And verify the relation between zeroes and the co-efficient.

30) Find the zeroes of the polynomial $3x^2 - x - 4$ and verify the relation between zeroes and the co-efficient.

31) Find the zeroes of the polynomial $4u^2 - 8u$ and verify the relation between zeroes and the co-efficient.

32) **Divide the polynomial $x^4 - 3x^2 + 4x + 5$ by the polynomial $x^2 + 1 - x$ and find the quotient and remainder.**

Solution :-

$$
\begin{array}{r|l}
 & x^2 + x - 3 \\
x^2 - x + 1 & x^4 + 0x^3 - 3x^2 + 4x + 5 \\
 & \underset{(-)}{x^4} \underset{(+)}{-\ x^3} \underset{(-)}{+\ x^2} \\
\hline
 & x^3 - 4x^2 + 4x + 5 \\
 & \underset{(-)}{x^3} \underset{(+)}{-\ x^2} \underset{(-)}{+\ x} \\
\hline
 & -3x^2 + 3x + 5 \\
 & \underset{(+)}{-3x^2} \underset{(-)}{+\ 3x} \underset{(+)}{-\ 3} \\
\hline
 & 8 \\
\hline
\end{array}
$$

Quotient $= x^2 + x - 3$ and remainder $= 8$

33) Dived the polynomial $x^3 - 3x^2 + 5x - 3$by the polynomial $x^2 - 2$ and find the quotient and remainder.

34) Dived the polynomial $x^4 - 5x + 6$by the polynomial $2 - x^2$ and find the quotient and remainder.

35) **Divide the polynomial $3x^4 + 5x^3 - 7x^2 + 2x + 2$by the polynomial $x^2 + 3x + 1$ .Verify if the second polynomial is a factor of the first polynomial.**

Solution :-

$$
\begin{array}{r|l}
 & 3x^2 - 4x + 2 \\
x^2+3x+1 & 3x^4 + 5x^3 - 7x^2 + 2x + 2 \\
 & 3x^4 + 9x^3 + 3x^2 \\
 & (-)\quad (-)\quad (-) \\
\hline
 & -4x^3 - 10x^2 + 2x + 2 \\
 & -4x^3 - 12x^2 - 4x \\
 & (+)\quad (+)\quad (+) \\
\hline
 & 2x^2 + 6x + 2 \\
 & 2x^2 + 6x + 2 \\
 & (-)\quad (-)\quad (-) \\
\hline
 & 0 \\
\hline
\end{array}
$$

Quotient $= 3x^2 - 4x + 2$ and remainder $= 0$
Since the remainder is zero, $x^2 + 3x + 1$ is factor of $3x^4 + 5x^3 - 7x^2 + 2x + 2$

36) Divide the polynomial $2t^4 + 3t^3 - 2t^2 - 9t - 12$ by the polynomial $t^2 - 3$ and verify if the second polynomial is a factor of the first polynomial .

37) Divide the polynomial $x^5 - 4x^3 + x^2 + 3x + 1$by the polynomial $x^3 - 3x + 1$ and verify if the second polynomial is a factor of the first polynomial.

38) If 3 and -3 are the zeroes of the polynomial $x^4 + 2x^3 - 8x^2 - 18x - 9$ find all the zeroes of the polynomial .

39) **If the polynomial $x^3 - 3x^2 + x + 2$is divided by g(x), then the remainder is $-2x + 4$ and quotient is $x - 2$ Find the divisor g(x).**
Solution :- $p(x) = x^3 - 3x^2 + x + 2$, $q(x) = x - 2$ and $r(x) = -2x + 4$

$p(x) - r(x) = (x^3 - 3x^2 + x + 2) - (-2x + 4)$

$p(x) - r(x) = x^3 - 3x^2 + x + 2 + 2x - 4$

$p(x) - r(x) = x^3 - 3x^2 + 3x - 2$

$$g(x) = \frac{p(x) - r(x)}{q(x)}$$

$$
\begin{array}{r|l}
 & x^2 - x + 1 \\
x-2 & x^3 - 3x^2 + 3x - 2 \\
 & x^3 - 2x^2 \\
 & (-)\quad (+) \\
\hline
 & -x^2 + 3x - 2 \\
 & -x^2 + 2x \\
 & (+)\quad (-) \\
\hline
 & x - 2 \\
 & x - 2 \\
 & (-)\quad (+) \\
\hline
 & 0 \\
\hline
\end{array}
$$

$\therefore g(x) = x^2 - x + 1$

UNIT – 10 : Quadratic Equations

1 Mark Questions (MCQ)

1) Which of the following is not a quadratic equation?
A) $x^2 + x = 2$ B) $p(p-3) = 0$ C) $x^2 + 2 = 6 + x^2 - x$ D) $x + \frac{1}{x} = 5$

2) If $x^2 + 1 = 101$ then the value of x is
A) ± 1 B) ± 10 C) ± 11 D) $\pm\sqrt{10}$

3) The value of discriminant of the quadratic equation $2x^2 - 5x - 1 = 0$ is
A) 33 B) 3 C) 0 D) 35

4) The discriminant of the quadratic equation $ax^2 + bx + c = 0$ is
A) $b^2 - ac$ B) $b^2 - 4ac$ C) $\sqrt{b^2 - 4ac}$ D) $b^2 + 4ac$

5) In the quadratic equation $ax^2 + bx + c = 0$ is $\frac{b^2}{4} = ac$ then the roots of the equation are
A) Equal B) Distinct C) Additive inverse D) Reciprocals.

6) In the quadratic equation $ax^2 + bx + c = 0$, $a = c$ Then the roots are
A) even numbers B) odd numbers C) negative numbers D) reciprocals

7) The roots of equations $x^2 = 49$ are
A) 7 and -7 B) 24 and 5 C) 8 and -8 D) 7 and 0

8) The roots of equations $x^2 - 4 = 0$ are
A) 2 and 0 B) 2 and -2 C) 4 and 5 D) 1 and -1

9) The roots of equations $x^2 - 4x = 0$ are
A) 0 and 2 B) -4 and 0 C) -2 and 0 D) 0 and 4

1 Mark Questions(VSA)

10) If the roots of equations $ax^2 + bx + c = 0$,are real and equal, what is the value of the discriminant ?
11) If $143 = t^2 - 1$ then solve for t.
12) Write the general form of a quadratic equation.
13) Which mathematician gave the formula to solve the equation $ax^2 + bx + c = 0$?

Ans	1) C	2) B	3) A	4) B	5) A	6) D	7) A	8) B
	9) D	10) $b^2 - 4ac = 0$		11) ± 12	12) $ax^2 + bx + c = 0$ ($a \neq 0$)			
	13) Brahmagupta							

2 Marks Questions (SA)

14) Verify if $x^2 - 2x = (-2)(3 - x)$ is a quadratic equation .

15) Find the roots of the equation $2x^2 - x + \frac{1}{8} = 0$ by factorization method

Solution :- $2x^2 - x + \frac{1}{8} = 0$

$16x^2 - 8x + 1 = 0$ (Multiplying each term by 8)

$16x^2 - 4x - 4x + 1 = 0$

First term $= +16x^2$, Last term $= +1$

Product $= 16x^2 = -4x \times -4x$

Middle term $= -8x = -4x - 4x$

$4x(4x - 1) - 1(4x - 1) = 0$

$(4x - 1)(4x - 1) = 0$

$4x - 1 = 0, \quad 4x - 1 = 0$

$4x = 1, \quad 4x = 1$

Roots $x = \frac{1}{4}, \quad x = \frac{1}{4}$

16) Find the roots of the following quadratic equations by factor method.
(i) $16x^2 - 3x - 10 = 0$ (ii) $2x^2 + x - 6 = 0$ (iii) $100x^2 - 20x + 1 = 0$

17) Solve the quadratic equation $2x^2 - 5x + 2 = 0$ by completing the square .

Solution :- $2x^2 - 5x + 2 = 0$this is in the form $ax^2 + bx + c = 0$.

$a = 2, \quad b = -5, \quad c = 2$

$$\left(x + \frac{b}{2a}\right)^2 = \left(\frac{b}{2a}\right)^2 - \frac{c}{a}$$

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

$$\left(x - \frac{5}{4}\right)^2 = \frac{25}{16} - 1$$

$\left(x - \frac{5}{4}\right)^2 = \frac{9}{16}$ (Taking square root on both side)

$$x - \frac{5}{4} = \pm\frac{3}{4}$$

$$x = \pm\frac{3}{4} + \frac{5}{4}$$

$x = +\frac{3}{4} + \frac{5}{4}$ or $x = -\frac{3}{4} + \frac{5}{4}$

$x = \frac{8}{4}$ or $x = \frac{2}{4}$

$x = 2$ or $x = \frac{1}{2}$

18) Solve the following equations by completing the square.
(i) $5x^2 - 6x - 2 = 0$ (ii) $9x^2 - 15x + 6 = 0$ (iii) $2x^2 - 5x + 3 = 0$

19) **Solve $4x^2 + 4\sqrt{3}x + 3 = 0$ by using formula.**

Solution: - $4x^2 + 4\sqrt{3}x + 3 = 0$ this is in the form $ax^2 + bx + c = 0$.

$a = 4, \quad b = 4\sqrt{3}, \quad c = 3$

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

$$x = \frac{-(4\sqrt{3}) \pm \sqrt{(4\sqrt{3})^2 - 4(4)(3)}}{2(4)}$$

$$x = \frac{-4\sqrt{3} \pm \sqrt{16 \times 3 - 48}}{8}$$

$$x = \frac{-4\sqrt{3} \pm \sqrt{48 - 48}}{8}$$

$$x = \frac{-4\sqrt{3} \pm 0}{8}$$

$x = \frac{-4\sqrt{3}}{8}$ or $x = \frac{-4\sqrt{3}}{8}$

$x = \frac{-\sqrt{3}}{2}$ or $x = \frac{-\sqrt{3}}{2}$

20) Find the roots of the following equations by formula method.

$(i) 2x^2 + x - 4 = 0$ $\quad (ii)\ 2x^2 - 7x + 3 = 0$ $\quad (iii)\ 2x^2 - 5x + 3 = 0$

$(iv)\ 3x^2 - 5x + 2 = 0$ $\quad (v)\ 5x^2 - 6x - 2 = 0$ $\quad (vi)\ 2x^2 + x = 528$

$(vii) x^2 + 2x = 143$ $\quad (viii) x^2 - 4 = 3x$ $\quad (ix)\ 2x^2 - 2\sqrt{2}x = -1$

21) **Show that the equation, $3x^2 - 4\sqrt{3}x + 4 = 0$ has real and equal roots.**

Solution :- $3x^2 - 4\sqrt{3}x + 4 = 0$

$a = 3, \quad b = -4\sqrt{3}, \quad c = 4$

Discriminant $= b^2 - 4ac$

$= (-4\sqrt{3})^2 - 4(3)(4)$

$= 48 - 48$

$= 0$

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

$\Rightarrow$ The equation has real and equal roots.

22) Find the discriminant of the equation $3x^2 - 2x + \frac{1}{3} = 0$. From this find the nature of the roots. Find the roots if they are real .

Solution:- $3x^2 - 2x + \frac{1}{3} = 0$

$a = 3, \quad b = -2, \quad c = \frac{1}{3}$

Discriminant $= b^2 - 4ac$

$= (-2)^2 - 4(3)\left(\frac{1}{3}\right)$

$= 4 - 4 = 0$

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

$\Rightarrow$ The equation has two equal real roots .

$\therefore$ the roots are $\frac{-b}{2a} = \frac{-(-2)}{2(3)}$ and $\frac{-b}{2a} = \frac{-(-2)}{2(3)}$

The roots are $\frac{2}{2(3)}$ and $\frac{2}{2(3)}$

$\therefore$ The roots are $\frac{1}{3}$and $\frac{1}{3}$.

23) Discuss the nature of the roots of the equation, $2x^2 - 3x + 5 = 0$.

24) Discuss the nature of the roots of the equation ,$x^2 - 6x + 3 = 0$.

25) **Find the value of k so that the roots of the equation $2x^2 + kx + 3 = 0$ are equal.**

Solution : $2x^2 + kx + 3 = 0$ $a = 2$, $b = k$ $c = 3$

For equal roots, $b^2 - 4ac = 0$

$(k)^2 - 4(2)(3) = 0$

$k^2 - 24 = 0$

$k^2 = 24$

$\sqrt{k^2} = \sqrt{4 \times 6} = \pm 2\sqrt{6}$

26) Find the value of k so that the roots of the equation $kx(x - 2) + 6 = 0$ are equal.

27) **A rectangular mango grove whose length is twice its breadth, and it's area is 800m² . find it's length and breadth.**

Solution :- Breadth of a rectangular mango grove $= l$

Length $= 2l$

area of Rectangular mango grove = length × breadth

$(2l)(l) = 800$

$2l^2 = 800$

$l^2 = \frac{800}{2} = 400$

$l = \pm\sqrt{400} = \pm 20$

Breadth of mango grove $= l = 20$ m

length of mango grove $= 2l = 2 \times 20 = 40$ m

3 or 4 Marks Questions

28) **An express train takes 1 hour less than the passenger train to travel 132 km between Bengaluru and Mysuru. If the average speed of the express train is 11km/h more than that of the passenger train, what is the average speed of the two trains?**

Solution :- average speed of passenger train $= x$ km/h

average speed of express train $= (x + 11)$km/h

total distance travelled = 132 km

time taken by passenger train $= \frac{132}{x}$ h

time taken by express train $= \frac{132}{x+11}$ h time difference between these two journeys = 1 h

$\therefore \dfrac{132}{x} - \dfrac{132}{x+11} = 1$

$132(x + 11) - 132\,x = x(x + 11)$

$132x + 1452 - 132x = x^2 + 11x$

$x^2 + 11x - 1452 = 0$

$x^2 + 44x - 33x - 1452 = 0$

$x(x + 44) - 33(x + 44) = 0$

$(x + 44)(x - 33) = 0$

$x + 44 = 0, \ \ x - 33 = 0$

$x = -44, \quad x = 33$

average speed of passenger train $= 33$ km/h

average speed of express train $= (33 + 11) = 44$ km/h

29) A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Determine the speed of the stream.

30) Two water taps together can fill a tank in $9\frac{3}{8}$ hour. The tap of larger diameter taken 10 hour less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

31) The diagonal of a rectangular field is 60 meter more than the shorter side. If the longer side is 30 meters more than the shorter side, find the sides of the field.

32) The difference of squares of two numbers is 180. The square of the smaller number is 8 times the larger number, find the two numbers.

33) **Find the length and breadth of a rectangular park whose perimeter is 80m and it's area is 400 m^2.**

Solution:- let l and b are the length and breadth of a rectangular park

Perimeter $= 2(l + b) = 80$

$l + b = \dfrac{80}{2} = 40$

$l = 40 - b$

Area $l \times b = 400$

$l(40 - l) = 400$

$40l - l^2 = 400$

$l^2 - 40l + 400 = 0$

$a = 1, \qquad b = -40, \qquad c = 400$

$b^2 - 4ac = (-40)^2 - 4(1)(400) = 1600 - 1600 = 0$

$b^2 - 4ac = 0$ roots are real and equal

roots $\frac{-b}{2a}, \quad \frac{-b}{2a} = \frac{-(-40)}{2(1)}, \qquad \frac{-(-40)}{2(1)} = \frac{40}{2}, \quad \frac{40}{2} = 20\,, \quad 20$

length $l = 20$ m

breadth $b = 40 - l = 40 - 20 = 20$m

UNIT– 11 : INTRODUCTION TO TRIGONOMETRY

Mark Questions (MCQ)

1) If $\tan A = \frac{4}{3}$ then the value of $4\cot A$ is

A) $\frac{1}{3}$ B) $\frac{3}{4}$ C) 4 D) 3

2) If $\cos\theta = \frac{12}{13}$ then the value of $\sec\theta$ is

A) $\frac{13}{12}$ B) $\frac{12}{25}$ C) $\frac{5}{13}$ D) $\frac{5}{12}$

3) If $\sin A = \frac{4}{5}$ then the value of $\operatorname{cosec} A$ is

A) $\frac{4}{5}$ B) $\frac{5}{4}$ C) $\frac{3}{4}$ D) $\frac{3}{5}$

4) If $\sqrt{3}\tan A = 1$ then the value of $\angle A$ is

A) 60° B) 30° C) 45° D) 90°

5) The value of $\tan^2 60^{\circ}$ is

A) $\sqrt{3}$ B) $\frac{1}{3}$ C) 3 D) $\frac{1}{\sqrt{3}}$

6) The value of $\operatorname{cosec}^2 45^{\circ}$ is

A) 2 B) $\sqrt{2}$ C) $\frac{1}{2}$ D) $\frac{1}{\sqrt{2}}$

7) The value of $1 + \tan^2 45^{\circ}$ is

A) 0 B) 2 C) 3 D) $\sqrt{2}$

8) The value of $1 - \tan^2 45^{\circ}$ is

A) 0 B) 2 C) 3 D) $\sqrt{2}$

9) The value of $\frac{\tan 65^{\circ}}{\cot 25^{\circ}}$ is

A) $\sqrt{2}$ B) 0 C) 1 D) $\frac{1}{\sqrt{2}}$

10) The value of $\cos 48^{\circ} - \sin 42^{\circ}$ is

A) $\frac{1}{2}$ B) 0 C) 1 D) $\frac{3}{2}$

11) If $\sin 2A = 2\sin A$ is true when $A = ?$

A) 0° B) 30° C) 45° D) 60°

12) The value $9\sec^2 A - 9\tan^2 A$ is

A) 1 B) 9 C) 8 D) 0

13) The equal value of $\cos A$ is

A) $\frac{1}{\text{cosec } A}$ B) $\frac{1}{\sec A}$ C) $\frac{1}{\sin A}$ D) $\frac{1}{\cot A}$

14) $(\sin A + \cos A)^2$ is equal to

A) $\sin^2 A + \cos^2 A$ B) $1 + 2\sin A.\cos A$

C) $\sin^2 A - \cos^2 A$ D) $1 - \sin A.\cos A$

1 Mark Questions (VSA)

15) If $\sin x = \frac{3}{5}$ then find the value of $3\text{cosec } x$.

16) If $\cot\theta = \frac{7}{8}$ then find the value of $\cot^2\theta$.

17) If $2\cos\theta = 1$ then find the value of acute angle θ.

18) If $\sqrt{3}\cot A = 1$ then find the value of acute angle A.

19) Find the value of $\frac{\sin 18^\circ}{\cos 72^\circ}$

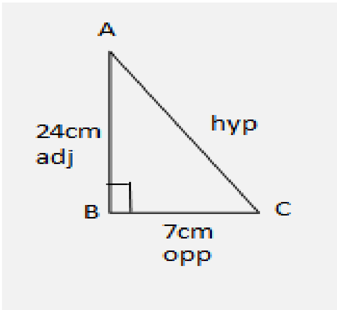
20) Find the value of $\text{cosec } 31^\circ - \sec 59^\circ$.

21) Find the value of $\sin^2 75^\circ + \cos^2 75^\circ$.

Ans	1) D	2)A	3)B	4)B	5)C	6)A	
7)B	8)A	9)C	10)B	11)A	12)B	13)B	
14)B	15)5	16)$\frac{49}{64}$	17) 60°	18) 60°	19)1	20)0	21)1

2 Marks Questions (SA)

22) In ΔABC, find sinA and cosA If $\angle B = 90^\circ$, $AB = 24cm$, $BC = 7cm$.



Solution : In ΔABC, $\angle B = 90^\circ$

given that $AB = 24cm, BC = 7cm$

$AC^2 = AB^2 + BC^2$

$AC^2 = 576 + 49$

$AC^2 = 625$

$AC^2 = 25^2$

$AC = 25cm$

$\sin A = \frac{opp}{hyp} = \frac{7}{25}$ and $\cos A = \frac{adj}{hyp} = \frac{24}{25}$

23) If $\cot\theta = \frac{7}{8}$ find other 5 trigonometric ratios.

24) If $\sin A = \frac{3}{4}$ find other 5 trigonometric ratios.

25) If $\sec\theta = \frac{13}{12}$ find other 5 trigonometric ratios.

26) If $15\cot A = 8$,find $\sin A$ and $\sec A$.

27) If $2\cos\theta = 1$ find other 5 trigonometric ratios.

28) If $2\sin\theta = \sqrt{3}$ find other 5 trigonometric ratios.

29) **If $3\tan A = \sqrt{3}$ find $\sin 3A$ and $\cos 2A$.**

Solution : $3\tan A = \sqrt{3}$

$$\tan A = \frac{\sqrt{3}}{3}$$

$$\tan A = \frac{\sqrt{3}}{\sqrt{3}\times\sqrt{3}}$$

$$\tan A == \frac{1}{\sqrt{3}}$$

$$\Rightarrow A = 30^\circ$$

$$\sin 3A = \sin 3(30^\circ) = \sin 90^\circ = 1$$

$$\cos 2A = \cos 2\,(30^\circ) = \cos 60^\circ = \frac{1}{2}$$

30) If $13\sin A = 5$, A is a acute angle find . $\frac{5\sin A - 2\cos A}{\tan A}$.

31) If $A = 60^\circ$, $B = 30^\circ$ then prove $\cos(A+B) = \cos A.\cos B - \sin A.\sin B$.

32) If $A = 60^\circ$, $B = 30^\circ$ then prove that $\tan(A-B) = \frac{\tan A - \tan B}{1+\tan A.\tan B}$.

33) If $B = 15^\circ$ then prove that $4\sin 2B.\cos 4B.\sin 6B = 1$.

34) Prove that $2\cos^2\theta - 1 = \cos^2\theta - \sin^2\theta$.

3 Marks Questions (SA)

35) **Show that $\frac{1-\cos\theta}{1+\cos\theta} = (\mathrm{cosec}\,\theta - \cot\theta)^2$.**

Solution : LHS $= \frac{(1-\cos\theta)}{(1+\cos\theta)}$

$$= \frac{(1-\cos\theta)(1-\cos\theta)}{(1+\cos\theta)(1-\cos\theta)}$$ [Multiply numerator and denominator by$(1-\cos\theta)$.]

$$= \frac{(1-\cos\theta)^2}{1-\cos^2\theta}$$ $[\because\ 1-\cos^2\theta = (1+\cos\theta)(1-\cos\theta)\,]$

$$= \frac{1^2+\cos^2\theta-2(1)(\cos\theta)}{\sin^2\theta}$$ $[\because \sin^2\theta = 1-\cos^2\theta\,]$

$$= \frac{1}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} - \frac{2\cos\theta}{\sin^2\theta}$$

$$= \frac{1}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} - \frac{2}{\sin\theta}.\frac{\cos\theta}{\sin\theta} \qquad [\because \frac{\cos^2\theta}{\sin^2\theta} = \cot^2\theta \ ]$$

$$= \csc^2\theta + \cot^2\theta - 2.\csc\theta.\cot\theta \qquad [\because \frac{1}{\sin^2\theta} = \csc^2\theta]$$

$$= (\csc\theta - \cot\theta)^2$$

$$= \text{RHS}$$

36) **Prove that $\sqrt{\sec^2\theta + \csc^2\theta} = (\tan\theta + \cot\theta)$.**

Solution : LHS $= \sqrt{\sec^2\theta + \csc^2\theta}$

$$= \sqrt{(1+\tan^2\theta) + (1+\cot^2\theta)} \qquad [\because 1+\tan^2\theta = \sec^2\theta,\ 1+\cot^2\theta = \csc^2\theta]$$

$$= \sqrt{\tan^2\theta + \cot^2\theta + 2}$$

$$= \sqrt{\tan^2\theta + \cot^2\theta + 2\tan\theta.\cot\theta} \qquad [\because \tan\theta.\cot\theta = 1]$$

$$= \sqrt{(\tan\theta + \cot\theta)^2}$$

$$= (\tan\theta + \cot\theta) = \text{RHS}$$

37) **Prove that $\frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta} = 1$.**

Solution : LHS $= \frac{\tan^2\theta}{1+\tan^2\theta} + \frac{\cot^2\theta}{1+\cot^2\theta}$

$$= \frac{\tan^2\theta}{\sec^2\theta} + \frac{\cot^2\theta}{\csc^2\theta} \qquad [\because 1+\tan^2\theta = \sec^2\theta,\ \ 1+\cot^2\theta = \csc^2\theta]$$

$$= \frac{\sin^2\theta}{\cos^2\theta}.\frac{1}{\sec^2\theta} + \frac{\cos^2\theta}{\sin^2\theta}.\frac{1}{\csc^2\theta}$$

$$= \frac{\sin^2\theta}{\cos^2\theta}.\cos^2\theta + \frac{\cos^2\theta}{\sin^2\theta}.\ \sin^2\theta \qquad [\because \frac{1}{\sec^2\theta} = \cos^2\theta, \qquad \frac{1}{\csc^2\theta} = \sin^2\theta\ ]$$

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

$$= 1$$

$$= \text{RHS}$$

38) **Prove that $\frac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} = 1 + 2\tan^2\theta + 2\sec\theta\,.\tan\theta$**

Solution : $\text{LHS} = \dfrac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta}$

$= \dfrac{\sec\theta + \tan\theta}{\sec\theta - \tan\theta} \times \dfrac{\sec\theta + \tan\theta}{\sec\theta + \tan\theta}$ [Multiply numerator and denominator by $\sec\theta + \tan\theta$].

$= \dfrac{(\sec\theta + \tan\theta)^2}{\sec^2\theta - \tan^2\theta}$

$= \dfrac{\sec^2\theta + \tan^2\theta + 2\sec\theta.\tan\theta}{1 + \tan^2\theta - \tan^2\theta}$

$= 1 + \tan^2\theta + \tan^2\theta + 2\sec\theta.\tan\theta$ [$\because 1 + \tan^2\theta = \sec^2\theta$]

$= 1 + 2\tan^2\theta + 2\sec\theta.\tan\theta = \text{RHS}$

39) If $\pi = 180^o$ and $A = \frac{\pi}{6}$ then prove that $\dfrac{(1+\cos A)(1-\cos A)}{(1-\sin A)(1+\sin A)} = \dfrac{1}{3}$.

40) If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$. Here $0^o < (A+B) \leq 90^o$;
Then find the value A and B.

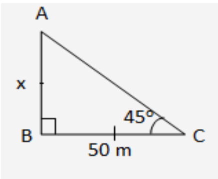
41) Prove that $\dfrac{\sin\theta}{1+\cos\theta} + \dfrac{1+\cos\theta}{\sin\theta} = 2\text{cosec}\theta$.

42) Prove that $(1 + \cot\theta - \text{cosec}\theta)(1 + \tan\theta + \sec\theta) = 2$.

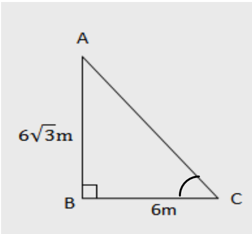
UNIT – 12 : SOME APPLICATIONS OF TRIGONOMETRY

1 Mark Questions (VSA)

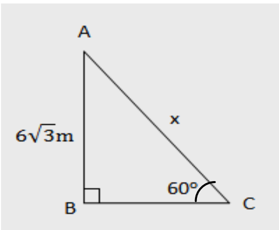
1) In the adjoining figure find the value of x.



2) In the adjoining figure find the value of $\angle C$.



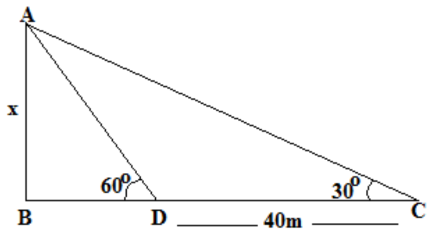
3) In the adjoining figure find the value of x.

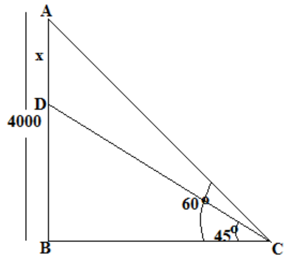


Ans	1) 50m	2) 60°	3) 12m

2 / 3 Marks Questions (SA/LA 1)

4) Find the value of the unknown in the following figure.



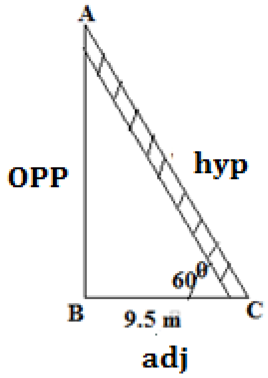


5) **The angle of elevation of ladder leaning against a wall is 60° and the foot of a ladder is 9.5 m away from the wall. find the length of ladder .**

Solution : Here AB = length of the wall

BC = distance from wall to foot of ladder

AC = length of ladder



$\cos\theta = \frac{\text{adj}}{\text{hyp}} = \frac{9.5}{AC}$

$\cos 60^\circ = \frac{9.5}{AC}$

$\frac{1}{2} = \frac{9.5}{AC}$

$AC = 9.5 \times 2 = 19$

$\therefore$ Length of $= 19$m

6) Two wind mills of height 50 m and 40 m are on either side of the field. A person observes the top of the wind mills from a point on the ground in between the towers. The angle of elevation was found to the 45° in both the cases, find the distance between the wind mills.

7) A tower stands vertically on the ground from a point on the ground which is 50m away from the foot of the tower the angle of elevation to top of the tower is 60°, find the height of the tower?

8) A tree is broken over by the wind forms a right angle triangle with the ground. If the broken part makes an angle of 60° with ground and the top of the tree is now 20 m from its base. How tall was the tree?

9) From the top of a building 16m high. The angular elevation of the top of a hill is 60° and the angular depression of the foot of the hill is 30°. Find the height of the hill.

UNIT – 13 : STATISTICS

1 Mark Questions (MCQ)

1) In the following which is not a measure of central tendency?
A) Mode B) Range C) Median D) Mean

2) The relationship between the measures of central tendency
A) Median = Mode+ 2 Mean B) Mode = 3 Median – 2 Mean
C) 3Median = 2 Mode + 2 Mean D) Mode = 3 Median + 2 Mean

3) The x- co ordinate of the point of intersection of two ogives, which were drawn as "more than" type and "less than" type for same data, represents
A) Mean. B) Median
C) Mode. D) Cumulative frequency.

4) The midpoint of the CI 10 – 25 is
A) 35 B) 15 C) 17.5 D) −7.5

5) Calculate mode if mean is 58 and median is 50 .
A) 34 B) 43 C) 108 D) 8

6) The point of intersection of two ogives, which were drawn as "more than" type and "less than" type for the some data is (66.4, 26.5). The Median of the same data is
A) 26.5 B) 39.9 C) 66.4 D) 33.2

1 Mark Questions (VSA)

7) Calculate median for the given scores 1, 5, 4, 3, 2.
8) What is the other name of cumulative frequency curve?
9) Write the formula to find mean for grouped data?.
10) Calculate median for the given scores 2, 8, 10, 6, 12, 16.

Ans	1) B	2) B	3) B	4) C	5) A
	6) C	7) 3	8) Ogive	9) $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$	10) 9

2Marks Questions (SA)

11) **Find the mean of the following data.**

CI	**10 - 25**	**25 - 40**	**40 – 55**	**55 - 70**	**70 - 85**	**85 - 100**
f	**2**	**3**	**7**	**6**	**6**	**6**

Solution: - **Direct method**

CI	f_i	Mid point x_i	$f_i\,x_i$
10 - 25	2	17.5	35.0
25 - 40	3	32.5	97.5
40 – 55	7	47.5	332.5
55 – 70	6	62.5	375.0
70 – 85	6	77.5	465.0
85 – 100	6	92.5	555.0
	$\sum f_i = 30$		$\sum f_i\,x_i = 1860.0$

Mean $\bar{x} = \frac{\sum f_i x_i}{\sum f_i}$

Mean $\bar{x} = \frac{1860}{30}$

Mean $\bar{x} = 62$

Solution: - **Assumed mean method**

Assumed mean a **= 17.5**

CI	f_i	Mid point x_i	$d_i = x_i - \mathrm{a}$	$f_i\,d_i$
10 - 25	2	17.5	0	0
25 - 40	3	32.5	15	45
40 – 55	7	47.5	30	210
55 - 70	6	62.5	45	270
70 - 85	6	77.5	60	360
85 - 100	6	92.5	75	450
	$\sum f_i = 30$			$\sum f_i\,d_i = 1335$

Mean $\bar{x} = \mathrm{a} + \frac{\sum f_i d_i}{\sum f_i}$

Mean $\bar{x} = 17.5 + \frac{1335}{30}$

Mean $\bar{x} = 17.5 + 44.5$

Mean $\bar{x} = 62$

Solution: - **Step deviation method**

Assume mean a = **17.5** .   Size Class interval h = **15**

CI	f_i	Mid point x_i	$u_i = \frac{x_i - a}{h}$	$f_i u_i$
10 - 25	2	17.5	0	0
25 - 40	3	32.5	1	3
40 – 55	7	47.5	2	14
55 - 70	6	62.5	3	18
70 - 85	6	77.5	4	24
85 - 100	6	92.5	5	30
	$\sum f_i = 30$			$\sum f_i u_i = 89$

Mean $\bar{x} = \mathrm{a} + \left[\frac{\sum f_i u_i}{\sum f_i}\right] \times \mathrm{h}$

Mean $\bar{x} = 17.5 + \left[\frac{89}{30}\right] \times 15$

Mean $\bar{x} = 17.5 + \frac{89}{2}$

Mean $\bar{x} = 17.5 + 44.5$

Mean $\bar{x} = 62$

12) Find the mean for the following distribution.

CI	15 - 25	25 - 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85
f	6	11	7	4	4	2	1

3 Marks Questions (LA-1)

13) **Find the Mode of the following data.**

CI	5 - 15	15 - 25	25 – 35	35 - 45	45 - 55	55 - 65
f	6	11	21	23	14	5

solution:-

CI	f
5 - 15	6
15 – 25	11
25 – 35	21
35 – 45	**23**
45 – 55	14
55 – 65	5
	$n = 80$

Maximum frequency = 23

Modal class = 35 – 45

Lower limit of modal class $\boldsymbol{l = 35}$

Class size $\boldsymbol{h = 10}$

Frequency of the Modal class $\boldsymbol{f_1 = 23}$

Frequency of the class preceeding the Modal class

$\boldsymbol{f_0 = 21}$

Frequency of the class suceeding the Modal class

$\boldsymbol{f_2 = 14}$

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

Mode = $35 + \left[\frac{23 - 21}{2 \times 23 - 21 - 14}\right] \times 10$

Mode = $35 + \left[\frac{2}{46 - 35}\right] \times 10$

Mode = $35 + \frac{20}{11}$

Mode = $35 + 1.82$

Mode = 36.82

14) Find the Mode of the following data.

CI	0 - 10	10 - 20	20 – 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
f	7	12	13	14	20	15	11	8

15) Find the Mode of the following data.

CI	0 - 20	20 - 40	40 – 60	60 - 80	80 - 100	100 - 120
f	10	35	52	61	38	29

16) Find the Mode for the following distribution .

CI	15 - 20	20 - 25	25 – 30	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55
f	3	8	9	10	3	0	0	2

17) Find the Mode for the following distribution .

CI	1 - 3	3 - 5	5 – 7	7 - 9	9 - 11
f	7	8	2	2	1

18) **Calculate the median of the following distribution.**

CI	**0 - 20**	**20 - 40**	**40 – 60**	**60 - 80**	**80 -100**	**100 - 120**	**120 - 140**
f	**6**	**8**	**10**	**12**	**6**	**5**	**3**

solution :-

CI	f	Cf
0 - 20	6	6
20 – 40	8	14
40 – 60	10	24 ***cf***
60 – 80	**12 *f***	**36**
80 – 100	6	42
100 – 120	5	47
120 -140	3	50
	$n = 50$	

Median $\frac{n}{2} = \frac{50}{2} = 25^{th}$ value

Median class $= 60 – 80$

Lower limit of Median class $\boldsymbol{l = 60}$

Number of observation $n = 50$

$\frac{n}{2} = \frac{50}{2} = \mathbf{25}$

Cumulative frequency of class
preceeding the median class $\boldsymbol{cf = 24}$

Frequency of Median class $\boldsymbol{f = 12}$

Class size $\boldsymbol{h = 20}$

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

$$\text{Median} = 60 + \left[\frac{25 - 24}{12}\right] \times 20$$

$$\text{Median} = 60 + \left[\frac{1}{3}\right] \times 5$$

$$\text{Median} = 60 + \frac{5}{3}$$

$$\text{Median} = 60 + 1.67$$

$$\text{Median} = 61.67$$

19) Find the median for the following distribution.

CI	65 - 85	85 - 105	105 – 125	125 - 145	145 - 165	165 - 185	185 - 205
f	4	5	13	20	14	8	4

20) Find the median for the following distribution.

CI	15 - 25	25 – 35	35 - 45	45 - 55	55 - 65	65 - 75	75 - 85
f	6	11	7	4	4	2	1

21) Find the median for the following distribution.

CI	40 - 45	45 – 50	50 - 55	55 - 60	60 - 65	65 - 70	70 - 75
f	2	3	8	6	6	3	2

22) Find the median for the following distribution.

CI	135 - 140	140 - 145	145 – 150	150 - 155	155 - 160	160 - 165
f	4	7	18	11	6	5

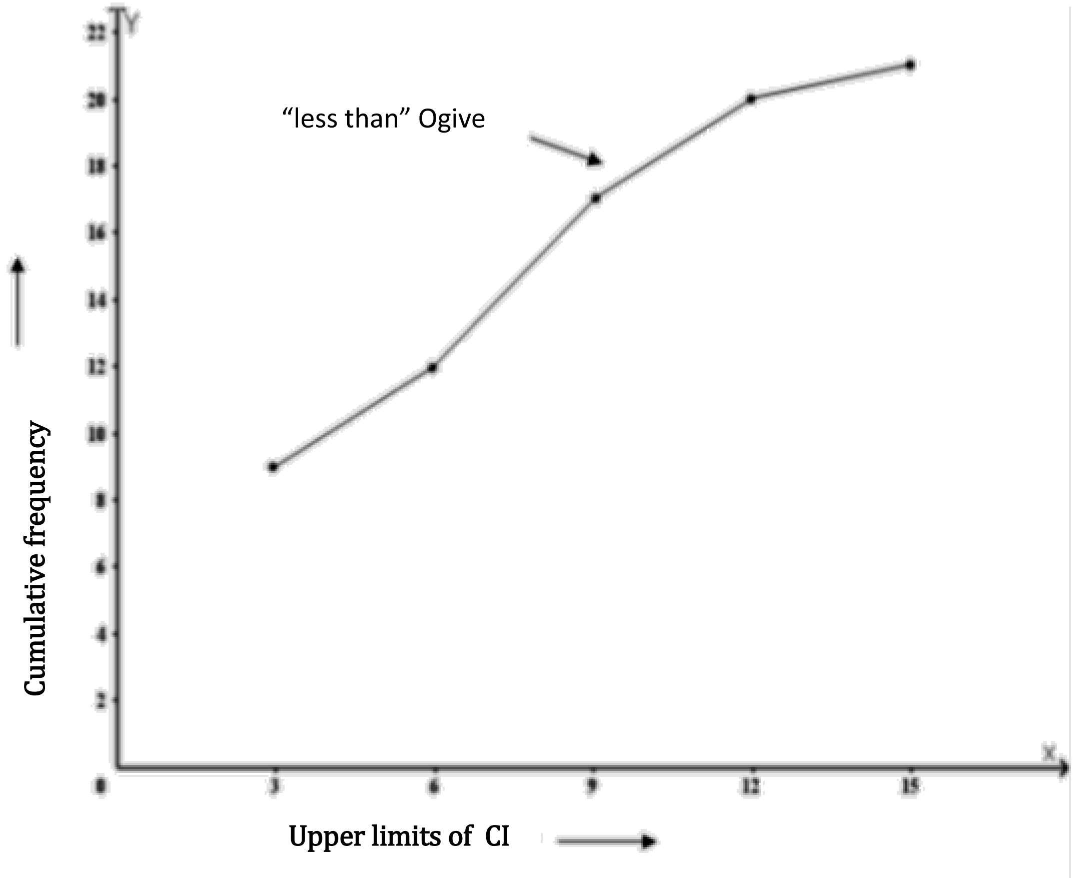
23) **Construct 'ogive' for the following distribution.**

CI	**0 - 3**	**3 - 6**	**6 – 9**	**9 - 12**	**12 - 15**
f	**9**	**3**	**5**	**3**	**1**

Solution :-

CI	f	Cf
less than 3	9	9
less than 6	3	12
less than 9	5	17
less than 12	3	20
less than 15	1	21

Note : Practice Ogive in graph sheet



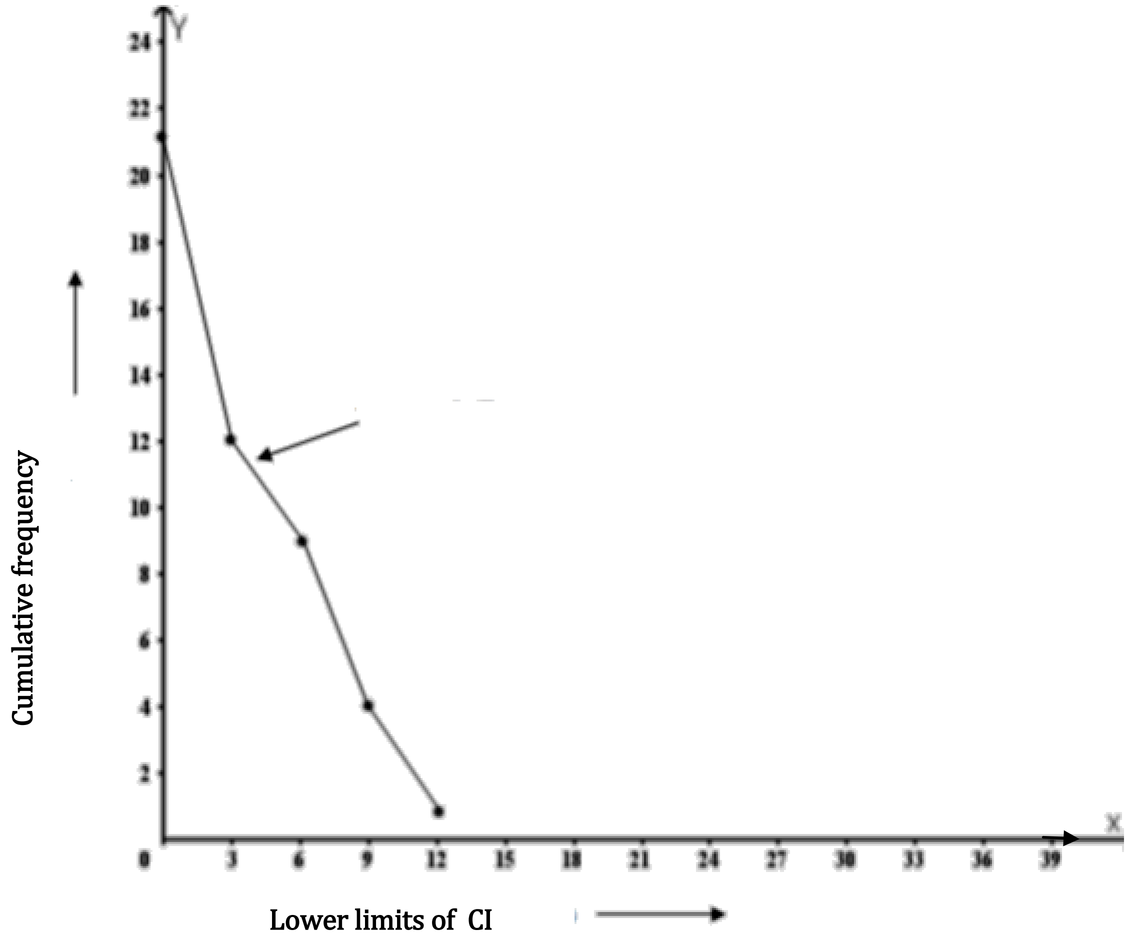
24) Convert the following distribution to a “less than type” distribution and draw its Ogive.

CI	100- 120	120 - 140	140 – 160	160 - 180	180 - 200
f	12	14	8	6	10

25) Convert the following distribution to a "more than type" distribution and draw its Ogive.

CI	**0 - 3**	**3 - 6**	**6 – 9**	**9 - 12**	**12 - 15**
f	**9**	**3**	**5**	**3**	**1**

CI	***f***	***Cf***
0 or more than 0	9	21
3 or more than 3	3	12
6 or more than 6	5	9
9 or more than 9	3	4
12 or more than 12	1	1



26) Convert the following distribution to a "more than type" distribution and draw its Ogive.

CI	50- 55	55 - 60	60 – 65	65 - 70	70 - 75	75 - 80
f	2	8	12	24	38	16

UNIT – 14: PROBABILITY

1 Mark Questions (MCQ)

1) Which of the following cannot be the probability of an event?

A) $\frac{2}{3}$ B) – 1.5 C) 15% D) 0.7

2) If P(E) = 0.05, what is the probability of 'not E'?
A) 0.05 B) 0.95 C) 0.005 D) 1.05

3) The probability of winning a game is $\frac{5}{6}$, then the probability of losing the game is
A) $\frac{-5}{6}$ B) $\frac{5}{6}$ C) $\frac{-1}{6}$ D) $\frac{1}{6}$

4) If the probability of an event is 1, then the event is called

A) Complementary event B) impossible event
C) mutually exclusive event D) sure event

5) The probability of winning a game is 0.3 ,then the probability of losing the game is
A) 0.1B) 0.3 C) 0.7 D) 1.3

6) A die is thrown once, the probability of getting an odd number is .

A) $\frac{1}{6}$ B) $\frac{4}{6}$ C) $\frac{2}{6}$ D) $\frac{3}{6}$

7) The probability of winning a game is 60% ,then the probability of losing the game is

A) 40% B) 10% C) 60% D) 20%

8) A die is thrown once, the probability of getting a number less than 6 is

A) $\frac{1}{6}$ B) $\frac{4}{6}$ C) $\frac{2}{6}$ D) $\frac{5}{6}$

9) Two fair coins are tossed once, the probability of getting head turns up is

A) $\frac{1}{4}$ B) $\frac{2}{4}$ C) $\frac{3}{4}$ D) $\frac{-1}{4}$

1 Mark Questions (VSA)

10) The chance of raining in a particular day is 35% . then what is the chance of not raining on the same day ?

11) If E and $\overline{E}$ both are complementary events, then the value of $P(E) + P(\overline{E})$ is?

12) In a random experiment, what is the total probability of all the primary events?

13) The probability of losing the game is $\frac{1}{4}$. Find the probability of winning the same game.

14) The probability of an event is 0. Name the type of event .

Ans	1) B	2) B	3) D	4) D	5) C	6) D	7) A	8) D	9) A
	10) 65%	11) 1	12) 1	13) $\frac{3}{4}$	14) Impossible event				

2Marks Questions (SA)

15) A die is thrown once. what is the probability of getting a number less than or equal to 4

Solution: - $S = \{ 1, 2, 3, 4, 5, 6 \}$ $\therefore n(S) = 6$

Let A be the event getting a number less than equal to 4.

$A = \{1, 2, 3, 4 \}$ $\therefore n(S) = 4$

$$P(A) = \frac{n(A)}{n(S)}$$

$$\therefore P(A) = \frac{4}{6} = \frac{2}{3}$$

16) A die is throw once. calculate the probability of getting

i) a prime number ii) an odd number

iii) a number lying between 2 and 6 Iv) a composite number

v) Even number vi) a square number

17) A box contains 50 discs which are numbered from 1 to 50. if one disc is drawn at random from the box, find the probability that its bears i) a perfect cube number ii) a number which is divisible by 2 and 3 .

18) Two dice are thrown. what is the probability of getting a)two identical faces b)sum of two faces are equal to 8 .

Solution:- $S = \{(1,1)(1,2)(1,3)(1,4)(1,5)\ (1,6)$

$(2,1)(2,2)(2,3)(2,4)(2,5)\ (2,6)$

$(3,1)(3,2)(3,3)(3,4)(3,5)\ (3,6)$

$(4,1)(4,2)(4,3)(4,4)(4,5)\ (4,6)$

$(5,1)(5,2)(5,3)(5,4)(5,5)\ (5,6)$

$(6,1)(6,2)(6,3)(6,4)(6,5)\ (6,6) \}$

total outcomes $n(S) = 36$

a) Let A be an event two identical faces (doublets)

$A = \{ (1,1)(2,2)(3,3)(4,4)(5,5)\ (6,6) \}$

$\therefore n(A) = 6$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A) = \frac{6}{36} = \frac{1}{6}$$

b) Let B be an event getting a sum 8 in two faces.

$B = \{ (2,6),(3,5),(4,4),(5,3),(6,2) \}$.

$\therefore n(B) = 5$

$$P(B) = \frac{n(B)}{n(S)}$$

$$P(B) = \frac{5}{36}$$

19) Two dice thrown simultaneously

i) Difference between the numbers in 2 faces is 2

ii) Sum between the numbers in 2 faces is 5

iii) product between the numbers is 2 faces is 12

iv) number except 5

v) find the probability to get 5 at least once.

20) **Three coins are tossed together find the probability of getting (i) at least 2 tail (ii) at most 2 tail**

Solution :- (i) three coins are tossed together the outcomes =n(s)=8

$$S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\} \therefore n(S) = 8$$

Let A is event of at least 2 tails.

$$A = \{ HTT, THT, TTH, TTT \} \therefore n(A) = 4$$

$$P(A) = \frac{n(A)}{n(S)} \therefore P(A) = \frac{4}{8} = \frac{1}{2}$$

(ii) Let b is event of at most 2 tails

$$B = \{HHH, HHT, HTH, THH, HTT, THT, TTH\} \therefore n(B) = 7$$

$$P(B) = \frac{n(B)}{n(S)} \qquad \therefore P(B) = \frac{7}{8}$$

21) Three unbiased coins are tossed. Find the probability of getting

(i) no tail (ii) at most one head.

22) There are three children in a family. Find the probability that there is one girl in the family.

23) **A box contains 500 wrist watches , in which 50 are damaged. One wrist watch is selected randomly from the box. Find the probability of getting a damaged wrist watch.**

Solution:- Total wrist watches $= 500$

$\therefore \mathrm{n(S)} = 500$

Let 'A' be an event of getting a damaged wrist watch

$\therefore \mathrm{n(A)} = 50$

$$\mathrm{P(A)} = \frac{\mathrm{n(A)}}{\mathrm{n(S)}}$$

$$\mathrm{P(A)} = \frac{50}{500} = \frac{1}{10}$$

24) A box contains 20 bulbs , in which 4 are damaged. One bulb is drawn out randomly from the box. Find the probability of getting (i) a damaged bulb (ii) a good bulb

25) From a bag containing 5 red, 8 white and 4 black marbles, one is drawn at random. Find the probability of getting

i) a red marble ii) a white marble iii) not a black marble.

Note : In a random experiment of throwing two dice , to solve the problems related to addition the following table is very useful.

	Numbers on faces of 1st die						
Numbers on faces of the 2nd die	+	1	2	3	4	5	6
	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10
	5	6	7	8	9	10	11
	6	7	8	9	10	11	12

Example : Probability of getting a sum 8 in two faces $\frac{5}{36}$

Note : In a random experiment of throwing two dice , to solve the problems related to multiplication the following table is very useful.

	Numbers on faces of 1st die						
Numbers on faces of the 2nd die	×	1	2	3	4	5	6
	1	1	2	3	4	5	6
	2	2	4	6	8	10	12
	3	3	6	9	12	15	18
	4	4	8	12	16	20	24
	5	5	10	15	20	25	30
	6	6	12	18	24	30	36

Example : Probability of getting a Product 12 in two faces $\frac{4}{36} = \frac{1}{9}$

UNIT – 15: SURFACE AREAS AND VOLUMES

1 Mark Questions (MCQ)

1) A solid has been melted and recast into a wire. Which of the following remains the same ?
A) length B) height C) radius D) volume

2) The curved surface area of a frustum of the cone is
A) $\pi(r_1 + r_2)l$ B) $\pi(r_1 + r_2)h$ C) $\pi(r_1 - r_2)l$ D) $\pi(r_1 - r_2)h$

3) A cylindrical Pencil, sharpened at one end is a combination of
A) Sphere and Cylinder B) Cylinder and Cone
C) Cylinder and Hemi sphere D) Cone and sphere

4) The perimeter of the base of a right circular cylinder is 44 cm. And the height of the cylinder is 10 cm. then it's curved surface area is
A) 440 cm^2 B) 44 cm^2 C) 880 cm^2 D) 88 cm^2

5) A cylinder of height 10cm and the area of it's base is 154 cm^2. then the volume of the cylinder is

A) 1450 cm^3 B) 1540 cm^3 C) 4510 cm^3 D) 154 cm^3

6) A cone of slant height 10cm and the perimeter of it's base is 44cm. then the curved surface area of the cone is
A) 440 cm^2 B) 220 cm^2 C) 44.0 cm^2 D) 4400 cm^2

7) A cone of height 15cm and the area of it's base is 154 cm^2. then the volume of the cone is
A) 770 cm^3 B) 2013 cm^3 C) 2310 cm^3 D) 77 cm^3

8) A cone and a cylinder have equal base and equal heights. If the volume of the cylinder is 300 cm^3 then the volume of the cone is
A) 300 cm^3 B) 900 cm^3 C) 600 cm^3 D) 100 cm^3

9) A cone and a cylinder have equal base and equal heights. The volume of cone and cylinder are in the ratio,
A) $2 : 1$ B) $3 : 1$ C) $1 : 4$ D) $\sqrt{2} : 3$

10) Formula used to find the total surface area of a solid hemi sphere is
A) $2\pi r^2$ B) $3\pi r^2$ C) $2\pi r^2$ D) $3\pi r^2 h$

11) The surface area of a sphere of radius 7cm is,
A) 616 cm^2 B) 61.6 cm^2 C) 313 cm^2 D) 31.3 cm^2

12) Formula used to find the total surface area of a cylinder is
A) $2\pi rh$ B) $2\pi r(h + r)$ C) $2\pi r^2 h$ D) $2\pi r(l + r)$

13) Formula used to find the volume of a cone is
A) $\frac{1}{3}\pi r^2 h$ B) $\frac{3}{2}\pi r^2 h$ C) $\pi r^2 h$ D) $\frac{4}{3}\pi r^2 h$

1 Mark Questions (VSA)

14) Write the formula to find the volume of a hemi sphere.

15) Find the slant height of a cone of height 3 cm and the diameter of it's base is 8cm.

16) Name the solids in a petrol tanker.

17) Write the formula to find the curved surface area of a cylinder.

18) Find the volume of a cube whose side is 5 cm.

19) Find the curved surface area of a hemi sphere whose radius is 7 cm.

<table>
<tr><td rowspan="2">**Ans.**</td><td>1) D</td><td>2)A</td><td>3)B</td><td>4)A</td><td>5)B</td><td>6)B</td><td>7)A</td><td>8)D</td><td>9)B</td></tr>
<tr><td>10)B</td><td>11)A</td><td>12)B</td><td>13)A</td><td colspan="3">14) $\frac{2}{3}\pi r^3$ cubic Units</td><td colspan="2">15) 5cm</td></tr>
</table>

16) 1 Cylinder and 2 hemi sphere	17) $2\pi rh$ Sq. Units	18) $125cm^3$	19) $308cm^2$

2 Marks Questions (SA)

20) **The slant height of a frustum of a cone is 4 cm. And the perimeters of its circular bases are 18cm and 6cm. Find it's curved surface area.**

Solution :- $l = 4$ cm, $2\pi r = 6$ cm, $2\pi R = 18$ cm.

$2\pi r = 6$, $\quad \therefore \pi r = \frac{6}{2} = 3$

$2\pi R = 18$, $\quad \therefore \pi R = \frac{18}{2} = 9$

$\therefore \pi r + \pi R = 3 + 9$

$\therefore \pi(r + R) = 12$-----> (1)

Curved surface area $= \pi(r + R)l$

$= 12 \times 4 = 48$ cm^2 (from eqn.(1) and $l = 4$)

21) The slant height of a frustum of a cone is 10.5 cm. And the radii of its circular bases are 33cm and 27cm. Find the curved surface area.

22) A vessel is in the shape of a frustum of a cone. The radii of its circular bases are 28cm and 7cm and the height of the vessel is 45 cm. Find the volume of the vessel.

Solution :- h = 45 cm , r = 7 cm, R = 28 cm

Volume (V)$= \frac{1}{3}\pi h(r^2 + R^2 + R.r)$

$= \frac{1}{3} \times \frac{22}{7} \times 45\ (7^2 + 28^2 + 28 \times 7)$

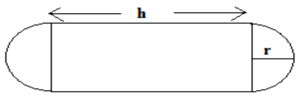
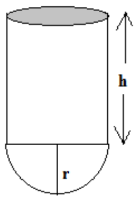
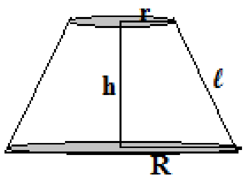
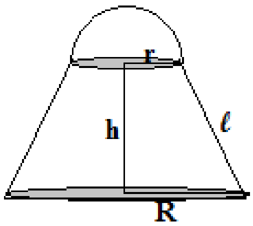
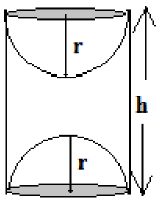
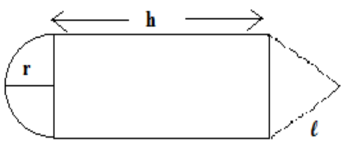
$= \frac{1}{3}\ X\ \frac{22}{7}\ X\ 45\ (49 + 784 + 196)$

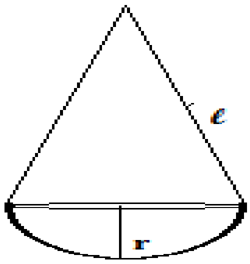
$= \frac{22}{7}\ X\ 15\ X\ 1029$

$= 48510cm^3$

23) A drinking glass is in the shape of a frustum of a cone of height 14 cm. The diameters of its two circular ends are 4 cm and 2 cm. Find the capacity of the glass.

24) Combination of solids is given in the following table. Construct the formulae to find surface area and volume as shown in the table.

Combination of solids	Surface area	Volume
	=(2 $\times$ surfae area of a hemi sphere)+ (surfae area of a cylinder) $= 2(2\pi r^2) + 2\pi rh$	=(2 $\times$ volume of a hemi sphere)+ (volume of a cylinder) $=2\left(\frac{2}{3}\pi r^3\right) + \pi r^2 h$
		
		
		
		
		

Combination of solids	Surface area	Volume
		

3/4 Marks Questions (LA1/ LA2)

25) **A cone of height 24 cm and radius of base 6 cm is made up of modelling clay. A student reshapes it in the form of a sphere. Find the radius of the sphere.**

Solution :- height of a cone h = 24 cm, radius of base r = 6 cm,

Let R be the radius of a sphere.

Given, Volume of a cone = Volume of a sphere

$\frac{1}{3}\pi r^2 h = \frac{4}{3}\pi R^3$

$\frac{1}{3}\pi(r^2 h) = \frac{1}{3}\pi(4R^3)$ [cancelling $\frac{1}{3}\pi$ on both sides]

$r^2 h = 4R^3$

$6^2 \times 24 = 4R^3$

$6^2 \times 6 \times 4 = 4R^3$ [cancelling 4 on both sides]

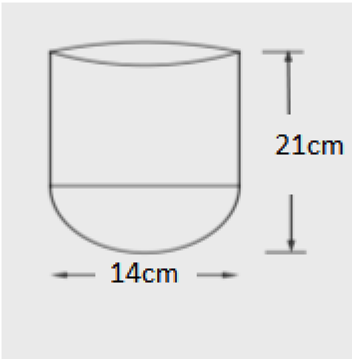
$6^3 = R^3$

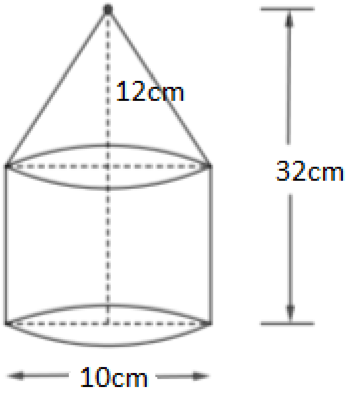
$R = 6$ cm

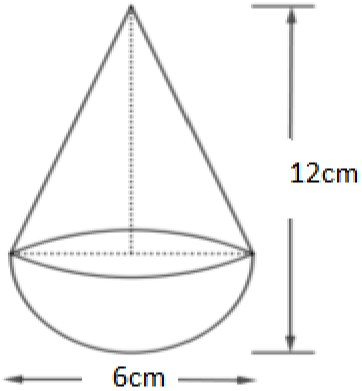
$\therefore$ radius of a sphere $R = 6$ cm

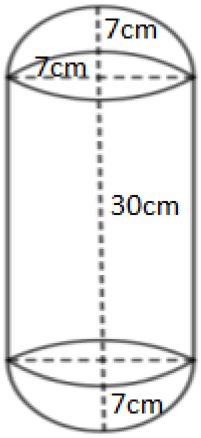
26) 2 cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid.

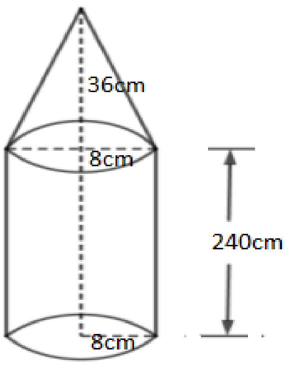
27) Combination of some solids are given below. Find the surface area and the volume.

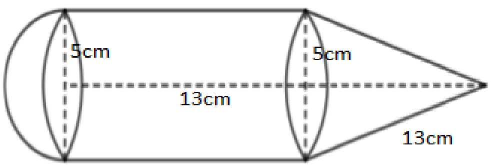












28) In the adjoining figure , a solid in the form of a frustum of a cone mounted on a hemi sphere. Find the volume of the solid.