

SUPPORT MATERIAL

**SUBJECT: MATHEMATICS
CLASS - IX**



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REGIONAL OFFICE PATNA**

YEAR : 2014 - 15

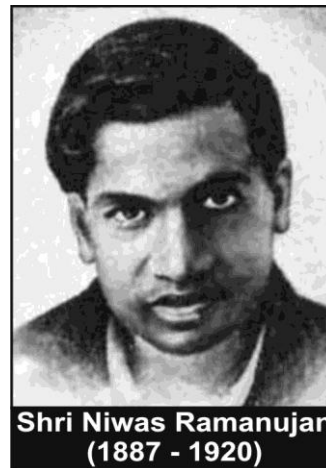
SA -II

How to use this study material?

Dear Students,

This study material contains gist of the topic/units along with the assignments for self assessment. Here are some tips to use this study material while revision during SA-I and SA-II examination.

- Go through the syllabus given in the beginning. Identify the units carrying more weight age.
- Suggestive blue print and design of question paper is a guideline for you to have clear picture about the form of the question paper.
- Revise each of the topic/unit. and consult the problem with your teacher.
- After revision of all the units, solve the sample paper and do self assessment with the value points.
- Must study the marking scheme / solution for CBSE previous year paper which will enable you to know the coverage of content under different questions.
- Underline or highlight key ideas to have bird eye view of all the units at the time of examination.
- Write down your own notes and make summaries with the help of this study material.
- Turn the theoretical information into outlines and mind maps.
- Make a separate revision notebook for diagrams and numerical.
- Discuss your 'Doubts' with your teacher or classmates.



Important

- (i) Slow learners may revise the knowledge part first.
- (ii) Bright students may emphasize the application part of the question paper.

INDEX

SA-2

PART - I

1. Linear Equation in two variables
2. Quadrilateral
3. Areas of Parallelograms and Triangles
4. Circles
5. Construction
6. Surface Areas and Volumes
7. Statistics
8. Probability
9. Activity / Project (Suggested)
10. Model (Sample) Question Paper SA-2 with solution

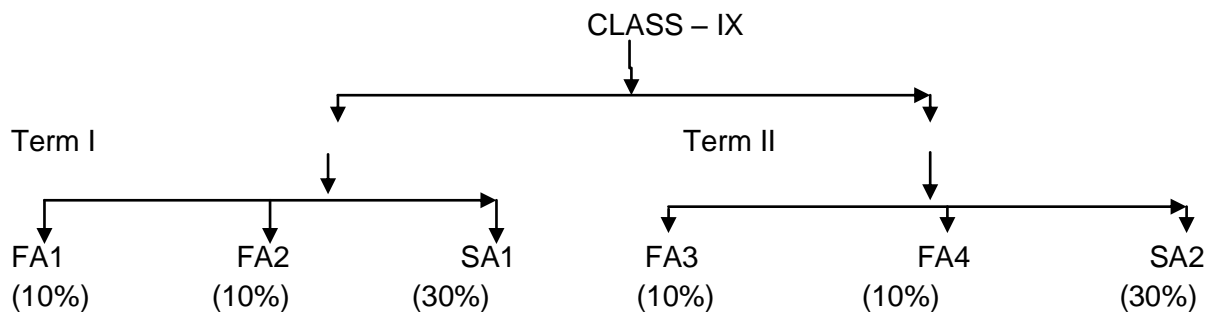
PART - II

Oral and Quiz for SA - 2

COURSE STRUCTURE

CLASS – IX

As per CCE guidelines, the syllabus of Mathematics for class IX has been divided term-wise. The units specified for each term shall be assessed through both formative and summative assessment.



Suggested activities and projects will necessarily be assessed through formative assessment.

SA- II

Second Term	Max Marks - 90
Unit I - Algebra (Contd.) (Linear Equation in two variables)	16
Unit - II Geometry (Contd.) (Quadrilaterals Area of Parallelogram and Triangles, circles, constructions)	38
Unit - III Mensuration (Contd.) Surface areas and volumes	18
Unit IV Statistics and Probability	18
TOTAL	90

NCERT MATHEMATICS BOOK

Topic wise analysis of examples and questions

Sl. No	Chapter No.	Name of chapter	No. of solved problems	No. of questions in exercises	Total
SA -II					
1	4	Linear equations in two variables	09	16	25
2	8	Quadrilateral	08	19	27
3	9	Area of parallelogram and triangles	04	23	27
4	10	Circles	06	23	29
5	11	Construction	01	10	11
6	13	Surface area and volumes	19	72	91
7	14	Statistics	15	26	41
8	15	Probability	10	13	23
Total			72	202	274

**DETAILS OF THE CONCEPTS TO BE MASTERED BY EVERY CHILD OF CLASS IX
WITH EXERCISE AND EXAMPLES OF NCERT TEXT BOOKS.**

SA - II

Symbols used

* - Important Questions

** - Very Important Questions

*** - Very Very Important Questions

S. No.	Topic	Concept	Degree of Importance	NCERT Book
1.	Linear Equations in two variables	Linear Equations	***	Example 2 Ex 4.1 - Q2
		Solution of Linear Equation	**	Example 4 Ex 4.2 Q - 2, 4
		Graph of a linear equation in two variables	***	Ex 4.3 Q : 1, 3, 8
		Equations of lines parallel to the x-axis and y-axis	*	Example 9 Ex. 4.4 Q : 1, 2
2.	Quadrilateral	Angle sum property of a Quadrilateral, properties of a parallelogram	***	Example: 2, 3, 5 Ex. 8.1 Q: 1, 3, 7, 9, 12
		Mid Point Theorem, Other conditions for the Quadrilaterals	**	Theorem 8.9 Ex. 8.2 Q: 2, 3, 5, 7
3.	Areas of Parallelograms and triangles	Figures on the same base and between the same parallels	*	Ex. 9.1 Q : 1
		Parallelograms on the same base and between the same parallels	**	Theorem 9.1 Example 2 Ex. 9.2 Q: 2, 3, 5
		Triangles on the same base and between the same parallels	***	Example: 3, 4 Ex. 9.3 Q: 2, 5, 7, 9
4.	Circles	Angle subtended by a chord at a point	*	Theorem 10.1 Ex. 10.2 Q: 2
		Perpendicular from the centre to a chord	**	Ex. 10.3 Q: 1, 3
		Equal Chords and their distances from the centre	***	Example 2 Ex. 10.4 Q: 2, 3, 6
		Angle subtended by an arc of a circle	**	Theorem 10.8 Example: 3, 6 Ex.10.5 Q: 2, 5, 8, 12
5.	Construction	Basic Construction	*	Ex. 11.1 Q: 2, 4

		Construction of Triangle	***	Ex. 11.2 Q: 1, 3, 5
6.	Surface areas and volumes	Surface area of a cuboid and a cube	**	Example 2 Ex. 13.1 A: 2, 5, 6, 8
		Surface Area of a Right Circular Cylinder	***	Ex. 13.2 A: 3, 5, 9, 10
		Surface Area of a Right Circular Cone	**	Example 5, 6 Ex. 13.3 Q: 3, 5, 6, 8
		Surface Area of a Sphere	**	Ex. 13.4 Q: 4, 6, 7, 9
		Volume of a Cuboid	**	Ex. 13.5 Q: 2, 6, 8, 9
		Volume of a Right Circular Cone	***	Ex. 13.7 Q: 2, 5, 7, 9
		Volume of a Sphere	**	Ex. 13.8 Q: 3, 6, 8, 9
7.	Statistics	Collection of Data	*	Ex. 13.8 Q: 3, 6, 8, 9
		Presentation of Data	***	Ex. 14.2 Q: 2, 4, 7, 9
		Graphical Representation of Data	***	Ex. 14.3 Q: 2, 4, 8, 9
		Measures of Central Tendency	***	Example 12, 14 Ex. Q: 3, 4, 5
8.	Probability	Probability an Experimental Approach	***	Example: 2, 5, 9 Ex. 15.1 Q: 2, 5, 7

Chapter - 4

(Linear Equations in two variables)

Key Concept

- An equation of the form $ax + by + c = 0$ where a , b and c are real numbers such that a and b are both zero is called a linear equation in two variables.
- A pair of values of x and y which satisfy the equation $ax + by + c = 0$ is called a solution of the equation.
- A linear equation in two variables has infinitely many solutions.
- The graph of every linear equation in two variables is a straight line.
- $y = 0$ is the equation of x -axis and $x = 0$ is equation of y -axis.
- The graph of $x = a$ is a straight line parallel to the y -axis.
- The graph of $y = a$ is a straight line parallel to the x -axis.
- An equation of the type $y = mx$ represent a line passing through the origin.
- An equation of the form $ax + by + c = 0$ where a, b and c are real numbers and $a \neq 0, b \neq 0$ is called in linear equation in two variables.
- The equation $ax + by + c = 0$ is called the standard form / general form of the linear equation in two variables

Section - A

- Q.1 The point (a, a) always lies on the line
(a) $y = x$ (b) y - axis (c) x - axis (d) $x + y = 0$
- Q.2 The point $(m, -m)$ always lies on the line.
(a) $x = m$ (b) $y = -m$ (c) $x + y = 0$ (d) $x = y$
- Q.3 If $x = -2$ and $y = 3$ is a solution of the equation $3x - 5y = a$, then value of a is
(a) 19 (b) -21 (c) -9 (d) -18
- Q.4 The graph of equation $x=2y$ will pass through .
(a) I & III quadrant (b) I & II quadrant
(c) II & IV quadrant (d) III & IV quadrant
- Q.5 $x = -5$ can be written in the form of equation in two variable as
(a) $x + 0.y + 5 = 0$ (b) $0.x + y = -5$
(c) $0.x + 0.y = -5$ (d) $0.x + 0.y = +5$
- Q.6 The linear equation $3x - 2y = 5$ has
(a) a unique solution
(b) two solutions
(c) no solution
(d) infinitely many solutions.
- Q.7 The equation of x -axis is
(a) $x = k$ (b) $y = 0$ (c) $x = 0$ (d) $y = k$
- Q.8 Any point on the y -axis is of the form
(a) (x, y) (b) (x, x) (c) $(0, y)$ (d) $(x, 0)$

Section - B

- Q.9 Draw the graph of the equation $x - 2y = 0$
- Q.10 The cost of a pen is four times the cost of a pencil express the statement as a linear equation in two variables.
- Q.11 Write any four solutions for each of the following equations.
(a) $5x - 2 = 0$
(b) $3x + y = 7$
- Q.12 Find the value of a if (-1, 1) is a solution of the equation $3x - ay = 5$
- Q.13 If (3,1) is a solution of the equation $3x + 2y = k$, find the value of k.
- Q.14 Verify that $x = 2, y = -1$, is a solution of the linear equation $7x + 3y = 11$
- Q.15 Write one solution of each of the following equations
(a) $4x - 3y = 0$
(b) $2y - y = 3$
- Q.16 The cost of 2 pencils is same as the cost of 5 erasers. Express the statement as a linear equation in two variables.

Section - C

- Q.17 Give the geometrical representation of the equation $y = 3$ as an equation.
(i) In one variable
(ii) In two variables
- Q.18 Ramesh is driving his car with a uniform speed of 80 km/hr. Draw the time distance graph. Form the graph. To find the distance travelled by him in.
(i) $1\frac{1}{2}$ hr (ii) 3 hours
- Q.19 solve the equation $2x+1=x-3$ and represent the solution on (i) number line (ii) the Cartesian plane
- Q.20 Draw the graph of the equation $5x + 6y - 28 = 0$ and check whether the point (2,3) lies on the line.
- Q.21 The taxi fare in a city is as follows: For the first kilometer, the fare is Rs. 18 and for the subsequent distance it is Rs. 15 per km. taking the distance covered as x km and total fare as Rs. y, writes a linear equation for this information, and draw its graph.
- Q.22 Write three solutions for the equation $7x - 8y = 13$
- Q. 23 Check whether (3,1) , (1,3) and (0,8) are the solutions of the equation $3x-y=8$
- Q. 24 Give equations of two lines passing through (2,14).How many more such lines are there and why ?

Level IV

Hot question

- Q.25. A number is 27 more than the number obtained by reversing its digits. If its unit's and ten's digit are x and y respectively, write the linear equation representing the above statement.

Q.No.26. A boat can move 16 km downstream and 8 km upstream in 6 hours. Also it can move 24 Km downstream and 10 km upstream in 8 hours. Express the statement in the form of equation.

Answer

Q.1 a Q.2 c Q.3 b Q.4 c Q.5 a Q.6 d
Q.7 b Q. 8 c Q.19 (-1, 1) Q.20 Yes

Chapter - 8 (Quadrilaterals)

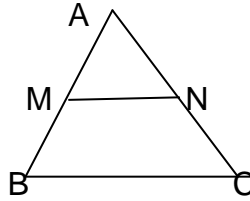
Key Concept

- (1) Sum of the angles of a quadrilateral is 360° .
- (2) A diagonal of a parallelogram divides it into two congruent triangles.
- (3) In a parallelogram
 - (a) Diagonals bisect each other.
 - (b) Opposite angles are equal.
 - (c) Opposite sides are equal
- (4) Diagonals of a square bisect each other at right angles and are equal, and vice-versa.
- (5) A line through the mid-point of a side of a triangle parallel to another side bisects the third side. (Converse of mid-point theorem)
- (6) The line segment through the mid point of two sides of a triangle is parallel to third side and half of it. (Mid-Point Theorem)
- (7) A quadrilateral is a parallelogram if a pair of opposite sides is equal and parallel.
- (8) Diagonals of a rhombus are perpendicular to each other.

Section - A

- Q.1 The figures obtained by joining the mid-points of the sides of a rhombus, taken in order, is
- (a) a square (b) a rhombus
(c) a parallelogram (d) a rectangle
- Q.2 The diagonals AC and BD of a parallelogram ABCD intersect each other at the point O, if $\angle DAC = 32^{\circ}$ and $\angle AOB = 72^{\circ}$ then $\angle DBC$ is
- (a) 32° (b) 24° (c) 40° (d) 63°
- Q.3 In a square ABCD, the diagonals AC and BD bisect at O. Then $\triangle AOB$ is
- (a) acute angled (b) right angled
(c) obtuse angled (d) equilateral
- Q.4 ABCD is a rhombus such that $\angle ACB = 40^{\circ}$ then $\angle ADB$ is
- (a) 40° (b) 45° (c) 50° (d) 60°
- Q.5 A quadrilateral ABCD is a parallelogram if
- (a) $AD \parallel BC$ (b) $AB = CD$
(c) $AB = AD$ (d) $\angle A = 60^{\circ}$, $\angle C = 60^{\circ}$, $\angle B = 120^{\circ}$

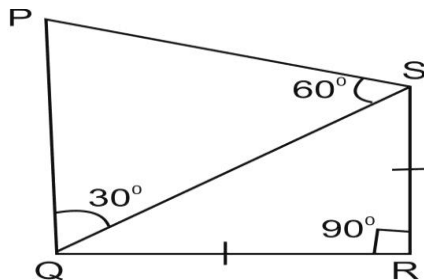
- Q.6 In the fig. M and N are the mid points of sides AB and AC. If length of BC is 15 cm the length of MN is



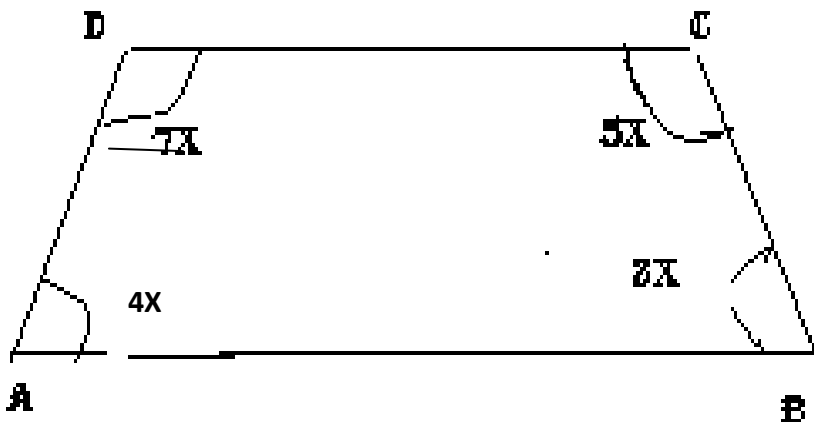
- (a) 7.5 cm (b) 8 cm (c) 10 cm (d) None of these

Section - B

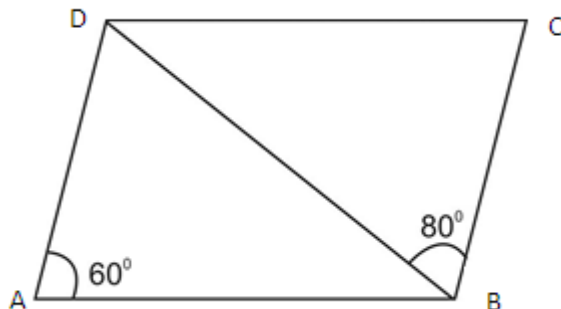
- Q.7 In the adjoining figure $QR=RS$
Find $\angle PSR$



- Q.8 Prove that the sum of the four angles of a quadrilateral is 360° .
 Q.9 Prove that the diagonals of a parallelogram bisect each other.
 Q.10 The angles of quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.
 Q.11 find the value of x in the given figure

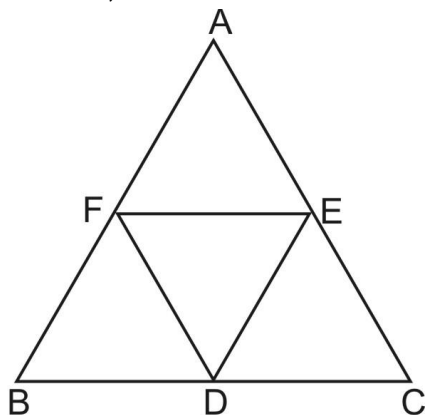


- Q.12 In the adjoining figure, ABCD is a ||gm. If $\angle DAB = 60^\circ$ and $\angle DBC = 80^\circ$. Find $\angle CDB$ and $\angle ADB$.



Section - C

- Q.13 Prove that the line segment joining the mid-points of two sides of a triangle is parallel to the third side and half of it.
- Q.14 ABCD is a rectangle and P, Q, R and S are mid-points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rhombus.
- Q.15 Prove that the straight line joining the mid-points of the diagonals of a trapezium is parallel to the parallel sides and is equal to half their difference.
- Q.16 In the adjoining figure, D, E and F are mid-points of the sides BC, CA and AB of $\triangle ABC$, If $AB = 4.3\text{cm}$, $BC = 5.6\text{cm}$ and $AC = 3.5\text{cm}$, find the perimeter of $\triangle DEF$



- Q.17 In a parallelogram ABCD, AP and CQ are drawn perpendiculars from vertices A and C on diagonal BD. Prove that $\triangle APB \cong \triangle CQD$
- Q.18 In a parallelogram ABCD, E and F are points on AB and CD such that $AE = CE$. Prove that $ED \parallel BF$.

Section - D

- Q.19 If a line is parallel to the base of a trapezium and bisects one of the non-parallel sides, then prove that it bisects either diagonal of the trapezium.
- Q.20 AD is a median of $\triangle ABC$ and E is the mid-point of AD. BE Produced meets AC in F. Prove that $AF = \frac{1}{3} AC$

Q.21 ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Show that

(i) D is the mid-point of AC

(ii) $CM = MA = \frac{1}{2}AB$

Q.22 Show that the bisectors of angles of a parallelogram form a rectangle.

Q. 23 In a quadrilateral ABCD ,AO and BO are the bisectors of $\angle A$ and $\angle B$ respectively. Prove that $\angle AOB = \frac{1}{2}(\angle C + \angle D)$.

Answers -

Q.1 (d) Rectangle

Q,2 (c) 40°

Q.3 (b) Right angled

Q.4 (c) 50°

Q.5 (d) $\angle A = 60^\circ$, $\angle C = 60^\circ$, $\angle B = 120^\circ$

Q.6 (a)

Q. 7 $\angle PSR = 105^\circ$

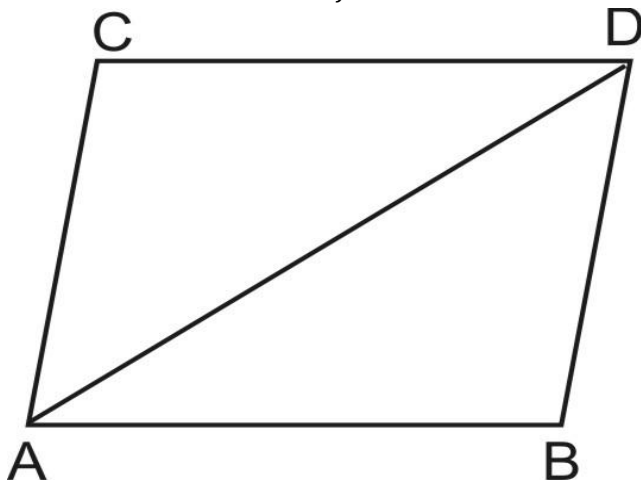
Q.11 20°

Chapter - 9

(Area of parallelograms and triangles)

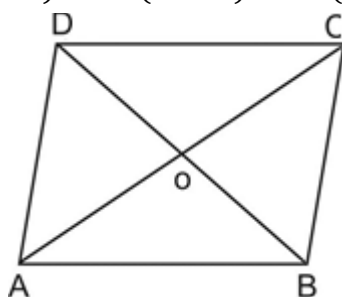
Key Concepts

- * Two figures are said to be congruent if they have the same shape and the same size.
- * Two congruent figures have equal areas.
If two figures have equal areas, they need not be congruent.
- * Area of a parallelogram = (base X height)
- * Area of a triangle = $\frac{1}{2}$ X base X height
- * Area of a trapezium = $\frac{1}{2} \times (\text{sum of parallel sides}) \times \text{distance between them}$
- * Area of rhombus = $\frac{1}{2} \times \text{product of diagonals}$
- * Parallelograms on the same base and between the same parallels are equal in area.
- * A parallelogram and a rectangle on the same base and between the same parallels are equal in area.
- * Triangles on the same base and between the same parallels are equal in area.
- * If a triangle and parallelogram are on the same base and between the same parallels, then.
(Area of triangle) = $\frac{1}{2}$ (area of the parallelogram)
- * A diagonal of a parallelogram divides it into two triangles of equal areas.
In parallelogram ABCD, we have
Area of $\triangle ABD$ = area of $\triangle ACD$



- * The diagonals of a parallelogram divide it into four triangles of equal areas therefore

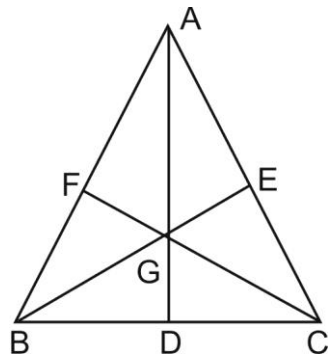
$$ar(\Delta AOB) = ar(\Delta COD) = ar(\Delta AOD) = ar(\Delta BOC)$$



- * A median AD of a ΔABC divides it into two triangles of equal areas. Therefore $ar(\Delta ABD) = ar(\Delta ACD)$

- * If the medians of a ΔABC intersect at G, then

$$ar(\Delta AGB) = ar(\Delta AGC) = ar(\Delta BGC) = \frac{1}{3} ar(\Delta ABC)$$

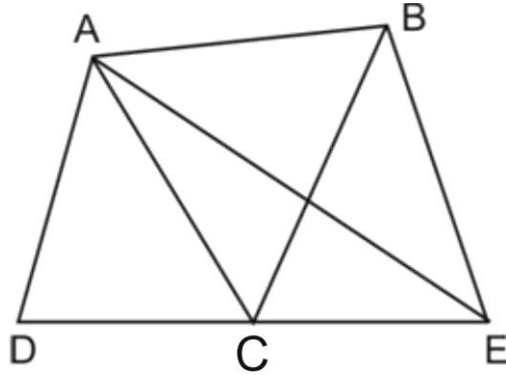


Section - A

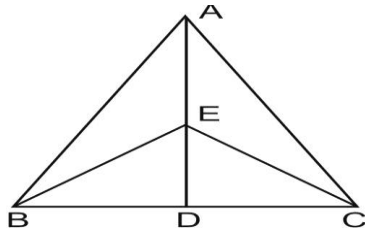
- Q.1 If E, F, G & H are mid points of sides of parallelogram ABCD, then show that $ar(EFGH) = \frac{1}{2} ar(ABCD)$
- Q.2 Point P and Q are on the sides DC and AD of a parallelogram respectively. Show that. $ar(APB) = ar(BQC)$
- Q.3 Show that a median of a triangle divides it into two triangles of equal area.
- Q.4 PQRS and ABRS are two parallelograms and X being any point on side BR. Show that.
- $ar(PQRS) = ar(ABRS)$
 - $ar(A \times S) = \frac{1}{2} ar(PQRS)$

Section - B

- Q.5 In given figure ABCD is a quadrilateral and $BE \parallel AC$ is such that BE meets at E on the extended CD. Show that area of triangle ADE is equal to the area of quadrilateral ABCD.



- Q.6 In given figure E be any point on the median AD of triangle, show that $ar(ABE) = ar(ACE)$

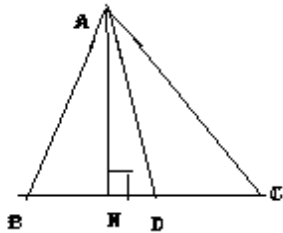


- Q.7 Show that the diagonals of a parallelogram divides it into four triangles of equal area.
OR
D, E & F are mid points of sides of triangle BC, CA & AB respectively. Show that
(i) BDEF is a parallelogram
(ii) $ar(DEF) = \frac{1}{4} ar(ABC)$
(iii) $ar(BDEF) = \frac{1}{2} ar(ABC)$

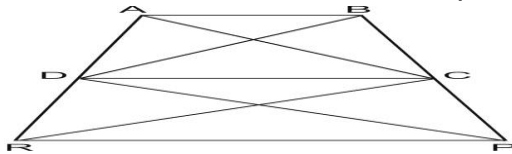
Section - C

- Q.8 ABCD is a trapezium in which $AB \parallel CD$ and diagonals AC and BD intersect at O. Prove that $ar(\triangle AOD) = ar(\triangle BOC)$
- Q.9 XY is a line parallel to side BC of a triangle ABC. If $BE \parallel AC$ and $CF \parallel AB$ meet XY at E and F respectively.
 $ar(ABE) = ar(ACF)$

Q.10 In the given AD is a median prove that $ar_{\Delta}(ABD) = ar_{\Delta}(ACD)$

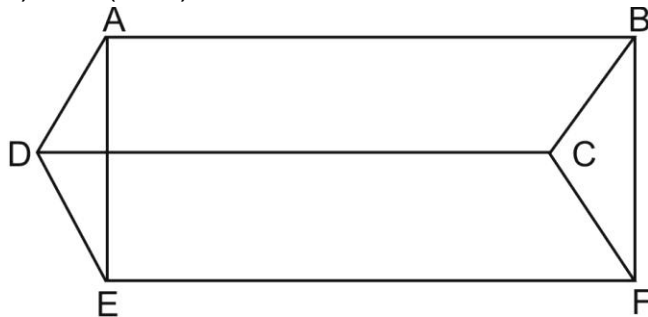


Q.11 In given figure $ar(DRC) = ar(DPC)$ and $ar(BDP) = ar(ARC)$ show that both quadrilaterals ABCD and DCPR are trapeziums.



Self Evaluation

Q.12 In given figure ABCD, DCFE and ABFE are parallelogram show that $ar(ADE) = ar(BCF)$



Q.13 P and Q are respectively the mid points of sides AB and BC of a triangle ABC and R is the mid-point of AP, show that.

(i) $ar(PQR) = \frac{1}{2} ar(ARC)$

(ii) $ar(RQC) = \frac{3}{8} ar(ABC)$

(iii) $ar(PBQ) = ar(ARC)$

Q.14 Parallelogram ABCD and rectangle ABEF are on the same base and have equal areas. Show that perimeter of the parallelogram is greater than that of rectangle.

Chapter - 10

(Circle)

Key Concept

- Circle - circle is locus of such points which are at equidistant from a fixed point in a plane.
- Concentric circle - Circle having same centre called concentric circle.
- Two arc of a circle called congruent if they have the same degree measure.
- If two arc equal then their corresponding chords are equal.
- The perpendicular from centre to chord of circle, bisects the chord and conversely; Line joining mid-point of a chord to the centre of circle, is perpendicular to the chord.
- There is one and only one circle passing through three non-collinear points.
- Equal chords of circle are equidistant from centre. Conversely, chords equidistance from the centre are equal.
- The angle subtend by an arc at the centre of circle is twice the angle which subtend at remaining part of circumference.
- Any two angles in the same segment of the circle are equal.
- Angle of semicircle is right angle.
- Equal chords of circle subtend equals angle at the centre of circle. Conversely, chords subtending equal angle at the centre are equal.
- If the all vertices of a quadrilateral lie on the circumference of circle then quadrilateral called cyclic.
- In a cycle quadrilateral the sum of opposite angles is 180° and conversely, quadrilateral whose opposite angles are supplementary is cyclic.
- The exterior angle of a cycle quadrilateral is equal to the opposite interior angle.
- Parts of circular plane :- A circle divides the plane in which it lies into three parts:-
- Inside the circle which is called interior of the circle.
- the circle .
- outside the circle which is called exterior of the circle.
- A line segment joining any two points in a circle is called Chord.
- The Chord which passes through the centre of the circle is called diameter and it is the longest chord.
- A diameter of the circle divides it into two equal parts , each part is called semi-circle.
- The length of the complete circle is called circumference.
 - $C = 2\pi r$

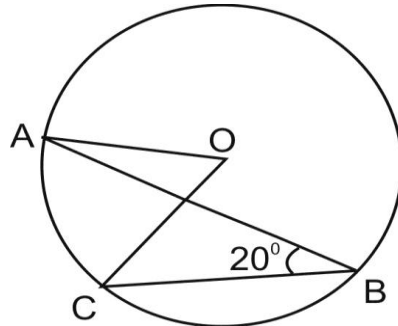
- A piece of circle between two points is called an Arc. The circular region between a chord and either of its arc is called Segment of the circle.
- The region between an Arc and the two radii joining the centre is called Sector.

Section - A

Q.1 AD is diameter of a circle and AB is a chord. If $AD = 34\text{cm}$, $AB = 30\text{cm}$. The distance of AB from centre of circle is.

- (a) 17cm (b) 15cm (c) 4 cm (d) 8cm

Q.2 In given figure, O is centre of circle if $\angle ABC = 20^\circ$ then $\angle AOC$ is equal to :

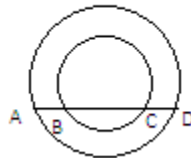


- (a) 20° (b) 40° (c) 60° (d) 10°

Q.3 Given three collinear points then the number(s) of circles which can be drawn through these three points are.

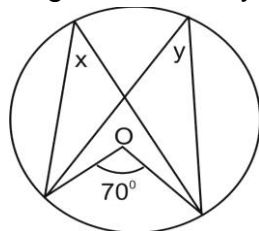
- (a) one (b) two (c) infinite (d) none

Q.4 Given two concentric circles with centre O. A line cut the circle at A, B, C and D respectively if $AB = 10\text{cm}$ then length of CD.



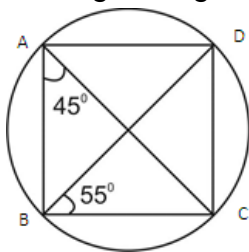
- (a) 5cm (b) 10cm (c) 3.5cm (d) 7.5cm

Q.5 In given figure value of y is



- (a) 35° (b) 45°
(c) 70° (d) 140°

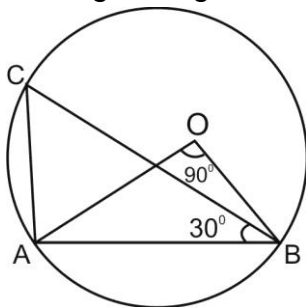
Q.6 In the given figure, $\angle DBC = 55^\circ$, $\angle BAC = 45^\circ$ then $\angle BCD$ is



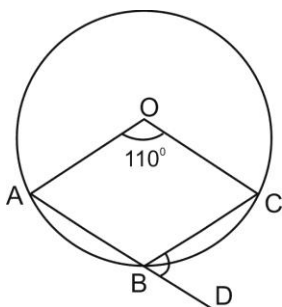
- (a) 45° (b) 55° (c) 100° (d) 80°

Section - B

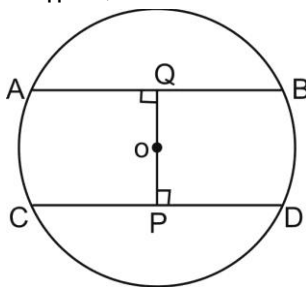
Q.7 In the given figure, $\angle CAB$ is, given $\angle AOB = 90^\circ$, $\angle CBA = 30^\circ$



Q.8 If O is centre of circle as shown in the figure, $\angle CBD$.



Q.9 In the given figure, O is the center of the circle with radius 5cm. $OP \perp CD$, $OQ \perp AB$
 $AB \parallel CD$, $AB = 6\text{cm}$ and $CD = 8\text{cm}$ determine PQ.

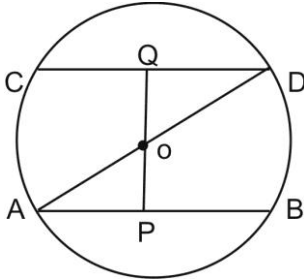


Q.10 Prove that the circle drawn on any equal side of an isosceles triangle as diameter, bisects the base.

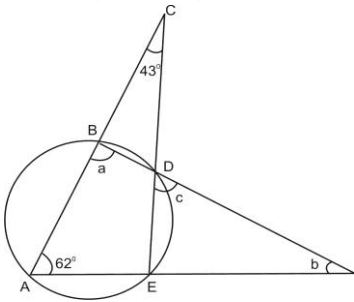
Q.11 Prove that cyclic parallelogram is always a rectangle.

Section - C

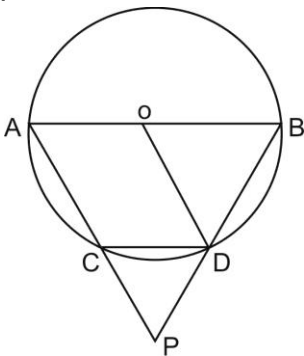
Q.12 In the given figure AD is diameter of the circle, whose centre is O and $AB \parallel CD$, Prove that $AB = CD$



Q.13 In the given figure determine a, b and c.



Q.14 AB is a diameter of circle C (O, r). Chord CD is equal to radius OD. AC and BD produced intersect at P. Prove that $\angle APB = 60^\circ$



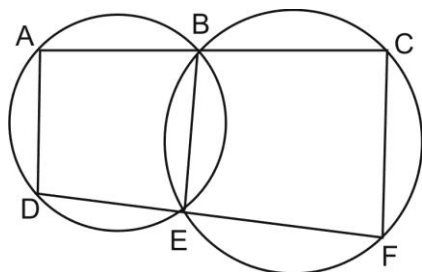
Q.15 If two non parallel side of a trapezium are equal, prove that it is cyclic.

Q.16 ABC is a right angle triangle, right angled at A. A circle is inscribed in it. The length of two sides containing angle A is 12cm and 5cm find the radius.

Section - D

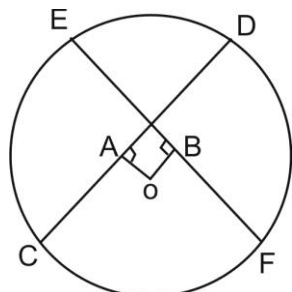
Q.17 A circle has radius $\sqrt{2} \text{ cm}$. It is divided into two segments by a chord of length 2cm. Prove that the angle subtended by the chord at a point in major segment is 45° .

- Q.18 Two circles intersect each other at points A and B. AP and AQ are diameters of the two circles respectively. If $\angle APB = 40^\circ$ and $\angle AQB = 70^\circ$, find $\angle PAB$ and $\angle QAB$
- Q.19 ABCD is a parallelogram. The circle through A, B and C intersects CD produced at E. If AB=10cm, BC=8cm, CE=14cm. Find AE.
- Q.20 Prove the sum of either pair of opposite angles of a cyclic quadrilateral is 180° .
- Q.21 In the given figure, B and E are points on line segment AC and DF respectively show that $AD \parallel CF$.

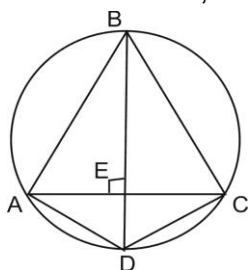


Self evaluation

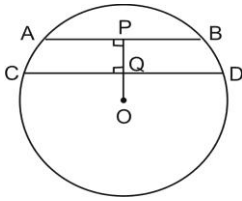
- Q.22 In the given figure, OA and OB are respectively perpendiculars to chords CD and EF of a circle whose centre is O. If $OA = OB$, prove that $\widehat{EC} = \widehat{DF}$



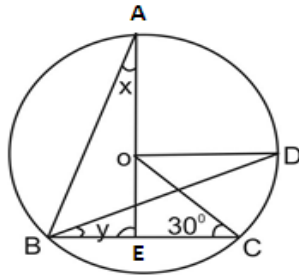
- Q.23 In the given figure $\angle BAC = 55^\circ$, $\angle BCA = 62^\circ$, the altitude BE produced meets the circle at D, determine $\angle ACD$, $\angle DAC$ and $\angle ADB$



Q.24 In the given figure, O is centre of circle of radius 5cm. $OP \perp CD, AB \parallel CD$, $AB = 6\text{cm}$ and $CD = 8\text{cm}$. Determine PQ



Q.25 In the given figure. O is the centre of circle, $\angle BCO = 30^\circ$ $\angle AEB = 90^\circ$ and $OD \parallel BC$ find x and y.

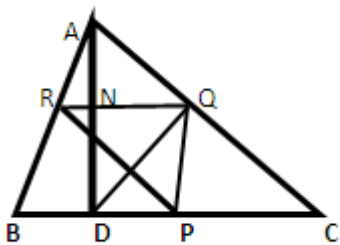


Q.26 O is circumcentre of the triangle ABC and D is the mid-point of the base BC. Prove that $\angle BOD = \angle A$

Value Based Question

Q.27. P, Q and R are the mid points of the sides BC, CA and AB of triangle ABC respectively. AD is perpendicular from A on BC. A student Mohit challenged another student Rohit that he cannot draw a circle through the points P, Q, R and D.

- (i) Will Rohit be able to meet the challenge.
- (ii) Comment on the behavior of Mohit.



Answers:

- | | | | |
|-------------------|-------------------------|----------------|---------------|
| 1. (d) | 2. (b) 40° | 3. (d) None | 4. (b) |
| 5. (a) 35° | 6. (d) 80° | 7. 105° | 8. 55° |
| 9. 7 cm. | 13. $a=105, b=13, c=62$ | 16. 2cm. | |

18. $50^\circ, 20^\circ$

19. 8cm.

23. $35^\circ, 28^\circ, 62^\circ$

24. 1cm

25. $30^\circ, 15^\circ$

27. (i) Yes, Rohit will be able to draw a circle through the points P,Q,R and D as the four points are concyclic.

(ii) Behaviour of Mohit is not justified. First , he should try him self. Teasing is not a good habit.

(Since P,Q,R are the mid points of sides BC,CA and AB of $\triangle ABC$. Therefore $PQ \parallel AB$, $QR \parallel BC$ and $RP \parallel AC$.

Therefore, $\angle PRQ = \angle AQR = \angle PCQ$

Also in $\triangle ABD$, R is the mid point of AB and $RN \parallel BD$. Therefore N is the mid point of AD.

Therefore, $\triangle ANQ \cong \triangle NBQ$ (SAS)

$\Rightarrow \angle AQN = \angle NQD$ (CPCT)

$\Rightarrow \angle QDP = \angle NQD$

$\Rightarrow \angle QDP = \angle AQN = \angle AQR = \angle C$

$\Rightarrow \angle QDP = \angle PRQ$

Therefore PQ subtends same angle at R and D. \Rightarrow Points P,Q, R and D are concyclic.)

Chapter - 11

(Constructions)

Key Concept

- (1) Use only ruler and compass while drawing constructions.
- (2) Protractor may be used for drawing non-standard angles.
- (3) Constructions of a triangle given its base, a base angle and the difference of the other two sides.
- (4) Constructions of a triangle given its perimeter and its two base angles.

Section - A

- Q.1 With a ruler and compass which of the following angles cannot be constructed?
(a) 60° (b) 80° (c) 90° 105°
- Q.2 With a ruler and compass which of the following angles can be constructed?
(a) 80° (b) 90° (c) 100° 110°

Section - B

- Q.3 Construct an angle of 45° at the initial point of a given ray and justify the construction.
- Q.4 Construct the following angles and verify by measuring them by a protractor.
(i) 75° (ii) 135°

Section - C

- Q.5 Construct a ΔPQR with base $QR = 3.8\text{cm}$, $\angle Q = 75^{\circ}$ and $PQ + PR = 7.9\text{cm}$
- Q.6 Construct a ΔPQR with base $QR = 3.4\text{cm}$, $\angle R = 75^{\circ}$ and $PR - PQ = 1.2\text{cm}$
- Q.7 Construct an equilateral triangle with sides 4cm.

Section -D

- Q.8 Construct a triangle ABC in which $\angle B = 60^{\circ}$, $\angle C = 45^{\circ}$ and $AB+BC+CA = 13\text{ cm}$.
- Q.9 Construct a right triangle whose base is 12cm and sum of its hypotenuse and other side is 18cm.
- Q.10 Construct a ΔPQR with its perimeter = 11cm and the base angles of 75° and 30° .

Answers:








- Q.1 b Q.2 b

Chapter - 13

(Surface areas and Volumes)

Surface area and volume of individual solid. Combination and conversion of solids are for class X.

Key Concepts

SN.	Name	Figure	Lateral/curved surface area	Total surface area TSA	Volume (V)	Symbols use for
1	Cuboid		$2(l + b) \times h$	$2(lb + bh + hl)$	lbh	$l = \text{length}$ $b = \text{breadth}$ $h = \text{height}$
2.	Cube		$4s^2$	$6s^2$	s^3	$s = \text{side}$
3.	Right circular cylinder		$2\pi rh$	$2\pi r(h + r)$	$\pi r^2 h$	$h = \text{height}$ $r = \text{radius of base}$
4.	Right circular cone	 $l^2 = r^2 + h^2$	πrl	$\pi r(l + r)$	$\frac{1}{3}\pi r^2 h$	$r = \text{radius of base}$ $h = \text{height}$ $l = \text{slant height}$
5.	Sphere		$4\pi r^2$	$4\pi r^2$	$\frac{4}{3}\pi r^3$	$r = OA = \text{radius}$
6.	Hemi sphere Solid		$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$	$r = OA = \text{radius}$
7.	Hemi sphere hollow		$2\pi r^2$	$2\pi r^2$	$\frac{2}{3}\pi r^3$	$r = OA = \text{radius}$

Keywords:-

- **Solid** :-Bodies which have three dimensions in space are called solids.
- **Volume** :- The amount of space occupied by a solid or bounded by a closed surface is known as the volume of solid.
- **Surface Area** :- Surface area is the total sum of all the areas of all the shapes that cover the surface of solid.
- **Lateral Surface Area** :- Lateral surface in a solid is the sum of surface areas of all its faces excluding the bases of solid.
- **Right Circular Cylinder**:- If a rectangle is revolved about one of its side, the solid thus formed is called a Right Circular Cylinder.
- **Right Circular Cone** :- If a right angled triangle is revolved about one of the sides containing a right angle, the solid thus generated is called a right circular cone.
- **Sphere** :- The set of all points in space which are equidistance from a fixed point is called Sphere.

Section - A

- Q.1 If surface areas of two spheres are in the ratio of 4: 9 then the ratio of their volumes is
(a) $\frac{16}{27}$ (b) $\frac{4}{27}$ (c) $\frac{8}{27}$ (d) $\frac{9}{27}$
- Q.2 The surface area of a cube whose edge is \sqrt{a} cm is
(a) $6 a^2 \text{cm}^2$ (b) $4a^2 \text{cm}^2$ (c) $6 a \text{cm}^2$ (d) $4 a \text{cm}^2$
- Q.3 A match box measures 4cm X 2.5cm X 1.5cm. What will be the volume of a packet containing 12 such boxes?
(a) 15cm^3 (b) 180cm^3 (c) 90cm^3 (d) 175cm^3
- Q.4 The side of a cube is 7 cm . The biggest sphere has been cut from the cube the radius of sphere is .
(a) 7cm (b) 3.5cm (c) 14 cm (d) 5 cm
- Q.5 The total surface area of a cone of radius $\frac{r}{2}$ and length $2l$ is
(a) $2\pi r(l + r)$ (b) $\pi r(l + r)$
(c) $\pi r \left(l + \frac{r}{4} \right)$ (d) $\pi r \left(l + \frac{r}{2} \right)$
- Q.6 volume of cone of radius $r/2$ cm and height $2h$ cm is
(a) $\frac{1}{5}\pi r^2 h \text{cm}^2$ (b) $\frac{1}{6}\pi r^2 h \text{cm}^2$
(c) $\frac{1}{3}\pi r^2 h \text{cm}^2$ (d) $\frac{1}{4}\pi r^2 h \text{cm}^2$

Section - B

- Q.7 Find the volume of a sphere whose surface area is 616cm^2 .

- Q.8 A solid cylinder has a total surface area of 231cm^2 . Its curved surface area is $\frac{2}{3}$ of the total surface area. Find the volume of the cylinder.
- Q.9 The diameter of a garden roller is 1.4m and it is 2m long. How much area will it cover in 5 revolutions? ($\pi = 22/7$) . Express it in square cm also.
- Q.10 Three metal cubes whose edge measure 3cm, 4cm and 5cm respectively are melted to form a single cube, find its edge and its diagonal.
- Q.11 The dimensions of a cuboid is in the ratio of 1 : 2 : 3 and its total surface area is 88m^2 . Find the dimensions.

Section - C

- Q.12 A cuboidal oil tin is 30cm X 40cm X 50cm. Find the cost of the tin required for making 20 such tins if the cost of tin sheet is Rs. $20/\text{m}^2$.
- Q.13 Find the lateral curved surface area of a cylindrical petrol storage tank that is 4.2m in diameter and 4.5m high. How much steel was actually used, if $\frac{1}{12}$ of steel actually used was wasted in making the closed tank.
- Q.14 The radius and height of a cone are in the ratio 4 : 3. The area of the base is 154cm^2 . Find the area of the curved surface.
- Q.15 A sphere, cylinder and cone are of the same radius and same height. Find the ratio of their curved surfaces.
- Q.16 The circumference of cross section of a hemispherical bowl is 132 cm. Find the capacity of the bowl.
- Q.17 A Sphere, a cylinder and a cone have the same radii. The height of the cylinder and the cone is equal to diameter of sphere. Find the ratio of their respective volumes

Section - D

- Q.18 A metallic sheet is of the rectangular shape with dimension 48 cm x 36 cm from each one of its corners a square of 8 cm is cut off. An open box is made of the remaining sheet. Find the surface area and volume of open box.
- Q.19 The height, curved surface area and volume of a cone are h , c and V respectively. Prove that $3\pi Vh^3 - c^2h^2 + 9V^2=0$
- Q.20 A cone of height 24cm and slant height 25cm has a curved surface area 550cm^2 . Find its volume use $\pi = \frac{22}{7}$
- Q.21 The radius and height of a cone are 6cm and 8cm respectively. Find the curved surface area of the cone.
- Q.22 A well with 10m inside diameter is dug 14m deep. Earth taken out of it is spread all around to a width of 5m to form an embankment. Find the height of embankment.

Self Evaluation

- Q.23 How many square metre of metal sheet is required to make a closed cylindrical tank of height 1.4 meter and base 2 m?
- Q.24 A hollow cylindrical pipe is 210cm long. Its outer and inner diameters are 10cm and 6cm respectively. Find the volume of the copper used in making the pipe.
- Q.25 A semi circular sheet of metal of diameter 28cm is bent into an open conical cup. Find the depth and capacity of cup.
- Q.26 If the radius of a sphere is doubled, what is the ratio of the volume of the first sphere to that of second sphere?
- Q. 27 The radius of a sphere is increased by 10%. By what percentage is the volume of sphere increased?

Value Based Question

- Q. 28 Neha wants to make a temporary shelter for her nano car by making a box-like structure having dimensions $4\text{m} \times 3\text{m} \times 2.5\text{m}$ with tarpaulin. The said structure would thus cover all the four sides and the top of the car (with the front face as a flap that can be rolled up)
- Find how much tarpaulin Neha requires to make the, shelter (assuming that margins are very small and so negligible).
 - which mathematical concept is used in the above problem?
 - Which value is depicted by Neha?
- Q.29 The students of Vidyalaya are invited to participate in a competition for making and decorating penholders in the shape of a cylinder with a base using cardboard. Each penholder is to be of radius 3cm and height 10.5 cm. On the day of competition, 35 competitors
- Find how much cardboard is required to be bought for the said competition.

- ii) Which mathematical concept is used in above problem?
- iii) Which value depicted in above problem?

Q.30 Ramesh an ice-cream seller has set up his shop . He has two options to serve ice-cream to his customers. One is to serve the ice-cream in cylindrical glasses with height 14 cm and base radius 3 cm. The other is to serve it in cylindrical glasses of height 14cm and base radius 2 cm. In both cases ,ice-cream is to be filled up to the rim.

Ramesh choose the second option to serve in cylindrical glasses of height 14 cm and base radius 2 cm.

- i) Find the volume of ice-cream served in the glasses .
- ii) Which cylindrical glass has the lesser capacity?
- iii) Which mathematical concept is used in above problem?

iv) By choosing the second option which value is violated by Ramesh's decision

Q.31 Rakes, a milkman supplies milk to his customers .He measures milk with a cylindrical shape cone with conical raised bottom of height 2.10 cm. The diameter of the measuring cylinder is 7 cm and height of the cylinder is 14 cm.(use $\pi=22/7$)

- (i) Find the volume of measuring cone?
- (ii) Which mathematical concept is used in above problem?
- (iii) Which value depicted by the milkman, Rakesh?

Answer

- | | | | | | | | |
|------|-----------------------|------|--|-----|---|-----|---|
| Q.1 | c | Q.2 | c | Q.3 | b | Q.4 | b |
| Q.5 | c | Q.6 | b | | | | |
| Q.7 | 179.66cm ² | | | | | | |
| Q.8 | 269.5cm ² | Q.9 | 44m ² | | | | |
| Q.10 | 6cm | Q.11 | 2, 4, 6 cm | | | | |
| Q.12 | Rs. 376 | Q.13 | 59.4m ² , 95.04m ² | | | | |
| Q.14 | 192.5cm ² | | | | | | |
| Q.15 | 4 : 4 : $\sqrt{5}$ | Q.16 | 19404 | | | | |
| Q.17 | 2:3:1 | Q.18 | volume: 1520 cm ³ , SA : 1472 cm ² | | | | |

- Q.20 1232 cm^2 Q.21 $60\pi\text{cm}^2$
 Q.22 4.66m Q.23 15.1 m^2
 Q.24 10560cm^3 Q.25 $12.12\text{cm}, 622.26\text{cm}^3$
 Q.26 $1:8$ Q.27 33.1%
 Q.28 (i) 47m^2
 (ii) Computation of surface area of 4 walls of a room including the roof.
 (iii) Creativity is reflected by Neha
- Q. 29 (i) 7920cm^2
 (ii) Surface area of cylinder solid figures(mensuration)
 (iv) Competitive spirit , among students , in the field of art and craft.
- Q.30 . (i) 1^{st} position $> 396 \text{ cm}^3$; 2^{nd} option $> 176 \text{ cm}^3$
 (ii) $v_2 < v_1$
 (iii) Volume of cylindrical solids.
 (v) The value of honesty is violated by Ramesh's Decision.
- Q.31 (i) 512.05cm^3
 (ii) Volume solid figures (Mensuration)
 (iii) Dishonesty

Chapter - 14 (Statistics)

Key Concept

- * There are two types of data (i) Primary (ii) Secondary
- * We can represent the data by (i) ungrouped and (ii) grouped frequency distribution.
- * Data can also represent by (i) bar graph (ii) Histogram (iii) Frequency polygons
- * Class mark of grouped data is $\frac{\text{lower limit} + \text{upper limit}}{2}$
- * Measure of central tendencies by mean, median, mode.
- * Mean $(\bar{x}) = \frac{\text{sum of all observations}}{\text{Total no. of observations}}$
If observations denoted by x_i and their occurrence i.e. frequency is denoted by f_i then mean is
$$(\bar{x}) = \frac{\sum f_i x_i}{\sum f_i}$$
- * Median: Arrange the observations in ascending or descending order then if number of observations (n) is odd then then median is $\frac{n+1}{2}$ th term.
If no. of observations (n) is even then median is average of $\frac{n}{2}$ th and $\frac{n}{2} + 1$ th terms.
- * Mode: The observation whose frequency is greatest.
- * Mode = 3 median - 2 mean.

Section - A

- Q.1 If the mean of 2, 4, 6, 8, x, y is 5 then find the value of x+y.
- Q.2 Write the class mark of 90-110 group.
- Q.3 If the ratio of mean and median of a certain data is 2:3, then find the ratio of its mode and mean.
- Q.4 Tally marks are used to find
- Q.5 The following marks were obtained by the students in a test.
81, 72, 90, 90, 86, 85, 92, 70, 71, 83, 89, 95, 85, 79, 62
What is the range?
- Q.6 In a histogram, each class rectangle is constructed with base as
(a) frequency (b) class interval
(c) range (d) size of the class

Section - B

- Q.7 The mean of 10 numbers is 20, If 5 is subtracted from every number, what will be the new mean.
- Q.8 Find the mean of first 10 even natural no.

Q.9 Calculate the mean for the following distribution.

x	5	6	7	8	9
f	4	8	14	11	3

Q.10 Find the median of 37, 31, 42, 43, 46, 25, 39, 45, 32

Q.11 Find the mode of following series.

25, 23, 22, 22, 24, 27, 27, 25, 23, 22, 26, 32

Q.12 If the median of a series of data is 3 and mean is 2 then find the mode.

Section - C

Q.13 Find the median of the following data

19, 25, 59, 48, 35, 31, 30, 32, 51. If 25 is replaced by 52, what will be the new median.

Q.14 If the mean of the following distribution is 6, then find the value of p.

x	2	4	6	10	p+5
f	3	2	3	1	2

Q.15 If the mean of five observations $x, x+2, x+4, x+6, x+8$ is 11 find the mean of first three observation.

Q.16 The mean of 5 numbers is 18. If one number is excluded, their mean is 16, find the excluded number.

Q.17 Construct a histogram for the following data:

30-60	60-90	90-120	120-150	150-180
5	12	14	18	10

Q.18 The following observations have been arranged in ascending order. If the median of the data is 63, find the value of x.

29, 32, 48, 50, x, x+2, 72, 78, 84, 95

Section - D

Q.19 Find the value of x and y in following distribution if it known that the mean of the distribution is 1.46.

No. of accidents	0	1	2	3	4	5	Total
Frequency	46	x	y	25	10	5	200

Q.20

The mean monthly salary of 10 members of a group is Rs. 1445, one more member whose monthly salary is Rs. 1500 has joined the group. Find the mean monthly salary of 11 members of the group.

Q.21 Draw a histogram for the marks of students given below.

Marks	0-10	10-30	30-45	45-50	50-60
No. of Student	8	32	18	10	6

Q.22 For the following data, draw a histogram and frequency polygon.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of student	5	10	4	6	7	3	2	2	3	9

Q.23 Given below is a cumulative frequency distribution table showing the age of people living in a locality.

Age in years	No. of persons
Above 108	0
Above 96	1
Above 84	3
Above 72	5
Above 60	20
Above 48	158
Above 36	427
Above 24	809
Above 12	1026
Above 0	1124

Prepare a frequency distribution table.

Question for self evaluation

Q.24 The marks scored by 55 students in a test are given below :

Marks	0-5	5-10	10-15	15-20	20-25	25-30	30-35
No. of Students	2	6	13	17	11	4	2

Construct a histogram.

Q.25 Construct a frequency polygon for the following data :

Age	0-2	2-4	4-6	6-8	8-10	10-12	12-14	14-16	16-18
Frequency	2	4	6	8	9	6	5	3	1

Q.26 If x_1, x_2, \dots, x_n are n values of a variable X such that

$$\sum_{i=1}^n (x_i - 2) = 110 \text{ and } \sum_{i=1}^n (x_i - 5) = 20 \text{ find the value of } n \text{ and mean.}$$

Q.27 The mean of 200 items was 50. Later on, it was discovered that the two items were misread as 92 and 8 instead of 192 and 88. Find the correct mean.

Q.28 Find the value of p , if the mean of following distribution is 20.

x	15	17	19	$20+p$	23
frequency	2	3	4	$5p$	6

Value Based Question

Q. 29 In a Survey , the following data were found to show the number of children in different families

No. of family	5	11	25	12	5	2
Number of children	0	1	2	3	4	5

- i) Find the mean of children per family.
- ii) Which mathematical concept is used in the above problem?
- iii) Which value depicted in above problem?

Answers :

- Q.1 10 Q.2 100 Q.3 5:2 Q.4 Frequency Q.5 33 Q.6 b
- Q.7 15 Q.8 11 Q.9 7.025 Q.10 39 Q.11 22 Q.12 5
- Q.13 32,35 Q.14 7 Q.15 9 Q.16 26 Q.18 62 Q.19 $x=76, y=38$
- Q.20 Rs 1450 Q.23

Age	0-12	12-24	24-36	36-48	48-60	60-72	72-84	84-96	96-108
Person	98	217	382	269	138	15	2	2	1

- Q.26 $n=30, \text{mean} = \frac{17}{3}$
- Q.27 50.9 Q.28 1
- Q.29 .(i) 2.12(Approx)
- (ii) Mean of ungrouped data
- (iii) Population need to be controlled.

Chapter - 15

(Probability)

Key Concept

- (1) Experiment - A job which produces some outcomes.
- (2) Trial - Performing an experiment.
- (3) Event - The group of outcomes, denoted by capital letter of English alphabets like A, B, E etc.
- (4) The empirical (or experimental) probability $P(E)$ of an event E is given by
$$P(E) = \frac{\text{Number of trials in which } E \text{ has happened}}{\text{Total no. of trials}}$$
- (5) The probability of an event lies between 0 and 1 (0 and 1 are included)
- (6) Impossible event: Event which never happen.
- (7) Certain event - event which definitely happen.
- (8) An experiment which when performed produces one of the several possible outcomes is called a Random Experiment.
- (9) An outcome of a trial of an experiment is an elementary event.
- (10) A collection of two or more possible outcomes of an experiment is called a compound event.
- (11) for any event A associated to an experiment , we have $0 \leq p(A) \leq 1$.
- (12) If E_1, E_2, \dots, E_n are n elementary events associated to a random experiment, then $P(E_1) + p(E_2) + \dots + p(E_n) = 1$

Section - A

- Q.1 Define an event.
- Q.2 Give definition of probability.
- Q.3 Probability of certain event is
- Q.4 Probability of impossible event is
- Q.5 Which is not a probability of an event?
(a) 2 (b) $\frac{2}{3}$ (c) .001 (d) .25
- Q.6 A bag contains 50 coins and each coin marked from 51 to 100. One coin is picked up at random. The probability that the number on the coin is not a prime number is.....

Section - B

- Q.7 A coin is tossed 1000 times with the following frequencies.
Head: 455, Tail: 545
compute the probability for each event.

Q.8 In a cricket match, a batsman hits a boundary 6 times out of 30 balls plays. Find the probability that on a ball played.

(i) He hits boundary (ii) He does not hit a boundary.

Q.9 Three coins tossed simultaneously 100 times with the following frequencies of different outcomes.

Out come	No head	one head	two head	three head
Frequency	14	38	36	12

If the coin tossed again then find the probability.

- (i) two heads coming up
- (ii) 3 heads coming up
- (iii) getting more tails than heads
- (iv) at least one head coming up

Q.10 In a football match, a player makes 4 goals from 10 kicks. The probability of a goal is from 10 kicks is.

Section - C

Q.11 The percentage of marks obtained by a student in the monthly unit tests are given as :

Unit Test	I	II	III	IV	V
% marks obtained	58	64	76	62	85

Find the probability that the student get a distinction (marks more than 75%)

Q.12 1000 families with 2 children were selected randomly, and the following data were recorded.

No. of boys in a family	0	1	2
No. of families	140	560	300

If a family chosen at random, find the prob. that it has

- (a) No boys
- (b) One boy
- (c) Two boys
- (d) at least one boy
- (e) at most two boy.

Q.13 The record of a weather station shows that out of the past 250 consecutive days, its weather forecast correct 175 times. What is the probability that on a given day.

- (i) it was correct.
- (ii) it was not correct.

Section - D

Q.14 A die is thrown 1000 times with following frequency of out comes 1, 2, 3, 4, 5 and 6 as given below

No. on die	1	2	3	4	5	6
Frequency	179	150	157	149	175	190

Find the probability of each out come.

Q.15 Following table shows the marks scored by a group of 90 students in a mathematics test of 100 marks.

Marks	0-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of student	7	10	10	20	20	15	8

Find the probability that a student obtained

(i) less than 20% marks

(ii) 60 or more marks

Q.16 The following table gives the life of 400 lamps.

Life time in Hours	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
No. of Lamp	14	56	60	86	74	62	48

A bulb is selected at random find the probability that the life time of the selected bulb is:

(i) less than 400

(ii) between 300 to 800 hours.

(iii) at least 700 hours.

Q.17 The percentage of attendance of different classes in a year in a school is given below:

Class	X	IX	VIII	VII	VI	V
Attendance	30	62	85	92	76	55

What is the probability that the class attendance is more than 75%

Value Based Question

Q. 18 The students of a vidayalya were asked to grow 50 plants in five different places..

The number of plants survived as follows:

No. of places	A	B	C	D	E
Number of plants survived	42	45	48	41	38

a) what is the probability of :

i) >40 plants survived in a place?

ii) <40 plants survived in a place?

b) which Mathematical concept is used in above problem?

c) Which values are depicted in above problem?

Answers:

Q.5 a 6. $\frac{4}{5}$ 7. 0.455, 0.545

8. (i) 0.2 (ii) 0.8

9. (i) 0.36 (ii) 0.12 (iii) 0.52 (iv) 0.86

10. $\frac{4}{10}$

11. 0.4

12. (a) 0.14 (b) 0.56 (c) 0.30 (d) 0.86 (e) 0.7

13. (i) 0.7 (ii) 0.3

14. (i) .179 (ii) .15 (iii) .157 (iv) .149 (v) .175 (vi) .19

15. $\frac{7}{90}$ $\frac{23}{90}$

16. (i) $\frac{7}{200}$ (ii) $\frac{29}{40}$ (iii) $\frac{23}{50}$

17. $\frac{1}{2}$

18. (a) (i) $\frac{4}{5}$

(ii) $\frac{1}{5}$

(b) concept of experimental (or empirical)

(c) ecofriendly and concern for nature.

Activities / Projects (Term II)

- (1) Verify that the sum of the angles of a quadrilateral is 360° .
- (2) Verify that the straight line joining mid-point of any two side of a triangle is parallel to the third side and is equal to half of it.
- (3) Formulate the formula for the area of trapezium experimentally.
- (4) Verify that the area of parallelogram on the same base and between same parallels are equal.
- (5) Verify that the area of a triangle on the same base and between same parallels are equal.
- (6) Verify that if the triangle and parallelogram are on same base and between same parallel lines, then area of triangle is equal to half of area of the parallelogram.
- (7) Verify that the opposite angles of a cyclic quadrilateral are supplementary.
- (8) Formulate the formula for the surface area of right circular cylinder.
- (9) Formulate the formula for the volume of a cone and that of a hemi sphere / sphere from the formula of volume of a cylinder.
- (10) Draw a histogram for FA-1 marks of students in your class.
- (11) Find experimental probability of each outcomes of a die when it is thrown 15 times.

Blue-Print
Summative Assessment – II
Sample Question Paper

Class IX

Subject: Mathematics

Unit/Topic	VSA	SA I	SA II	LA	Total
Algebra (Linear eq. in 2 variables)	2(2)		6(2)	8(2)	16(6)
Geometry (quadrilateral, Area, Circles, construction)	1(1)	4(2)	9(3)	24(6)	38(12)
Mensuration (surface area and volumes)		4(2)	6(2)	8(2)	18(6)
Statistics and Probability	1(1)	4(2)	9(3)	4(1)	18(7)
Total	4(4)	12(6)	30(10)	44(11)	90(31)

Sample question paper
SA – II 2014-15
Class –IX
Mathematics

Time:- $3\frac{1}{2}$ h

F.M – 90

General Instructions:-

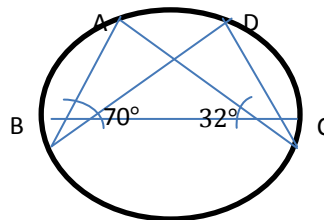
- i) All questions are compulsory.
- ii) The question paper consists of 31 questions divided into four sections A,B,C and D. Section 'A' comprises of 4 questions of 1 mark each. Section 'B' comprises of 6 questions of 2 marks each. Section 'C' comprises of 10 questions of 3 marks each and section 'D' comprises of 11 questions of 4 marks each.
- iii) There is no overall choice in this question paper.
- iv) Use of calculator is not permitted.
- v) $\frac{1}{2}$ hour time is allotted to O.T.B.A

Section – A

- Q1. Write the equation of the line representing X axis
- Q2. Express $4x-1 = 3$ as a linear equation in two variables.
- Q3. What is name of a quadrilateral formed by joining the mid points of the sides of a rhombus?
- Q4. What is the sum of all the probabilities of an event?

Section – B

- Q5. Diagonals of a quadrilateral PQRS bisect each other. If $\angle P = 40^\circ$ find $\angle Q$.
- Q6. In fig, $\angle ABC = 70^\circ$, $\angle ACB = 32^\circ$ Find $\angle BDC$.



- Q7. If the lateral surface area of a cylinder is 94.2 cm^2 and its height is 5cm then find its radius of the base. [take $\pi = \frac{22}{7}$]
- Q8. Find the volume of a sphere whose surface area is 154 cm^2 .
- Q9. Find the mean of first 5 prime numbers.
- Q10. In a throw of a die, what is the probability of getting an off prime number?

Section – C

Q11. Find the solution of the linear equation $3x - y = 4$ which represent a point on

- a) The x axis
- b) The y axis

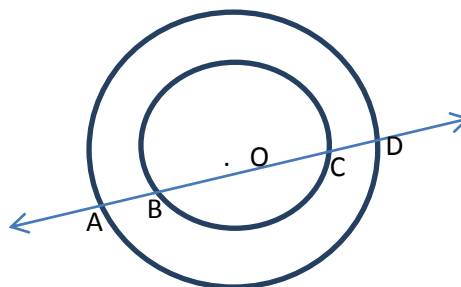
Q12. If (2,1) is a solution of the linear equation $3x - 4y = K$ then find the value of K.

Q13. Show that the line segments joining the mid points of the opposite sides of a quadrilateral bisect each other.

Q14. In a triangle ABC, E is the mid-point of median AD. Show that $ar(BED) = \frac{1}{4} ar(ABC)$

Q15. In this given fig, if a line intersects two concentric circles with center O at A, B, C and D, Prove that

$AB = CD$



Q16. The height of a cone is 16cm and its base diameters is 24cm. Find the curved surface area of the cone (use $\pi = 3.14$)

Q17. The capacity of a closed cylindrical vessel of height 1m is 15.4 liters. How many square meters of metal sheet would be needed to make it?

Q18. If the mean of the observations $x, x+3, x+5, x+7, x+10$ is 9, find the mean of the last three observation.

Q19. The value of π upto 35 decimal places is given below

3.14159265358979323846264338327950288

Make a frequency distribution of the digits from 0 to 9 after the decimal point.

Q20. The blood groups of 20 students of a class are recorded as below

B, A, B, O, AB, O, A, AB, O, B, B, AB, AB, O, A, O, A, B, AB and O.

A student is selected at random. Find the probability that his blood group is

- (i) A (ii) B (iii) AB (iv) O

Section – D

Q21. Draw the graph of the equation $5x - 2y = 10$.

Q22. The taxi fare in a city is as follows:-

For the first kilometer, the fare is Rs20 and for the subsequent distance it is Rs.6 per km. taking x km as the distance covered and y as the total fare, write a linear equation for this information.

Q23. Construct a triangle ABC, in which $\angle B = 60^\circ$, $\angle C = 45^\circ$ and $AB + BC + CA = 11\text{cm}$.

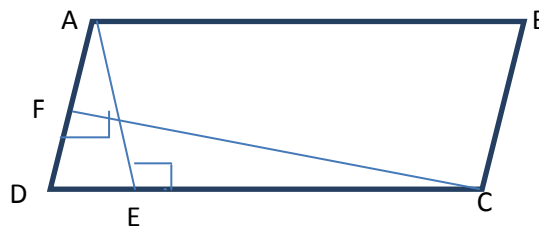
Q24. Prove that the bisector of any two consecutive angles of parallelogram intersects at right angle.

Q25. Prove that the angle subtended by an arc at the center is double the angle subtended by it at any point on the remaining part of the circle.

Q26. Prove that if the non-parallel sides of a trapezium are equal then it is a cyclic.

Q27. Prove that the parallelogram on the same base and between the same parallel are equal in area.

Q28. In fig, ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$ if $AB = 16\text{cm}$, $AE = 8\text{cm}$ and $CF = 10\text{cm}$ find AD



Q29. The lateral surface area of a cube is 576cm^2 . Find its volume and the total surface area.

Q30. In a city, the weekly observations made on the cost of living index are given in the following table:

Cost of living index	140 – 150	150-160	160-170	170-180	180-190	190-200	Total
No of weeks	5	10	20	09	06	02	52

Draw the frequency polygon for the data given above (without constructing a histogram)

Value based question

31. The teacher asked the student to prepare project related to Diwali. Lipsa prepare 12 cylindrical candle each having radius of base 2cm and height 7cm. Himanshu prepared 14 fire crackers each of spherical shape of radius 1.5cm.

- i) find the volume of candles and fire crackers.
- ii) according to you which has better project work and why?
- iii) which message has been conveyed in above information?

Term - II

ORAL AND QUIZ QUESTIONS

Linear equations in two variables

Oral

- Q.1 What is the equation of y-axis?
- Q.2 What is the equation parallel of x-axis?
- Q.3 What is the equation parallel to x-axis?
- Q.4 What is the equation parallel to y-axis?
- Q.5 Write the equation parallel to x-axis intersecting y-axis at 5 unit in +ive direction.
- Q.6 How many solutions $y=3x+5$ has?

QUIZ

- Q.1 If (4,9) is a solution of the equation $y=kx$ then value of k.....
- Q.2 If $ax = b$ then value of x is
- Q.3 If $ax + by + c = 0$ then coefficient of x is.
- Q.4 What is linear equation in two variables?

QUADRILATERAL

ORAL

- Q.1 In a quadrilateral the sum of all angles is
- Q.2 If angles of a quadrilateral are in ratio 1 : 2 : 3 : 4 then angles are
- Q.3 Consecutive angles of II gram are
- Q.4 If consecutive sides of II gram are equal then ||gram is

QUIZ

- Q.1 What is SSS criterion for Δ 's
- Q.2 What is RHS criterion for Δ 's
- Q.3 What is SAS criterion for Δ 's
- Q.4 What is Pythagoras theorem?
- Q.5 What is mid point theorem.

AREA OF II GRAMS AND TRIANGLES.

ORAL

- Q.1 If ΔABC and BDE are equilaterals such that D is mid point of BC, then find $ar(\Delta ABC) : ar(\Delta BDE)$
- Q.2 A triangle and II gram are on same base and between IIs then ratio of their areas.
- Q.3 The median of a Δ divide it into parts.
- Q.4 Sum of angle of a Δ is

QUIZ

- Q.1 Area of II gram is
- Q.2 Area of Δ is
- Q.3 Area of right Δ is

Q.4 A diagonal of Ilgram divide it into two equal in area and triangles.

Q.5 In a Ilgram opposite angles are

CIRCLES

ORAL

Q.1 Give definition of circle.

Q.2 What is concentric circle?

Q.3 Twice the radius of circle called.....

Q.4 Equal chord of circle subtendangle.

Q.5 \perp bisector of chord divide it into parts.

QUIZ

Q.1 How many circle passes through one point.

Q.2 How many circles pass through three non collinear points?

Q.3 Tangent to a circle cut it into exactly in point / points

Q.4 What is cyclic quadrilateral?

Q.5 If the sum of any pair of opposite angles of a quadrilateral is 180° , then quadrilateral is

SURFACE AREA AND VOLUME.

ORAL

Q.1 What is surface area.

Q.2 What is volume?

Q.3 Surface area of cuboid is

Q.4 Surface area of cube is

Q.5 Surface area of hemi sphere

QUIZ

Q.1 What is the volume of cube whose side is 2cm?

Q.2 In a sphere number of faces is.

Q.3 Total surface area of hemi sphere whose radius is r is.....

Q.4 Volume of a hemisphere of radius r is

Q.5 Define sphere.

STATISTICS

ORAL

Q.1 Find the mean of all factor of 10.

Q.2 Define primary and secondary data.

Q.3 The measures of central tendency are

Q.4 What is class mark?

Q.5 What are tally marks?

QUIZ

Q.1 What is formula to find a mean?

Q.2 What is motto to read statistics?

Q.3 What is the relation between mean, mode, median.

- Q.4 How many ways data can represent.
Q.5 Find the mean of first n natural numbers.

PROBABILITY

ORAL

- Q.1 Who is the main founder of probability?
Q.2 What is experiment?
Q.3 How many types of event generally define?
Q.4 Is probability means %.
Q.5 What is the probability of certain event?

QUIZ

- Q.1 Define event.
Q.2 The probability of an event lies between 0 and 1 are inclusive or exclusive.
Q.3 What is trial?
Q.4 What is out comes.
Q.5 How many out comes possible in tosses of a coin twice.

Co ordination of revised Committee

SH. SHUDHAKAR SINGH

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Reviewed by,

- | | |
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