NCERT Mathematics Question Paper (Class - 9)

(Mathematics) Chapter 3 Coordinate Geometry

EXERCISE 3.1

Question 1. How will you describe the position of a table lamp on your study table to another person?

Question 2. (Street Plan) : A city has two main roads which cross each other at the centre of the city. These two roads are along the North-South direction and East-West direction.

(i) The perpendicular distance of the point P from the y - axis measured along the positive direction of the x - axis is PN = OM = 4 units.

(ii) The perpendicular distance of the point P from the x - axis measured along the positive direction of the y - axis is PM = ON = 3 units.

(iii) The perpendicular distance of the point Q from the y - axis measured along the negative direction of the x - axis is OR = SQ = 6 units.

(iv) The perpendicular distance of the point Q from the x - axis measured along the negative direction of the y - axis is OS = RQ = 2 units. Now, using these distances, how can we describe the points so that there is no confusion? We write the coordinates of a point, using the following conventions:

(i) The x - coordinate of a point is its perpendicular distance from the y - axis measured along the x - axis (positive along the positive direction of the x - axis and negative along the negative direction of the x - axis). For the point P, it is + 4 and for Q, it is – 6. The x - coordinate is also called the abscissa.

(ii) The y - coordinate of a point is its perpendicular distance from the x - axis measured along the y - axis (positive along the positive direction of the y - axis and negative along the negative direction of the y - axis). For the point P, it is + 3 and for Q, it is –2. The y - coordinate is also called the ordinate.

(iii) In stating the coordinates of a point in the coordinate plane, the x - coordinate comes first, and then the y - coordinate. We place the coordinates in brackets. Hence, the coordinates of P are (4, 3) and the coordinates of Q are (– 6, – 2). Note that the coordinates describe a point in the plane uniquely. (3, 4) is not the same as (4, 3).

EXERCISE 3.2

Question 1.Write the answer of each of the following questions:

(i) What is the name of horizontal and the vertical lines drawn to determine the position of any point in the Cartesian plane?

(ii) What is the name of each part of the plane formed by these two lines?

(iii) Write the name of the point where these two lines intersect.

Questions 2. See Fig.3.14, and write the following:

(i) The coordinates of B.

(ii) The coordinates of C.

(iii) The point identified by the coordinates (–3, –5).

(iv) The point identified by the coordinates (2, – 4).

(v) The abscissa of the point D.

(vi) The ordinate of the point H.

(vii) The coordinates of the point L.

(viii) The coordinates of the point M.

(Mathematics) Chapter 4 Linear Equations in Two Variables

EXERCISE 4.1

Question 1. The cost of a notebook is twice the cost of a pen. Write a linear equation in two variables to represent this statement. (Take the cost of a notebook to be Rs x and that of a

pen to be Rs y).

Question 2. Express the following linear equations in the form ax + by + c = 0 and indicate the values of a, b and c in each case:

(i) 2x + 3y = 9.35

(ii) x – 5 y – 10 = 0

(iii) –2x + 3y = 6

(iv) x = 3y

(v) 2x = –5y (

vi) 3x + 2 = 0

(vii) y – 2 = 0

(viii) 5 = 2x

EXERCISE 4.2

Question 1.Which one of the following options is true, and why? y = 3x + 5 has

(i) a unique solution

(ii) only two solutions

(iii) infinitely many solutions

Question 2. Write four solutions for each of the following equations:

(i) 2x + y = 7

(ii) πx + y = 9

(iii) x = 4y

Question 3. Check which of the following are solutions of the equation x – 2y = 4 and which are not:

(i) (0, 2)

(ii) (2, 0)

(iii) (4, 0)

(iv) (2 , 4 2)

(v) (1, 1)

Question 4. Find the value of k, if x = 2, y = 1 is a solution of the equation 2x + 3y = k.

EXERCISE 4.3

Question 1. Draw the graph of eachof the following linear equations in two variables:

(i) x + y = 4
(ii) x – y = 2
(iii) y = 3x
(iv) 3 = 2x + y

Question 2. Give the equations of two lines passing through (2, 14). How many more such lines are there, and why?

Question 3. If the point (3, 4) lies on the graph of the equation 3y = ax + 7, find the value of a.

Question 4. The taxi fare in a city is as follows: For the first kilometre, the fare is Rs 8 and for the subsequent distance it is Rs 5 per km. Taking the distance covered as x km and total fare as Rs y, write a linear equation for this information, and draw its graph.

Question 5. From the choices given below, choose the equation whose graphs are given in Fig. 4.6 and Fig. 4.7. For Fig. 4. 6 For Fig. 4.7
(i) y = x
(i) y = x + 2
(ii) x + y = 0
(ii) y = x – 2
(iii) y = 2x
(iii) y = –x + 2
(iv) 2 + 3y = 7x
(iv) x + 2y = 6

Question 6. If the work done by a body on application of a constant force is directly proportional to the distance travelled by the body, express this in the form of an equation in two variables and draw the graph of the same by taking the constant force as 5 units. Also read from the graph the work done when the distance travelled by the body is (i) 2 units (ii) 0 unit

Question 7. Yamini and Fatima, two students of Class IX of a school, together contributed Rs 100 towards the Prime Minister's Relief Fund to help the earthquake victims. Write a linear equation which satisfies this data. (You may take their contributions as Rs x and Rs y.) Draw the graph of the same.

Question 8. In countries like USA and Canada, temperature is measured in Fahrenheit, whereas in countries like India, it is measured in Celsius. Here is a linear equation that converts Fahrenheit to Celsius: F = 9 C + 32 5

(i) Draw the graph of the linear equation above using Celsius for x-axis and Fahrenheit for y-axis.

(ii) If the temperature is 30°C, what is the temperature in Fahrenheit?

(iii) If the temperature is 95°F, what is the temperature in Celsius?

(iv) If the temperature is 0°C, what is the temperature in Fahrenheit and if the temperature is 0°F, what is the temperature in Celsius?

(v) Is there a temperature which is numerically the same in both Fahrenheit and Celsius? If yes, find it.

EXERCISE 4.4

Question 1. Give the geometric representations of y = 3 as an equation

(i) in one variable

(ii) in two variables

Question 2. Give the geometric representations of 2x + 9 = 0 as an equation

(i) in one variable

(ii) in two variables

(Mathematics) Chapter 7 Triangles

EXERCISE 7.1

Question 1. In quadrilateral ACBD, AC = AD and AB bisects ∠ A (see Fig. 7.16). Show that Δ ABC Δ ABD. What can you say about BC and BD?

Question 2 . ABCD is a quadrilateral in which AD = BC and ∠ DAB = ∠ CBA (see Fig. 7.17). Prove that

(i) Δ ABD Δ BAC

(ii) BD = AC

(iii) ∠ ABD = ∠ BAC.

Question 3. AD and BC are equal perpendiculars to a line segment AB (see Fig. 7.18). Show that CD bisects AB.

Question 4. l and m are two parallel lines intersected by another pair of parallel lines p and q (see Fig. 7.19). Show that Δ ABC Δ CDA.

Question 5. line l is the bisector of an angle ∠ A and B is any point on l. BP and BQ are perpendiculars from B to the arms of ∠ A (see Fig. 7.20). Show that:

(i) Δ APB Δ AQB

(ii) BP = BQ or B is equidistant from the arms of ∠ A.

Question 6. In Fig. 7.21, AC = AE, AB = AD and ∠ BAD = ∠ EAC. Show that BC = DE.

Question 7 . AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that ∠ BAD = ∠ ABE and ∠ EPA = ∠ DPB (see Fig. 7.22). Show that

(i) Δ DAP Δ EBP

(ii) AD = BE

Question 8. In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B (see Fig. 7.23). Show that:

(i) Δ AMC Δ BMD

(ii) ∠ DBC is a right angle.

(iii) Δ DBC Δ ACB

(iv) CM = 1 2 AB

EXERCISE 7.2

Question 1. In an isosceles triangle ABC, with AB = AC, the bisectors of ∠ B and ∠ C intersect each other at O. Join A to O. Show that :

(i) OB = OC

(ii) AO bisects ∠ A

Question 2. In Δ ABC, AD is the perpendicular bisector of BC (see Fig. 7.30). Show that Δ ABC is an isosceles triangle in which AB = AC.

Question 3. ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see Fig. 7.31). Show that these altitudes are equal.

Question 4. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see Fig. 7.32). Show that

(i) Δ ABE Δ ACF

(ii) AB = AC, i.e., ABC is an isosceles triangle.

Question 5. ABC and DBC are two isosceles triangles on the same base BC (see Fig. 7.33). Show that ∠ ABD = ∠ ACD.

Question 6. ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD

= AB (see Fig. 7.34). Show that ∠ BCD is a right angle. 7. ABC is a right angled triangle in which ∠ A = 90° and AB = AC. Find ∠ B and ∠ C.

Question 7. Show that the angles of an equilateral triangle are 60°each.

EXERCISE 7.3

Question 1. Δ ABC and Δ DBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see Fig. 7.39). If AD is extended to intersect BC at P, show that

(i) Δ ABD Δ ACD

(ii) Δ ABP Δ ACP

(iii) AP bisects ∠ A as well as ∠ D.

(iv) AP is the perpendicular bisector of BC.

Question 2. AD is an altitude of an isosceles triangle ABC in which AB = AC. Show that

(i) AD bisects BC

(ii) AD bisects ∠ A.

Question 3. Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of Δ PQR (see Fig. 7.40). Show that:

(i) Δ ABM Δ PQN

(ii) Δ ABC Δ PQR

Question 4. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that the triangle ABC is isosceles.

Question 5. ABC is an isosceles triangle with AB = AC. Draw AP ⊥ BC to show that ∠ B = ∠ C.

EXERCISE 7.4

Question 1. Show that in a right angled triangle, the hypotenuse is the longest side.

Question 2. In Fig. 7.48, sides AB and AC of Δ ABC are extended to points P and Q respectively. Also, ∠ PBC < ∠ QCB. Show that AC > AB. 3. In Fig. 7.49, ∠ B < ∠ A and ∠ C < ∠ D. Show that AD < BC.

Question 3. AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see Fig. 7.50). Show that ∠ A > ∠ C and ∠ B > ∠ D.

Question 4. In Fig 7.51, PR > PQ and PS bisects ∠ QPR. Prove that ∠ PSR > ∠ PSQ.

Question 5. Show that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

EXERCISE 7.5

Question 1 . ABC is a triangle. Locate a point in the interior of Δ ABC which is equidistant from all the vertices of Δ ABC.

Question 2. In a triangle locate a point in its interior which is equidistant from all the sides of the triangle.

Question 3. In a huge park, people are concentrated at three points (see Fig. 7.52):

A : where there are different slides and swings for children,

B : near which a man-made lake is situated,

C : which is near to a large parking and exit. Where should an icecream parlour be set up so that maximum number of persons can approach it? (Hint : The parlour should be equidistant from A, B and C)

Question 4. Complete the hexagonal and star shaped Rangolies [see Fig. 7.53(i) and (ii)] by filling them with as many equilateral triangles of side 1 cm as you can. Count the number of triangles in each case. Which has more triangles?

(Mathematics) Chapter 8 Quadrilaterals

EXERCISE 8.1

Question 1. The angles of quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral.

Question 2. If the diagonals of a parallelogram are equal, then show that it is a rectangle.

Question 3. Show that if the diagonals of a quadrilateral bisect each other at right angles, then it is a rhombus.

Question 4. Show that the diagonals of a square are equal and bisect each other at right angles.

Question 5. Show that if the diagonals of a quadrilateral are equal and bisect each other at right angles, then it is a square.

Question 6. Diagonal AC of a parallelogram ABCD bisects ∠ A (see Fig. 8.19). Show that

(i) it bisects ∠ C also

(ii) ABCD is a rhombus.

Question 7. ABCD is a rhombus. Show that diagonal AC bisects ∠ A as well as ∠ C and diagonal BD bisects ∠ B as well as ∠ D.

Question 8. ABCD is a rectangle in which diagonal AC bisects ∠ A as well as ∠ C. Show that:

(i) ABCD is a square

(ii) diagonal BD bisects ∠ B as well as ∠ D.

Question 9. In parallelogram ABCD, two points P and Q are taken on diagonal BD such that DP = BQ (see Fig. 8.20). Show that:

(i) Δ APD Δ CQB

(ii) AP = CQ

(iii) Δ AQB Δ CPD

(iv) AQ = CP

(v) APCQ is a parallelogram

Question 10. ABCD is a parallelogram and AP and CQ are perpendiculars from vertices A and C on diagonal BD (see Fig. 8.21). Show that :

(i) Δ APB Δ CQD

(ii) AP = CQ

Question 11. In Δ ABC and Δ DEF, AB = DE, AB || DE, BC = EF and BC || EF. Vertices A, B and C are joined to vertices D, E and F respectively (see Fig. 8.22). Show that :

(i) quadrilateral ABED is a parallelogram

(ii) quadrilateral BEFC is a parallelogram

(iii) AD || CF and AD = CF

(iv) quadrilateral ACFD is a parallelogram

(v) AC = DF

(vi) Δ ABC Δ DEF.

Question 12. ABCD is a trapezium in which AB || CD and AD = BC (see Fig. 8.23). Show that:

(i) ∠ A = ∠ B

(ii) ∠ C = ∠ D

(iii) Δ ABC Δ BAD

(iv) diagonal AC = diagonal BD [Hint : Extend AB and draw a line through C parallel to DA intersecting AB produced at E.]

EXERCISE 8.2

Question 1. ABCD is a quadrilateral in which P, Q, R and S are mid-points of the sides AB, BC, CD and DA (see Fig 8.29). AC is a diagonal. Show that :

(i) SR || AC and SR = 1 2 AC

(ii) PQ = SR

(iii) PQRS is a parallelogram.

Question 2. ABCD is a rhombus and P, Q, R and S are ©wthe mid-points of the sides AB, BC, CD

and DA respectively. Show that the quadrilateral PQRS is a rectangle.

Question 3. 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.

Question 4. ABCD is a trapezium in which AB || DC, BD is a diagonal and E is the mid-point of AD. A line is drawn through E parallel to AB intersecting BC at F (see Fig. 8.30). Show that F is the mid-point of BC.

Question 5. In a parallelogram ABCD, E and F are the mid-points of sides AB and CD respectively (see Fig. 8.31). Show that the line segments AF and EC trisect the diagonal BD.

Question 6. Show that the line segments joining the mid-points of the opposite sides of a quadrilateral bisect each other.

Question 7. 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) MD ⊥ AC
(iii) CM = MA = 1 2 AB

(Mathematics) Chapter 9 Areas of Parallelograms and Triangles

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EXERCISE 9.1

Question1. Which of the following figures lie on the same base and between the same parallels. In such a case, write the common base and the two parallels.

EXERCISE 9.2

Question 1. In Fig. 9.15, ABCD is a parallelogram, AE ⊥ DC and CF ⊥ AD. If AB = 16 cm, AE = 8 cm and CF = 10 cm, find AD.

Question 2. If E,F,G and H are respectively the mid-points of the sides of a parallelogram ABCD, show that ar (EFGH) = 1 ar (ABCD) 2 .

Question 3. P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD. Show that ar (APB) = ar (BQC).

Question 4. In Fig. 9.16, P is a point in the interior of a parallelogram ABCD. Show that:
(i) ar (APB) + ar (PCD) = 1 ar (ABCD) 2
(ii) ar (APD) + ar (PBC) = ar (APB) + ar (PCD) [Hint : Through P, draw a line parallel to AB.]

Question 5. . In Fig. 9.17, PQRS and ABRS are parallelograms and X is any point on side BR. Show that
(i) ar (PQRS) = ar (ABRS)
(ii) ar (AX S) = 1 ar (PQRS)

Question 6. A farmer was having a field in the form of a parallelogram PQRS. She took any point A on RS and joined it to points P and Q. In how many parts the fields is divided? What are the shapes of these parts? The farmer wants to sow wheat and pulses in equal portions of the field separately. How should she do it?

EXERCISE 9.3

Question 1. In Fig.9.23, E is any point on median AD of a Δ ABC. Show that ar (ABE) = ar (ACE).

Question 2. In a triangle ABC, E is the mid-point of median AD. Show that ar (BED) = 1 ar(ABC) 4 .

Question 2. Show that the diagonals of a parallelogram divide it into four triangles of equal area.

Question 4. In Fig. 9.24, ABC and ABD are two triangles on the same base AB. If line- segment CD is bisected by AB at O, show that ar(ABC) = ar (ABD).

Question 5. D, E and F are respectively the mid-points of the sides BC, CA and AB of a Δ ABC. Show that
(i) BDEF is a parallelogram.
(ii) ar (DEF) = 1 4 ar (ABC)
(iii) ar (BDEF) = 1 2 ar (ABC)

Question 6. In Fig. 9.25, diagonals AC and BD of quadrilateral ABCD intersect at O such that OB = OD. If AB = CD, then show that:

(i) ar (DOC) = ar (AOB)
(ii) ar (DCB) = ar (ACB)
(iii) DA || CB or ABCD is a parallelogram. [Hint : From D and B, draw perpendiculars to AC.]

Question 7. D and E are points on sides AB and AC respectively of Δ ABC such that ar (DBC) = ar (EBC). Prove that DE || BC.

Question 8. XY is a line parallel to side BC of a triangle ABC. If BE || AC and CF || AB meet XY at E and F respectively, show that ar (ABE) = ar (ACF)

Question 9. The side AB of a parallelogram ABCD is produced to any point P. A line through A and parallel to CP meets CB produced at Q and then parallelogram PBQR is completed (see Fig. 9.26). Show that ar (ABCD) = ar (PBQR). [Hint : Join AC and PQ. Now compare ar (ACQ) and ar (APQ).]

Question 10. Diagonals AC and BD of a trapezium ABCD with AB || DC intersect each other at O. Prove that ar (AOD) = ar (BOC).

Question 11. In Fig. 9.27, ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show that
(i) ar (ACB) = ar (ACF)
(ii) ar (AEDF) = ar (ABCDE)

Question 12. A villager Itwaari has a plot of land of the shape of a quadrilateral. The Gram Panchayat of the village decided to take over some portion of his plot from one of the corners to construct a Health Centre. Itwaari agrees to the above proposal with the condition that he should be given equal amount of land in lieu of his land adjoining his plot so as to form a triangular plot. Explain how this proposal will be implemented.

Question 13. ABCD is a trapezium with AB || DC. A line parallel to AC intersects AB at X and BC at Y. Prove that ar (ADX) = ar (ACY). [Hint : Join CX.]

Question 14. In Fig.9.28, AP || BQ || CR. Prove that ar (AQC) = ar (PBR).

Question 15. . Diagonals AC and BD of a quadrilateral ABCD intersect at O in such a way that ar (AOD) = ar (BOC). Prove that ABCD is a trapezium.

Question 16. In Fig.9.29, ar (DRC) = ar (DPC) and ar (BDP) = ar (ARC). Show that both the quadrilaterals ABCD and DCPR are trapeziums.

EXERCISE 9.4

Question 1. Parallelogram ABCD and rectangle ABEF are on the same base AB and have equal areas. Show that the perimeter of the parallelogram is greater than that of the rectangle.

Question 2. In Fig. 9.30, D and E are two points on BC such that BD = DE = EC. Show that ar (ABD) = ar (ADE) = ar (AEC). Can you now answer the question that you have left in the 'Introduction' of this chapter, whether the field of Budhia has been actually divided into three parts of equal area? triangles ABD, ADE and AEC of equal areas. In the same way, by dividing BC into n equal parts and joining the points of division so obtained to the opposite vertex of BC, you can divide ΔABC into n triangles of equal areas.]

Question 3. In Fig. 9.31, ABCD, DCFE and ABFE are parallelograms. Show that ar (ADE) = ar (BCF).

Question 4. In Fig. 9.32, ABCD is a parallelogram and BC is produced to a point Q such that AD = CQ. If AQ intersect DC at P, show that ar (BPC) = ar (DPQ). [Hint : Join AC.]

Question 5. In Fig.9.33, ABC and BDE are two equilateral triangles such that D is the mid-point of BC. If AE intersects BC at F, show that:

(i) ar (BDE) = 1 4 ar (ABC)

(ii) ar (BDE) = 1 2 ar (BAE)

(iii) ar (ABC) = 2 ar (BEC)

(iv) ar (BFE) = ar (AFD)

(v) ar (BFE) = 2 ar (FED)

(vi) ar (FED) = 1 8 ar (AFC) [Hint : Join EC and AD. Show that BE || AC and DE || AB, etc.]

Question 6. Diagonals AC and BD of a quadrilateral ABCD intersect each other at P. Show that ar (APB) × ar (CPD) = ar (APD) × ar (BPC). [Hint : From A and C, draw perpendiculars to BD.]

Question 7. 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 (PRQ) = 1 2 ar (ARC)

(ii) ar (RQC) = 3 8 ar (ABC)

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

Question 8. In Fig. 9.34, ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment AX ⊥ DE meets BC at Y. Show that:

(i) Δ MBC Δ ABD

(ii) ar (BYXD) = 2 ar (MBC)

(iii) ar (BYXD) = ar (ABMN)

(iv) Δ FCB Δ ACE

(v) ar (CYXE) = 2 ar (FCB)

(vi) ar (CYXE) = ar (ACFG)

(vii) ar (BCED) = ar (ABMN) + ar (ACFG) Note : Result

(vii) is the famous Theorem of Pythagoras. You shall learn a simpler proof of this theorem in Class X.

(Mathematics) Chapter 10 Circles

EXERCISE 10.1

Question 1. Fill in the blanks:

(i) The centre of a circle lies in of the circle. (exterior/ interior)

(ii) A point, whose distance from the centre of a circle is greater than its radius lies in of the circle. (exterior/ interior)

(iii) The longest chord of a circle is a of the circle.

(iv) An arc is a when its ends are the ends of a diameter.

(v) Segment of a circle is the region between an arc and of the circle.

(vi) A circle divides the plane, on which it lies, in parts.

Question 2. Write True or False: Give reasons for your answers.

(i) Line segment joining the centre to any point on the circle is a radius of the circle.

(ii) A circle has only finite number of equal chords.

(iii) If a circle is divided into three equal arcs, each is a major arc.

(iv) A chord of a circle, which is twice as long as its radius, is a diameter of the circle.

(v) Sector is the region between the chord and its corresponding arc.

(vi) A circle is a plane figure.

EXERCISE 10.2

Question 1. Recall that two circles are congruent if they have the same radii. Prove that equal chords of congruent circles subtend equal angles at their centres.

Question 2. Prove that if chords of congruent circles subtend equal angles at their centres, then the chords are equal.

EXERCISE 10.3

Question 1. Draw different pairs of circles. How many points does each pair have in common? What is the maximum number of common points?

Question 2. Suppose you are given a circle. Give a construction to find its centre.

Question 3. If two circles intersect at two points, prove that their centres lie on the perpendicular

EXERCISE 10.4

Question 1. Two circles of radii 5 cm and 3 cm intersect at two points and the distance between their centres is 4 cm. Find the length of the common chord.

Question 2. If two equal chords of a circle intersect within the circle, prove that the segments of one chord are equal to corresponding segments of the other chord.

Question 3. If two equal chords of a circle intersect within the circle, prove that the line joining the point of intersection to the centre makes equal angles with the chords.

Question 4. If a line intersects two concentric circles (circles with the same centre) with centre O at A, B, C and D, prove that AB = CD (see Fig. 10.25).

Question 5. Three girls Reshma, Salma and Mandip are playing a game by standing on a circle of radius 5m drawn in a park. Reshma throws a ball to Salma, Salma to Mandip, Mandip to Reshma. If the distance between Reshma and Salma and between Salma and Mandip is 6m each, what is the distance between Reshma and Mandip?

Question 6. A circular park of radius 20m is situated in a colony. Three boys Ankur, Syed and David are sitting at equal distance on its boundary each having a toy telephone in his hands to talk each other. Find the length of the string of each phone.

EXERCISE 10.5

Question 1. In Fig. 10.36, A,B and C are three points on a circle with centre O such that ∠ BOC = 30° and ∠ AOB = 60°. If D is a point on the circle other than the arc ABC, find ∠ADC

Question 2. A chord of a circle is equal to the radius of the circle. Find the angle subtended by the chord at a point on the minor arc and also at a point on the major arc.

Question 3. In Fig. 10.37, ∠ PQR = 100°, where P, Q and R are points on a circle with centre O. Find ∠ OPR.

Question 4. In Fig. 10.38, ∠ ABC = 69°, ∠ ACB = 31°, find ∠ BDC.

Question 5. In Fig. 10.39, A, B, C and D are four points on a circle. AC and BD intersect at a point E such that ∠ BEC = 130° and ∠ ECD = 20°. Find ∠ BAC.

Question 6. ABCD is a cyclic quadrilateral whose diagonals intersect at a point E. If ∠ DBC = 70°, ∠ BAC is 30°, find ∠ BCD. Further, if AB = BC, find ∠ ECD.

Question 7. If diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, prove that it is a rectangle.

Question 8. If the non-parallel sides of a trapezium are equal, prove that it is cyclic.

Question 9. Two circles intersect at two points B and C. Through B, two line segments ABD and PBQ are drawn to intersect the circles at A, D and P, Q respectively (see Fig. 10.40). Prove that ∠ ACP = ∠ QCD.

Question 10. If circles are drawn taking two sides of a triangle as diameters, prove that the point of intersection of these circles lie on the third side.

Question 11. ABC and ADC are two right triangles with common hypotenuse AC. Prove that ∠ CAD = ∠ CBD.

Question 12. Prove that a cyclic parallelogram is a rectangle.

EXERCISE 10.6

Question 1. Prove that the line of centres of two intersecting circles subtends equal angles at the two points of intersection.

Question 2. Two chords AB and CD of lengths 5 cm and 11 cm respectively of a circle are parallel to each other and are on opposite sides of its centre. If the distance between AB and CD is 6 cm, find the radius of the circle.

Question 3. The lengths of two parallel chords of a circle are 6 cm and 8 cm. If the smaller chord is at distance 4 cm from the centre, what is the distance of the other chord from the centre?

Question 4. Let the vertex of an angle ABC be located outside a circle and let the sides of the angle intersect equal chords AD and CE with the circle. Prove that ∠ABC is equal to half the difference of the angles subtended by the chords AC and DE at the centre.

Question 5. Prove that the circle drawn with any side of a rhombus as diameter, passes through the point of intersection of its diagonals.

Question 6. ABCD is a parallelogram. The circle through A, B and C intersect CD (produced if necessary) at E. Prove that AE = AD.

Question 7. AC and BD are chords of a circle which bisect each other. Prove that :

(i) AC and BD are diameters

(ii) ABCD is a rectangle.

Question 8. Bisectors of angles A, B and C of a triangle ABC intersect its circumcircle at D, E and F respectively. Prove that the angles of the triangle DEF are 90° – 1 2 A, 90° – 1 2 B and 90° – 1 2 C.

(Mathematics) Chapter 11 Constructions

EXERCISE 11.1

Question 1. Construct an angle of 900 at the initial point of a given ray and justify the construction.

Question 2. Construct an angle of 450 at the initial point of a given ray and justify the construction.

Question 3. Construct the angles of the following measurements:

(i) 30°

(ii) 22 1 2 °

(iii) 15°

Question 4. Construct the following angles and verify by measuring them by a protractor:

(i) 75°

(ii) 105°

(iii) 135°

Question 5. Construct an equilateral triangle, given its side and justify the construction.

EXERCISE 11.2

Question 1. Construct a triangle ABC in which BC = 7cm, ∠B = 75° and AB + AC = 13 cm.

Question 2. Construct a triangle ABC in which BC = 8cm, ∠B = 45° and AB – AC = 3.5 cm.

Question 3. Construct a triangle PQR in which QR = 6cm, ∠Q = 60° and PR – PQ = 2cm.

Question 4. Construct a triangle XYZ in which ∠Y = 30°, ∠Z = 90° and XY + YZ + ZX = 11 cm.

Question 5. Construct a right triangle whose base is 12cm and sum of its hypotenuse and other side is 18 cm.

(Mathematics) Chapter 12 Heron's Formula

EXERCISE 12.1

Question 1. A traffic signal board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side 'a'. Find the area of the signal board, using Heron's formula. If its perimeter is 180 cm, what will be the area of the signal board?

Question 2. The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 122 m, 22 m and 120 m (see Fig. 12.9). The advertisements yield an earning of Rs 5000 per m2 per year. A company hired one of its walls for 3 months. How much rent did it pay?

Question 3. There is a slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN" (see Fig. 12.10). If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour. Fig. 12.10

Question 4. Find the area of a triangle two sides of which are 18cm and 10cm and the perimeter is 42cm.

Question 5. Sides of a triangle are in the ratio of 12 : 17 : 25 and its perimeter is 540cm. Find its area. 6. An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.

EXERCISE 12.2

Question 1. A park, in the shape of a quadrilateral ABCD, has ∠ C = 90º, AB = 9 m, BC = 12 m, CD = 5 m and AD = 8 m. How much area does it occupy?

Question 2. Find the area of a quadrilateral ABCD in which AB = 3 cm, BC = 4 cm, CD = 4 cm, DA = 5 cm and AC = 5 cm.

Question 3. Radha made a picture of an aeroplane with coloured paper as shown in Fig 12.15. Find the total area of the paper used.

Question 4. A triangle and a parallelogram have the same base and the same area. If the sides of the triangle are 26 cm, 28 cm and 30 cm, and the parallelogram stands on the base 28 cm, find the height of the parallelogram. Fig. 12.14

Question 5. A rhombus shaped field has green grass for 18 cows to graze. If each side of the rhombus is 30 m and its longer diagonal is 48 m, how much area of grass field will each cow be getting?

Question 6. An umbrella is made by stitching 10 triangular pieces of cloth of two different colours (see Fig. 12.16), each piece measuring 20 cm, 50 cm and 50 cm. How much cloth of each colour is required for the umbrella? 7. A kite in the shape of a square with a diagonal 32 cm and an isosceles triangle of base 8 cm and sides 6 cm each is to be made of three different shades as shown in Fig. 12.1

Question 7. How much paper of each shade has been used in it?

Question 8. A floral design on a floor is made up of 16 tiles which are triangular, the sides of the triangle being 9 cm, 28 cm and 35 cm (see Fig. 12.18). Find the cost of polishing the tiles at the rate of 50p per cm2.

Question 9. A field is in the shape of a trapezium whose parallel sides are 25 m and 10 m. The non-parallel sides are 14 m and 13 m. Find the area of the field.

(Mathematics) Chapter 13 Surface Areas and Volumes

EXERCISE 13.1

Question 1. A plastic box 1.5 m long, 1.25 m wide and 65 cm deep is to be made. It is to be open at the top. Ignoring the thickness of the plastic sheet, determine:
(i) The area of the sheet required for making the box.
(ii) The cost of sheet for it, if a sheet measuring 1m2 costs Rs 20.

Question 2. The length, breadth and height of a room are 5 m, 4 m and 3 m respectively. Find the cost of white washing the walls of the room and the ceiling at the rate of Rs 7.50 per m2.

Question 3. The floor of a rectangular hall has a perimeter 250 m. If the cost of painting the four walls at the rate of Rs 10 per m2 is Rs 15000, find the height of the hall. [Hint : Area of the four walls = Lateral surface area.]

Question 4. The paint in a certain container is sufficient to paint an area equal to 9.375 m2. How

many bricks of dimensions 22.5 cm × 10 cm × 7.5 cm can be painted out of this container?

Question 5. A cubical box has each edge 10 cm and another cuboidal box is 12.5 cm long, 10 cm wide and 8 cm high.
(i) Which box has the greater lateral surface area and by how much?
(ii) Which box has the smaller total surface area and by how much?

Question 6. A small indoor greenhouse (herbarium) is made entirely of glass panes (including base) held together with tape. It is 30 cm long, 25 cm wide and 25 cm high.
(i) What is the area of the glass?
(ii) How much of tape is needed for all the 12 edges?

Question 7. Shanti Sweets Stall was placing an order for making cardboard boxes for packing their sweets. Two sizes of boxes were required. The bigger of dimensions 25 cm × 20 cm × 5 cm and the smaller of dimensions 15 cm × 12 cm × 5 cm. For all the overlaps, 5% of the total surface area is required extra. If the cost of the cardboard is Rs 4 for 1000 cm2, find the cost of cardboard required for supplying 250 boxes of each kind.

Question 8. Parveen wanted to make a temporary shelter for her car, by making a box-like structure with tarpaulin that covers all the four sides and the top of the car (with the front face as a flap which can be rolled up). Assuming that the stitching margins are very small, and therefore negligible, how much tarpaulin would be required to make the shelter of height 2.5 m, with base dimensions 4 m × 3 m?

EXERCISE 13.2

Assume π = 22/7 , unless stated otherwise.

Question 1. The curved surface area of a right circular cylinder of height 14 cm is 88 cm2. Find the diameter of the base of the cylinder.

Question 2. It is required to make a closed cylindrical tank of height 1 m and base diameter 140 cm from a metal sheet. How many square metres of the sheet are required for the same?

Question 3. A metal pipe is 77 cm long. The inner diameter of a cross section is 4 cm, the outer diameter being 4.4 cm (see Fig. 13.11). Find its

(i) inner curved surface area,
(ii) outer curved surface area,
(iii) total surface area.

Question 4. The diameter of a roller is 84 cm and its length is 120 cm. It takes 500 complete revolutions to move once over to level a playground. Find the area of the playground in m2.

Question 5. A cylindrical pillar is 50 cm in diameter and 3.5 m in height. Find the cost of painting the curved surface of the pillar at the rate of Rs 12.50 per m2.

Question 6. Curved surface area of a right circular cylinder is 4.4 m2. If the radius of the base of the cylinder is 0.7 m, find its height.

Question 7. The inner diameter of a circular well is 3.5 m. It is 10 m deep. Find
(i) its inner curved surface area,
(ii) the cost of plastering this curved surface at the rate of Rs 40 per m2.

Question 8. In a hot water heating system, there is a cylindrical pipe of length 28 m and diameter 5 cm. Find the total radiating surface in the system.

Question 9. Find
(i) the lateral or curved surface area of a closed cylindrical petrol storage tank that is 4.2 m in diameter and 4.5 m high.
(ii) how much steel was actually used, if 1 12 of the steel actually used was wasted in making the tank.

Question 10. In Fig. 13.12, you see the frame of a lampshade. It is to be covered with a decorative cloth. The frame has a base diameter of 20 cm and height of 30 cm. A margin of 2.5 cm is to be given for folding it over the top and bottom of the frame. Find how much cloth is required for covering the lampshade.

Question 11. The students of a Vidyalaya were asked to participate in a competition for making and decorating penholders in the shape of a cylinder with a base, using cardboard. Each penholder was to be of radius 3 cm and height 10.5 cm. The Vidyalaya was to supply the competitors with cardboard. If there were 35 competitors, how much cardboard was required to be bought for the competition?

EXERCISE 13.3

Assume π = 22/7 , unless stated otherwise.

Question 1. Diameter of the base of a cone is 10.5 cm and its slant height is 10 cm. Find its curved surface area.

Question 2. Find the total surface area of a cone, if its slant height is 21 m and diameter of its base is 24 m. 3. Curved surface area of a cone is 308 cm2 and its slant height is 14 cm. Find
(i) radius of the base and
(ii) total surface area of the cone.

Question 4. A conical tent is 10 m high and the radius of its base is 24 m. Find
(i) slant height of the tent.
(ii) cost of the canvas required to make the tent, if the cost of 1 m2 canvas is Rs 70.

Question 5. What length of tarpaulin 3 m wide will be required to make conical tent of height 8 m and base radius 6 m? Assume that the extra length of material that will be required for stitching margins and wastage in cutting is approximately 20 cm (Use π = 3.14).

Question 6. The slant height and base diameter of a conical tomb are 25 m and 14 m respectively. Find the cost of white-washing its curved surface at the rate of Rs 210 per 100 m2.

Question 7. A joker's cap is in the form of a right circular cone of base radius 7 cm and height 24 cm. Find the area of the sheet required to make 10 such caps.

Question 8. A bus stop is barricaded from the remaining part of the road, by using 50 hollow cones made of recycled cardboard. Each cone has a base diameter of 40 cm and height 1 m. If the outer side of each of the cones is to be painted and the cost of painting is Rs 12 per m2, what will be the cost of painting all these cones? (Use π = 3.14 and take 1.04 = 1.02)

EXERCISE 13.4

Assume π = 22/7 , unless stated otherwise.

Question 1. Find the surface area of a sphere of radius:
(i) 10.5 cm
(ii) 5.6 cm

(iii) 14 cm

Question 2. Find the surface area of a sphere of diameter:
(i) 14 cm
(ii) 21 cm
(iii) 3.5 m

Question 3. Find the total surface area of a hemisphere of radius 10 cm. (Use π = 3.14)

Question 4. The radius of a spherical balloon increases from 7 cm to 14 cm as air is being pumped into it. Find the ratio of surface areas of the balloon in the two cases.

Question 5. A hemispherical bowl made of brass has inner diameter 10. 5 cm. Find the cost of tin-plating it on the inside at the rate of Rs 16 per 100 cm2.

Question 6. Find the radius of a sphere whose surface area is 154 cm2.

Question 7. The diameter of the moon is approximately one fourth of the diameter of the earth. Find the ratio of their surface areas.

Question 8. A hemispherical bowl is made of steel, 0.25 cm thick. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl.

Question 9. A right circular cylinder just encloses a sphere of radius r (see Fig. 13.22).Find
(i) surface area of the sphere,
(ii) curved surface area of the cylinder,
(iii) ratio of the areas obtained in
(i) and (ii). cm × 2.5 cm × 1.5 cm. What will be the volume of a packet containing 12 such boxes?

EXERCISE 13.5

Question 1. A matchbox measures 4 cm × 2.5 cm × 1.5 cm. What will be the volume of a packet containing 12 such boxes?

Question 2. A cuboidal water tank is 6 m long, 5 m wide and 4.5 m deep. How many litres of water can it hold? (1 m3 = 1000 l)

Question 3. A cuboidal vessel is 10 m long and 8 m wide. How high must it be made to hold 380 cubic metres of a liquid?

Question 4. Find the cost of digging a cuboidal pit 8 m long, 6 m broad and 3 m deep at the rate of Rs 30 per m3.

Question 5. The capacity of a cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its length and depth are respectively 2.5 m and 10 m.

Question 6. A village, having a population of 4000, requires 150 litres of water per head per day. It has a tank measuring 20 m × 15 m × 6 m. For how many days will the water of this tank last?

Question 7. A godown measures 40 m × 25 m × 10 m. Find the maximum number of wooden crates each measuring 1.5 m × 1.25 m × 0.5 m that can be stored in the godown.

Question 8. A solid cube of side 12 cm is cut into eight cubes of equal volume. What will be the side of the new cube? Also, find the ratio between their surface areas. 9. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water will fall into the sea in a minute?

EXERCISE 13.6

Assume π = 22/7 , unless stated otherwise.

Question 1. The circumference of the base of a cylindrical vessel is 132 cm and its height is 25 cm. How many litres of water can it hold? (1000 cm3 = 1l)

Question 2. The inner diameter of a cylindrical wooden pipe is 24 cm and its outer diameter is 28 cm. The length of the pipe is 35 cm. Find the mass of the pipe, if 1 cm3 of wood has a mass of 0.6 g.

Question 3. A soft drink is available in two packs - (i) a tin can with a rectangular base of length5 cm and width 4 cm, having a height of 15 cm and (ii) a plastic cylinder with circular base of diameter 7 cm and height 10 cm. Which container has greater capacity and by how much?

Question 4. If the lateral surface of a cylinder is 94.2 cm2 and its height is 5 cm, then find (i) radius of its base (ii) its volume. (Use π = 3.14)

Question 5. It costs Rs 2200 to paint the inner curved surface of a cylindrical vessel 10 m deep. If the cost of painting is at the rate of Rs 20 per m2, find

(i) inner curved surface area of the vessel,
(ii) radius of the base,
(iii) capacity of the vessel.

Question 6. The capacity of a closed cylindrical vessel of height 1 m is 15.4 litres. How many square metres of metal sheet would be needed to make it?

Question 7. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled in the interior. The diameter of the pencil is 7 mm and the diameter of the graphite is 1 mm. If the length of the pencil is 14 cm, find the volume of the wood and that of the graphite.

Question 8. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients

EXERCISE 13.7

Assume π = 22/7 , unless stated otherwise.

Question 1. Find the volume of the right circular cone with (i) radius 6 cm, height 7 cm (ii) radius 3.5 cm, height 12 cm

Question 2. Find the capacity in litres of a conical vessel with (i) radius 7 cm, slant height 25 cm (ii) height 12 cm, slant height 13 cm

Question 3. The height of a cone is 15 cm. If its volume is 1570 cm3, find the radius of the base. (Use π = 3.14)

Question 4. If the volume of a right circular cone of height 9 cm is 48 π cm3, find the diameter of its base.

Question 5. A conical pit of top diameter 3.5 m is 12 m deep. What is its capacity in kilolitres?

Question 6. The volume of a right circular cone is 9856 cm3. If the diameter of the base is 28 cm, find
(i) height of the cone
(ii) slant height of the cone

(iii) curved surface area of the cone

Question7. A right triangle ABC with sides 5 cm, 12 cm and 13 cm is revolved about the side 12 cm. Find the volume of the solid so obtained.

Question 8. If the triangle ABC in the Question 7 above is revolved about the side 5 cm, then find the volume of the solid so obtained. Find also the ratio of the volumes of the two solids obtained in Questions 7 and 8.

Question 9. A heap of wheat is in the form of a cone whose diameter is 10.5 m and height is 3 m. Find its volume. The heap is to be covered by canvas to protect it from rain. Find the area of the canvas required.

EXERCISE 13.8

Assume π = 22/7 , unless stated otherwise.

Question 1. Find the volume of a sphere whose radius is (i) 7 cm (ii) 0.63 m

Question 2. Find the amount of water displaced by a solid spherical ball of diameter (i) 28 cm (ii) 0.21 m

Question 3. The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm3?

Question 4. The diameter of the moon is approximately one-fourth of the diameter of the earth. What fraction of the volume of the earth is the volume of the moon?

Question 5. How many litres of milk can a hemispherical bowl of diameter 10.5 cm hold?

Question 6. A hemispherical tank is made up of an iron sheet 1 cm thick. If the inner radius is 1 m, then find the volume of the iron used to make the tank.

Question 7. Find the volume of a sphere whose surface area is 154 cm2.

Question 8. A dome of a building is in the form of a hemisphere. From inside, it was white-washed at the cost of Rs 498.96. If the cost of white-washing is Rs 2.00 per square metre, find

the

(i) inside surface area of the dome,

(ii) volume of the air inside the dome.

Question 9. Twenty seven solid iron spheres, each of radius r and surface area S are melted to form a sphere with surface area S. Find the (i) radius r of the new sphere, (ii) ratio of S and S′.

Question 10. A capsule of medicine is in the shape of a sphere of diameter 3.5 mm. How much medicine (in mm3) is needed to fill this capsule?

EXERCISE 13.9

Question 1. A wooden bookshelf has external dimensions as follows: Height = 110 cm, Depth = 25 cm, Breadth = 85 cm (see Fig. 13.31). The thickness of the plank is 5 cm everywhere. The external faces are to be polished and the inner faces are to be painted. If the rate of polishing is 20 paise per cm2 and the rate of painting is 10 paise per cm2, find the total expenses required for polishing and painting the surface of the bookshelf.

Question 2. The front compound wall of a house is decorated by wooden spheres of diameter 21 cm, placed on small supports as shown in Fig 13.32. Eight such spheres are used for this purpose, and are to be painted silver. Each support is a cylinder of radius 1.5 cm and height 7 cm and is to be painted black. Find the cost of paint required if silver paint costs 25 paise per cm2 and black paint costs 5 paise per cm2.

Question 3. The diameter of a sphere is decreased by 25%. By what per cent does its curved surface area decrease?

(Mathematics) Chapter 14 Statistics

EXERCISE 14.1

Question 1. Give five examples of data that you can collect from your day-to-day life. 2. Classify the data in Q.1 above as primary or secondary data.

EXERCISE 14.2

Question 1. The blood groups of 30 students of Class VIII are recorded as follows:

A, B, O, O, AB, O, A, O, B, A, O, B, A, O, O,

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

Represent this data in the form of a frequency distribution table. Which is the most common, and which is the rarest, blood group among these students?

Question 2. The distance (in km) of 40 engineers from their residence to their place of work were found as follows:

5 3 10 20 25 11 13 7 12 31
19 10 12 17 18 11 32 17 16 2
7 9 7 8 3 5 12 15 18 3
12 14 2 9 6 15 15 7 6 12

Construct a grouped frequency distribution table with class size 5 for the data given above taking the first interval as 05 (5 not included). What main features do you observe from this tabular representation?

Question 3. The relative humidity (in %) of a certain city for a month of 30 days was as follows:

98.1 98.6 99.2 90.3 86.5 95.3 92.9 96.3 94.2 95.1

89.2 92.3 97.1 93.5 92.7 95.1 97.2 93.3 95.2 97.3

96.2 92.1 84.9 90.2 95.7 98.3 97.3 96.1 92.1 89

(i) Construct a grouped frequency distribution table with classes 84 - 86, 86 - 88, etc.
(ii) Which month or season do you think this data is about?
(iii) What is the range of this data?

Question 4. The heights of 50 students, measured to the nearest centimetres, have been found to be as follows:

161 150 154 165 168 161 154 162 150 151
162 164 171 165 158 154 156 172 160 170
153 159 161 170 162 165 166 168 165 164
154 152 153 156 158 162 160 161 173 166
161 159 162 167 168 159 158 153 154 159

(i) Represent the data given above by a grouped frequency distribution table, taking the class intervals as 160 - 165, 165 - 170, etc.
(ii) What can you conclude about their heights from the table?

Question 5. A study was conducted to find out the concentration of sulphur dioxide in the air in parts per million (ppm) of a certain city. The data obtained for 30 days is as follows:

0.03 0.08 0.08 0.09 0.04 0.17
0.16 0.05 0.02 0.06 0.18 0.20
0.11 0.08 0.12 0.13 0.22 0.07
0.08 0.01 0.10 0.06 0.09 0.18
0.11 0.07 0.05 0.07 0.01 0.04
(i) Make a grouped frequency distribution table for this data with class intervals as 0.00 - 0.04, 0.04 - 0.08, and so on.
(ii) For how many days, was the concentration of sulphur dioxide more than 0.11 parts per million?

Question 6. Three coins were tossed 30 times simultaneously. Each time the number of heads occurring was noted down as follows:
0 1 2 2 1 2 3 1 3 0
1 3 1 1 2 2 0 1 2 1
3 0 0 1 1 2 3 2 2 0
Prepare a frequency distribution table for the data given above.

Question 7. The value of π upto 50 decimal places is given below:

3.14159265358979323846264338327950288419716939937510

(i) Make a frequency distribution of the digits from 0 to 9 after the decimal point.
(ii) What are the most and the least frequently occurring digits?

Question 8. Thirty children were asked about the number of hours they watched TV programmes in the previous week. The results were found as follows:
1 6 2 3 5 12 5 8 4 8
10 3 4 12 2 8 15 1 17 6
3 2 8 5 9 6 8 7 14 12
(i) Make a grouped frequency distribution table for this data, taking class width 5 and one of the class intervals as 5 - 10.
(ii) How many children watched television for 15 or more hours a week?

Question 9. A company manufactures car batteries of a particular type. The lives (in years) of 40 such batteries were recorded as follows:
2.6 3.0 3.7 3.2 2.2 4.1 3.5 4.5
3.5 2.3 3.2 3.4 3.8 3.2 4.6 3.7
2.5 4.4 3.4 3.3 2.9 3.0 4.3 2.8

3.5 3.2 3.9 3.2 3.2 3.1 3.7 3.4
4.6 3.8 3.2 2.6 3.5 4.2 2.9 3.6

Construct a grouped frequency distribution table for this data, using class intervals of size 0.5 starting from the interval 2 - 2.5.

EXERCISE 14.3

Question 1. A survey conducted by an organisation for the cause of illness and death among the women between the ages 15 - 44 (in years) worldwide, found the following figures (in %):
(i) Represent the information given above graphically.
(ii) Which condition is the major cause of women's ill health and death worldwide?
(iii) Try to find out, with the help of your teacher, any two factors which play a major role in the cause in (ii) above being the major cause.

Question 2. The following data on the number of girls (to the nearest ten) per thousand boys in different sections of Indian society is given below
(i) Represent the information above by a bar graph.
(ii) In the classroom discuss what conclusions can be arrived at from the graph.

Question 3. Given below are the seats won by different political parties in the polling outcome of a state assembly elections:
(i) Draw a bar graph to represent the polling results.
(ii) Which political party won the maximum number of seats?

Question 4. The length of 40 leaves of a plant are measured correct to one millimetre, and the obtained data is represented in the following table:
(i) Draw a histogram to represent the given data.
(ii) Is there any other suitable graphical representation for the same data?
(iii) Is it correct to conclude that the maximum number of leaves are 153 mm long? Why?

Question 5. The following table gives the life times of 400 neon lamps:
(i) Represent the given information with the help of a histogram.
(ii) How many lamps have a life time of more than 700 hours?

Question 6. The following table gives the distribution of students of two sections according to the marks obtained by them: Represent the marks of the students of both the sections on the same graph by two frequency polygons. From the two polygons compare the performance of the two

sections.

Question 7. The runs scored by two teams A and B on the first 60 balls in a cricket match are given below: Represent the data of both the teams on the same graph by frequency polygons. [Hint : First make the class intervals continuous.]
Draw a histogram to represent the data above.

Question 8. 100 surnames were randomly picked up from a local telephone directory and a frequency distribution of the number of letters in the English alphabet in the surnames was found as follows:
(i) Draw a histogram to depict the given information.
(ii) Write the class interval in which the maximum number of surnames lie.

EXERCISE 14.4

Question 1. The following number of goals were scored by a team in a series of 10 matches:
2, 3, 4, 5, 0, 1, 3, 3, 4, 3 Find the mean, median and mode of these scores.

Question 2. In a mathematics test given to 15 students, the following marks (out of 100) are recorded:
41, 39, 48, 52, 46, 62, 54, 40, 96, 52, 98, 40, 42, 52, 60 Find the mean, median and mode of this data.

Question 3. 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

Question 4. Find the mode of 14, 25, 14, 28, 18, 17, 18, 14, 23, 22, 14, 18.

Question 5. Find the mean salary of 60 workers of a factory from the following table:

Question 6. Give one example of a situation in which (i) the mean is an appropriate measure of central tendency. (ii) the mean is not an appropriate measure of central tendency but the median is an appropriate measure of central tendency.

(Mathematics) Chapter 15 Probability

EXERCISE 15.1

Question 1. In a cricket match, a batswoman hits a boundary 6 times out of 30 balls she plays. Find the probability that she did not hit a boundary.

Question 2. 1500 families with 2 children were selected randomly, and the following data were recorded:Compute the probability of a family, chosen at random, having

(i) 2 girls

(ii) 1 girl

(iii) No girl Also check whether the sum of these probabilities is 1.

Question 3. Refer to Example 5, Section 14.4, Chapter 14. Find the probability that a student of the class was born in August.

Question 4. Three coins are tossed simultaneously 200 times with the following frequencies of different outcomes: If the three coins are simultaneously tossed again, compute the probability of 2 heads coming up.

Question 5. An organisation selected 2400 families at random and surveyed them to determine a relationship between income level and the number of vehicles in a family. The information gathered is listed in the table below: Suppose a family is chosen. Find the probability that the family chosen is

(i) earning Rs 10000 – 13000 per month and owning exactly 2 vehicles.

(ii) earning Rs 16000 or more per month and owning exactly 1 vehicle.

(iii) earning less than Rs 7000 per month and does not own any vehicle.

(iv) earning Rs 13000 – 16000 per month and owning more than 2 vehicles.

(v) owning not more than 1 vehicle.

Question 6. Refer to Table 14.7, Chapter 14.

(i) Find the probability that a student obtained less than 20% in the mathematics test.

(ii) Find the probability that a student obtained marks 60 or above.

Question 7. To know the opinion of the students about the subject statistics, a survey of 200 students was conducted. The data is recorded in the following table Find the probability that a student chosen at random

(i) likes statistics, (ii) does not like it.

Question 8. Refer to Q.2, Exercise 14.2. What is the empirical probability that an engineer lives:

(i) less than 7 km from her place of work?

(ii) more than or equal to 7 km from her place of work?

(iii) within 1 2 km from her place of work?

Question 9. Activity : Note the frequency of two-wheelers, three-wheelers and four-wheelers going past during a time interval, in front of your school gate. Find the probability that any one vehicle out of the total vehicles you have observed is a two-wheeler.

Question 10. Activity : Ask all the students in your class to write a 3-digit number. Choose any student from the room at random. What is the probability that the number written by her/him is divisible by 3? Remember that a number is divisible by 3, if the sum of its digits is divisible by 3.

Question 11. Eleven bags of wheat flour, each marked 5 kg, actually contained the following weights of flour (in kg):

4.97 5.05 5.08 5.03 5.00 5.06 5.08 4.98 5.04 5.07 5.00

Find the probability that any of these bags chosen at random contains more than 5 kg of flour.

Question 12. In Q.5, Exercise 14.2, you were asked to prepare a frequency distribution table, regarding the concentration of sulphur dioxide in the air in parts per million of a certain city for 30 days. Using this table, find the probability of the concentration of sulphur dioxide in the interval 0.12 - 0.16 on any of these days.

Question 13. In Q.1, Exercise 14.2, you were asked to prepare a frequency distribution table regarding the blood groups of 30 students of a class. Use this table to determine the probability that a student of this class, selected at random, has blood group AB.