CONTENTS

CHAPTER I

NUMBER SYSTEM

Real Numbers

1. Is every real number is a rational number ?
2. Is 1.01001000100001 …… irrational? If so, why?
3. Is every whole number is a natural number ?
4. Is zero a rational number? Explain it.
5. If $\frac{1}{x} = \frac{x^2}{27}$ then find whether x is a rational or irrational number
6. Insert three rational numbers between $-\frac{13}{24}, -\frac{9}{24}$
7. Find two rational numbers between 1 and 2.
8. Is $\sqrt{225}$ a rational number?
9. Is it true that every integer is a rational number ?
10. Is every rational number is an Integer.
11. Find the value of , if $5^{x-2} = 125$.
12. Find two irrational numbers. between 2 and 2.5.
13. Insert a rational & an irrational number between 2 and 3.
14. Give examples of two irrational numbers the product of which is:
    (a) A rational number
    (b) An irrational number.
15. How to insert irrational numbers between two given rational numbers.
16. Express $\frac{7}{8}$ in the decimal form by long division method.
17. Find three rational numbers between -2 and 5.
18. State whether the following statements are true or false. Give reasons for your answers.
    (a) Every integer is a whole number
    (b) Every rational number is a whole number.
19. Find six rational numbers between 3 and 4.
20. Find five rational numbers between 1 and 2.
21. Visualize 3.765 on the number line using successive magnification.
22. State whether the following statements are true or false. Justify.
    (a) Every irrational number is a real number.

(b) Every point on the number line is of the form $\sqrt{m}$, where m is a natural number.

(c) Every real number is an irrational number.

23. Are square roots of all the +ve integers irrational? If not, give an example of the square root of a number that is a rational number.

24. Construct the square root spiral.

25. Find in each of the following cases whether x is a rational number or an irrational number:

(a) $x^2 = 4$ (b) $x^3 = 8$ (c) $x^2 = 0.04$

26. Considering x, y, z to be positive real numbers, simplify the following: -

(a) $\sqrt[3]{xy^2} \div \sqrt{x^2}y$ (b) $\sqrt[4]{\sqrt[3]{x^{36}}}$

(c) $(x^3 - y^{-1})/\{\left(\frac{x}{y^3}\right)^{-1}\left(\frac{x}{y}\right)^3 + \left(\frac{1}{x}\right)^{-1}\}$ (d) $\frac{1}{(1+x)^{a-b}} + \frac{1}{(1+x)^{b-a}}$

(e) $(x^2)^{\frac{3}{2}} - xy^0 - \left(\frac{1}{x^4}\right)^{-\frac{1}{2}}$

27. If $2^x = 3^{-y} = 6^z$, ST $y = \frac{2x^z}{z+x}$

28. Assuming x to be a positive real number, and a, b, c as rational numbers, prove that: -

(a) $\frac{(x^3)^{a+b}(x^3)^{b+c}(x^3)^{c+a}}{(x^a x^b x^c)^6} = 1$ (b) $\left(\frac{5^a}{5^b}\right)^{a+b}\left(\frac{5^b}{5^c}\right)^{b+c}\left(\frac{5^c}{5^a}\right)^{c+a} = 1$

29. If $\frac{\{-32 \times 2^{x+5} + (2^x)^2\}}{2 \times 2^{x+1} - 2^{12}} = 2^{3x-10}$ find the value of x given that $x \neq 10$.

30. If $24^x = \frac{16}{9^y}$ find x and y.

31. Prove that $\frac{1}{3+\sqrt{8}} + \frac{1}{\sqrt{8}+\sqrt{7}} + \frac{1}{\sqrt{7}+\sqrt{6}} + \frac{1}{\sqrt{6}+\sqrt{5}} + \frac{1}{\sqrt{5}+2} = 1$

32. Taking $\sqrt{2} = 1.414,$ and $\sqrt{5} = 2.236$, and $\pi = 3.141$, evaluate $\pi + (\frac{1}{2\sqrt{5}+3\sqrt{2}})$

33. If $x = \frac{\sqrt{a+2b}+\sqrt{a-2b}}{\sqrt{a+2b}-\sqrt{a-2b}}$, ST $bx^2 - ax + b = 0$

34. If $abc = 1$, ST $[1 + a + \frac{1}{b}]^{-1} + [1 + b + \frac{1}{c}]^{-1} + [1 + c + \frac{1}{a}]^{-1} = 1$

35. Determine the point on the number line which represents: -

(a) $\sqrt{6.7}$ (b) $\sqrt{11}$

36. Arrange the following in ascending order: -

(a) $\sqrt{3},\ \sqrt[4]{5},\ \sqrt[3]{4}$ (b) $\sqrt[3]{2},\ \sqrt[4]{3},\ \sqrt[3]{4}$ (c) $\sqrt[4]{10},\ \sqrt[3]{8},\ \sqrt{20}$

37. Convert $\sqrt[3]{9}$ and $\sqrt{26}$ into a surd of order 6.

38. Simplify: -

(a) $5\sqrt{3}+2\sqrt{27}+\frac{1}{\sqrt{3}}$ (b) $4\sqrt{3}-3\sqrt{12}+2\sqrt{75}$ (c) $3\sqrt{147}-\left(\frac{7}{3}\right)\sqrt{\frac{1}{3}}+7\sqrt{\frac{1}{3}}$

39. Simplify: -

(a) $\sqrt[4]{15}+\sqrt[4]{81}$ (b) $9\sqrt[4]{15}\div 3\sqrt[3]{2}$ (c) $6\sqrt[5]{8}\div\sqrt[5]{6}$

40. Find the values of a and b in each of the following: -

(a) $\frac{\sqrt{3}-1}{\sqrt{3}+1}=a+b\sqrt{3}$ (b) $\frac{3-\sqrt{5}}{3+2\sqrt{5}}=a\sqrt{5}-b$ (c) $\frac{\sqrt{2}+\sqrt{3}}{3\sqrt{2}-2\sqrt{3}}=a-b\sqrt{6}$

41. Simplify: -

(a) $\frac{2\sqrt{6}-\sqrt{5}}{3\sqrt{5}-2\sqrt{6}}$ (b) $\frac{7\sqrt{3}-5\sqrt{2}}{\sqrt{48}+\sqrt{18}}$

42. In each of the following, state which is greater: -

(a) $\sqrt{2}$ or $3\sqrt{3}$ (b) $\sqrt[3]{5}$ or $\sqrt[4]{6}$ (c) $\sqrt[3]{15}$ or $\sqrt[4]{20}$

43. If $a=\frac{\sqrt{3}+1}{\sqrt{3}-1}$ and $b=\frac{\sqrt{3}-1}{\sqrt{3}+1}$, find the value of a^2+ab+b^2

44. If $x=\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}+\sqrt{2}}$ and $y=\frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}}$, find x^2+y^2+xy

45. Find the simplest rationalising factor for the following: -

(a) $\sqrt{3}+\sqrt{5}$ (b) $2\sqrt{5}-\sqrt{3}$ (c) $\sqrt[3]{500}$ (d) $\sqrt[4]{768}$

46. Find the value of p and q in $\frac{\sqrt{3}-1}{\sqrt{3}+1}+\frac{\sqrt{3}+1}{\sqrt{3}-1}=p+\sqrt{3q}$

47. Give an example to show that the quotient of two irrational numbers is not necessary to be irrational.

48. Show that the product of a rational number and an irrational number is always irrational.

49. Prove that the sum of two irrational numbers need not be an irrational number.

50. Define an irrational number and give three examples.

CHAPTER 2

POLYNOMIALS

1. Find the zeroes of polynomial $2x^2 - 8$

2. Check, whether 1 is the zero of the polynomial $9x^3 - 5x + 20$

3. Factorise $\frac{2x^2}{8} - \frac{2y^2}{8}$

4. Show that $x - 1$ is a zero of the polynomial $3x^3 - 4x^2 + 8x - 7$

5. Find the degree of polynomial $30x^5 - 15x^2 + 40$

6. Find the degree of the polynomial $4x + 5$.

7. Find the remainder when $6x^3 - 5x^2 + 2x - 9$ is divided by $x - 1$

8. Factorise: $4y^3 - 4y + 1$

9. Give one example each of a binomial of degree 35 and a monomial of degree 100 .

10. Resolve into factors: $27x^3 + y^3 + z^3 - 9xyz$

11. Find the value of k, if $x - 1$ is a factor of the following expression:$p(x) = kx^2 - \sqrt{2}x + 1$

12. Divide the polynomial $3x^4 - 4x^3 - 3x - 1$ by $x - 1$

13. If$\sqrt{m} + \sqrt{n} - \sqrt{p} = 0$, then find the value of $(m + n - p)^2$

14. If the polynomials $z^3 - 4z^2 + 3z - 4$ and $z^3 - 4z + a$ leave the same remainder when divided by $z - 3$, find the value of a?

15. Without actually calculating the cubes, find the values of

    (a) $\left(\frac{1}{2}x - \frac{1}{3}y\right)^3 + \left(\frac{1}{3}y - \frac{1}{4}z\right)^3 + \left(\frac{1}{4}z - \frac{1}{2}x\right)^3$

    (b) $(a - 2b)^3 + (2b - 3c)^3 + (3c - a)^3$

16. If $a^2 + \frac{9}{a^2} = 31$, find the value of $a - \frac{3}{a}$

17. Factorise the following: -

    (a) $a^3 - 3\sqrt{3}b^3$ (b) $2\sqrt{2}a^3 + 3\sqrt{3}b^3 + 6\sqrt{3}a^2b + 9\sqrt{2}ab^2$

    (c) $(x + 2)^3 + (x - 2)^3$ (d) $64(x + xy)^3 + 729(y^3 + y)^3$

18. If a, b, c are all non zero and $a + b + c = 0$, prove that $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab} = 3$

19. Find the value of m and n so that the polynomial $p(x) = z^3 - mz^2 - 13z + n$ has $z - 1$ and $z + 3$ as factors.

20. If $(x + a)$ is a factor of the polynomials $x^2 + px + q$ and $x^2 + mx + n$, prove that $a = \frac{n-q}{m-p}$

21. For what value of m is $x^2-(m+2)x+6$ is divisible by $x-m$

22. Simplify $\frac{\left[(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3\right]}{[(a-b)^3+(b-c)^3+(c-a)^3]}$

23. If $a+b+c=0$, prove that $(bc+ca+ab)^2=b^2c^2+c^2a^2+a^2b^2$

24. If $a+b+c=9$, and $a^2+b^2+c^2=35$, prove that $ab+bc+ca=23$

25. If $x-\frac{2}{x}=5$, prove that $x^3-\frac{8}{x^3}=155$

26. If a,b,c are all non zero and $a+b+c=0$, prove that $\frac{a^2}{bc}+\frac{b^2}{ca}+\frac{c^2}{ab}=3$

27. It is given that the remainder obtained when $p(x)=x^3-2x^2+5x-m$ is divided by $(x-2)$ and $q(x)=x^3+x^2-nx+15$ is divided by $(x+3)$ are same. Prove that $m+3n=13$

28. If $x+\frac{1}{x}=\frac{5}{2}$, find the value of

(a) $x^2+\frac{1}{x^2}$ (b) $x^3+\frac{1}{x^3}$ (c) $x-\frac{1}{x}$

29. If $x-\frac{1}{x}=\sqrt{24}$, find the value of $\left(x^2+\frac{1}{x^2}\right)\left(x+\frac{1}{x}\right)$

30. If $\frac{x}{y}+\frac{y}{x}=-1,\ (x,y\neq 0)$, find the value of x^3-y^3

31. If $x-\frac{1}{x}=3$, prove that $x^3-\frac{1}{x^3}=36$

32. If $xy=6$, and $8x^3+27y^3=793$, prove that $2x+3y=13$

33. Find the value of a and b so that the polynomial x^3+10x^2+ax+b is exactly divisible by $(x-1)$ as well as by $(x+2)$?

34. Show that $(x-1)(x-2)$ and $(x-3)$ are factors of $x^3-6x^2+11x-6$?

35. Find the value of a and b such that $(x+1)$ and $(x-3)$ are the factors of the polynomial
x^3+ax^2+5x+b?

36. For what value of p would $(x-3)$ be factor of $p^2x^3-px^2+3px-p$?

37. Without actually calculating the cubes, find the value of each of the following: -

(a) $(-12)^3+7^3+5^3$ (b) $28^3+(-15)^3+(-13)^3$

38. Write in the standard form: $x^2-4x^5+3x^4+2x-3x^3+7$

39. Show that $1, 2$ and 3 are the zeroes of the polynomial $y^3-6y^2+11y-6$.

40. Find the integral zeroes of the polynomial $12x^3-4x^2-3x+1$?

41. Find the value of m, if $(x+3)$ is a factor of $6+mx+3x^2$?

42. Find the remainder when $p(x)$ is divided by $q(x)$ given that:

(a) $p(x)=4x^3-3x^2+2x-4$ (b) $q(x)=x+2$

43. Find the value of m, if $2y^3+my^2+11y+m+3$ is exactly divisible by $(2y-1)$?

44. What should be added to $x^4 - x^2 + x + 2$ to get $x^2 + x + 4$?

45. If both $(y - 2)$ and $\left(y - \frac{1}{2}\right)$ are the factors of $py^2 + 5y + r$, show that $p = r$?

46. If $p(x.y) = x^2 - y^2 - xy$ and $q(x, y) = -x^2 + y^2 + 3xy$, then find $4p(x, y) - 5q(x, y)$

CHAPTER 3

COORDINATE GEOMETRY

1. In which quadrant will the point $P(x, y)$ lie?, where x is a positive and y is a negative number.

2. Write the name of the point of intersection of coordinate axes.

3. Define quadrant.

4. Write the x-coordinate of a point which lies on y-axis.

5. What is the sign of the x-coordinate of a point in third quadrant?

6. If a point P(2,3) lies in first quadrant, then what will be the coordinate of point Q opposite to it in fourth quadrant having equal distant from both the axes ?

7. Write the answer of each of the following questions:

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

   (b) Write the coordinates of the point where these two lines (as described above) intersect.

9. Which of the following points: B(1, 0), C (0,1), E (-1, 0), F (0,1), G (4, 0), H (0, 7)

   (a) lie on x –axis?

   (b) lie on y – axis?

10. Determine the quadrants in which the following points lie;

(a) A (1,1)	(b) B (2,4)	(c) C (-3, -10)
(d) D (-1,2)	(e) E (1,-1)	(f) F (-2,-4)
(g) G (-3, 10)	(h) H (1,-2)	

11. Plot the following points in a Cartesian plane: (-2,4), (3,-1), (-1, 0), (1, 2) & (-3, -5)

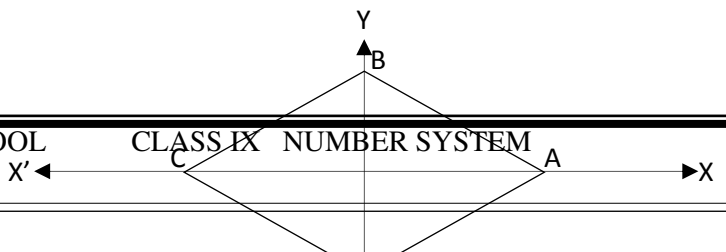
12. Write the coordinates of the vertices of a rectangle, which is 6 units long and 4 units wide. The rectangle is in the first quadrant, its longer side lies on the x-axis and one vertex is at the origin.

13. The vertices of a rectangle ABCD are A (1, 3), B (1, -1) and C (7, -1). Plot these points on a graph paper and hence find the coordinates of the fourth vertex, D. Also, find the area of this rectangle.

14. In which quadrant or axis do these points lie? P (5, 0), Q (0, 5), R (-4, -6), S (-6, -4) ? Do R and S represent the same point? Why or why not? Give reasons.

15. Plot the points P (0, 0), Q (5, 0), R (7, 3), S (2, 3) on the Cartesian plane and identify the figure PQRS.

16. In the figure given below, ABCD is a rhombus with diagonals AD = 2a and BD = 2b. Find the coordinates of A, B, C and D.



17. Plot the points A (5, 0), B (3, 2), C (-3, 2), D (-5, 0), E (-3, -2) and F (3, -2) on the x-y plane with the scale 1 cm = 1 unit on both the axes and identify the geometrical figure ABCDEF hence formed.

18. Plot the points A (-3, 2), B (1, -2) and C (9, -10) on the graph paper and join them by a straight line and observe that they are collinear.

19. With the rectangular axes, plot the points O (0, 0), A (3, 0) and C (0, 4). Complete the rectangle OABC and then find the coordinates of vertex B.

20. Prove that the points (8, 4), (5, 7), and (-1, 1) form a right-angled triangle.

21. Plot the points P(-6, 2) and from it draw PM and PN as perpendiculars to x-axis and y-axis respectively. Write the coordinates of the points M and N.

22. Plot the following points and write the name of the figure thus obtained. :

(a) P (-3, 2), Q (-7, -3) (b) R (6, -3), S (2, 2)

23. Plot the points A (-3, 1), B (-1, 3), C(0, 2), D(1, 3) and E (3, 1)on a graph paper. Join AB, BC, CD and DE. Which English alphabet is obtained?

24. Plot the points A(2, 1), B (5, 1) and C (2, 7) on the x-y plane with the scale 1 cm = 1 unit. Find the area of the ΔABC.

25. Find the coordinates of the point.

(a) Which lies on x and y axes both.

(b) Whose ordinate is -4 and which lies on y axis.

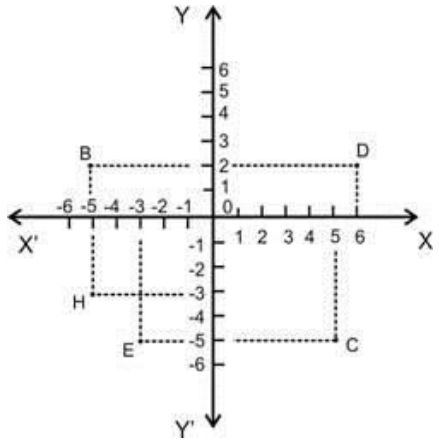
(c) Whose abscissa is 5 and which lies o x-axis.

26. Three vertices of a rectangle are (3, 2), (-4, 2) and (-4, 5). Plot these points and find the coordinates of the fourth vertex.

27. Write the coordinates of the vertices of a rectangle whose length and breadth are 5 and 3 units respectively. One vertex at the origin, the longer side lies on the x-axis and one of the vertices lies in the third quadrant.

28. What are the co-ordinates of the Origin?

29. Observe the fig. given below and answer the following:



(a) The coordinates of B. (b) The Coordinates of C.

(c) The point identified by the coordinate (-3, -5).

(iv) The abscissa of the point D. (e) The coordinates of H.

30. For each of the following sets of points, find whether the point are collinear or not.

(a) (3, 2), (-1, 6), (7, -2) (b) (2,2), (4, 0) (0, 4)

31. Plot the points P(1, 0), Q (4, 0) and S(1, 3). Find the coordinates of the point R such that PQRS is a square.

32. Write the co-ordinates of a point: -

(a) above X-Axis lying on Y-Axis at a distance of 3 units.

(b) Below X-Axis and on Y-Axis at a distance of 8 units.

(c) Right of origin and on X-Axis at a distance of 2 units.

(d) Left of Y-Axis and on X-Axis at a distance of 4 units.

33. Plot the points $(2,0), (2,3), (0,6), (-2,3)$ and $(-2,0)$ and join them in order. Find the type of figure thus formed.

34. Find the area of the figure formed by joining the points $(5,0), (0,0)$ and $(0,6)$?

35. Draw a quadrilateral whose vertices are $(2,2), (-2,2), (-2,-2)$ and $(2,-2)$. What type of quadrilateral is this? Find its area?

36. Plot the points (4,-4), (-4,-4) and join. Comment on the graph.

37. Plot the points A, B, C, D, E from the following table and answer the following: -

(a) Coordinates of A, B, C, D, and E

(b) Measure AC, DC and AD

(c) Shade the triangle

(d) Verify that AD+DC > AC

Point	A	B	C	D	E

Abscissa	-7	-3	5	2	-3
Ordinate	2	0	-4	2	+2

38. Which of the following points will lie on x-axis or y-axis

    A (0,2) , B (5,0) ,C (15,0) , D (0,8)

39. Name the quadrants of the points (-3,2), (2,-3), (2,2), (-5,2)

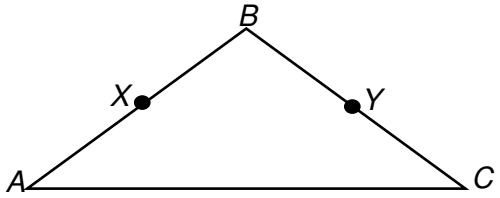
40. Which of the following points do not lie in any quadrants?

    (3,4), (0,5), (6,9), (4,0)

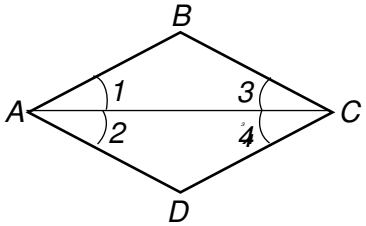
CHAPTER 5

INTRODUCTION TO EUCLID'S GEOMETRY

1. Write Euclid's definition of straight line.
2. State true or false:
   (a) Two distinct lines intersect at more than one point.
   (b) Given two distinct points, there are two lines which pass through them.
   (c) Only one line can pass through a single point.
   (d) If AB=PQ and PQ=XY, then AB=XY.
3. Fill in the blank:
   (a) A_____ is that which has no part.
   (b) Three or more lines are said to be ____if their common point lies on them.
   (c) According to Euclid, 'A_____ is that which has length and breadth only'.
4. If A, B and C are three points on a line and B lies between A and C then prove that AB + BC = AC.
5. If a point C lies between two points A and B such that AC = BC, then prove that AC = (1/2)AB.
6. Define the following terms:
   (a) Intersecting lines (d) Parallel lines
   (b) Line segment (e) Collinear points.
   (c) Axiom (f) Theorem
7. Define the following:
   (a) Collinear points (b) Concurrent lines
8. Name any three undefined terms.
9. If $\angle 1 = \angle 3,\ \angle 2 = \angle 4$ and $\angle 3 = \angle 4$, write the relation between $\angle 1$ and $\angle 2$
10. In the given figure, we have
    (a) $AB = BC, BX = BY$.
    (b) Show that $AX = CY$

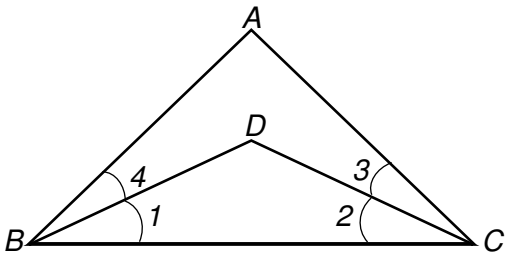


11. In the same figure, we have
12. $BX = \frac{1}{2} BC$, and $AB = BC$. Show that $BX = BY$
13. In the given figure, $\angle 1 = \angle 3$ and $\angle 2 = \angle 4$.
    (a) Show that $\angle A = \angle C$.



14. In the given figure, $\angle ABC = \angle ACB$,

(a) $\angle 3 = \angle 4$. Show that $\angle 1 = \angle 2$.



15. Solve the equation $a - 15 = 25$ and state which axiom is used here.

16. How many points a line segment can have?

17. State two equivalent versions of Euclid's fifth postulate.

18. It is known that $x + y = 10$ and that $x = z$. Show that $z + y = 10$

19. Choose the correct answer

(a) If point *P* lies in between *M* and *N* and *C* is the mid-point of *MP*, then

(i) $MC + PN = MN$ (ii) $MP + CP + MN$

(iii) $MC + CN = MN$ (iv) $CP + CN = MN$

(b) *"Two intersecting lines cannot be parallel to the same line"* is stated in the form of:

(i) an axiom (ii) a definition

(ii) a postulate (iv) a proof

(c) Which of the following is an example of a geometric line?

(i) Black Board (ii) Sheet of Paper

(iii) Meeting place of two walls (iv) Tip of a sharp pencil

(d) The number of dimensions a surface has:

(i) 1 (ii) 2

(iii) 0 (iv) 3

(e) Which of the following needs proof?

(i) Axiom (ii) Theorem

(iii) Postulate (iv) Definition

(f) Given four points such that no three of them are collinear, then the number of lines that can be drawn through them is:

(i) 2 lines (ii) 4 lines

(iii) 6 lines (iv) 8 lines

(g) Two lines are respectively perpendicular to two perpendicular lines, then these two lines to each other are:

(i) Parallel (ii) Perpendicular

(iii) Inclined at some acute angle (iv) Intersecting at 110^{O}.

(h) How many number of lines does pass through two distinct points?

(i) 1 (ii) 2

(iii) 3 (iv) 4

(i) *"Lines are parallel if they do not intersect"* – is stated in the form of:

(i) An axiom (ii) A definition

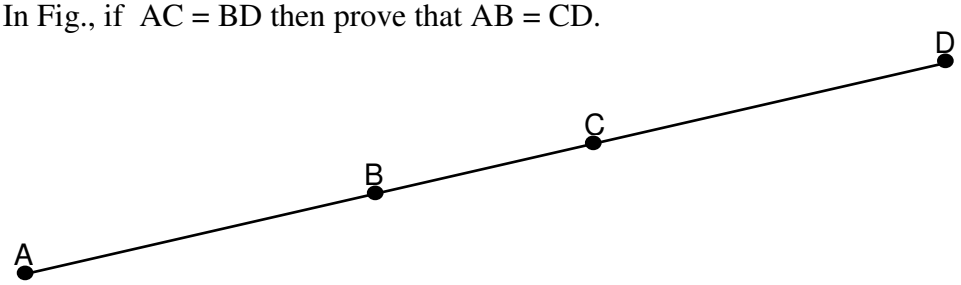
(iii) A postulate (iv) A proof

(j) Two planes intersect each other to form a:

(i) plane (ii) point

(iii) straight line (iv) angle

20. In Fig., if AC = BD then prove that AB = CD.



21. If a point C lies between two points A and B such that $AC = BC$, then prove that $AC = \frac{AB}{2}$.

22. If l and m are intersecting lines, $l \parallel p$ and $m \parallel q$, show that p and q also intersect.

23. Rewrite Euclid's fifth postulate in simple language.

24. Show that two lines which are parallel to the same line are parallel to each other.

25. Name the line segments determined by three collinear points A, B and C.

CHAPTER 6
LINES AND ANGLES

1. What is the sum of all angles round a point?

2. State corresponding angles axiom.

3. If a ray stands on a line, then write the sum of the adjacent angles so formed.

4. State true or false: If two parallel lines are intersected by a transversal, then bisectors of any two corresponding angles are perpendicular.

5. Define collinear points.

6. The measure of an angle is twice the measure of its supplementary angle. Find its measure.

7. If the angles of a triangle are in the ratio 2 : 3 : 4, find all the three angles.

8. Two supplementary angles are in the ratio 4:5. Find the angles.

9. An angle is equal to its complement. Find the measure of angle.

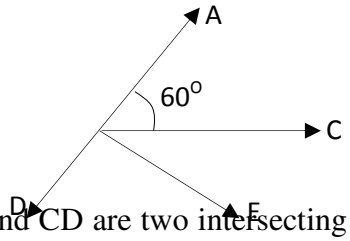
10. If $2x = 15$ and $3x + 15$ are complementary angles, find the value of x.

11. If an angle is 40^O less than its supplement, find the angle.

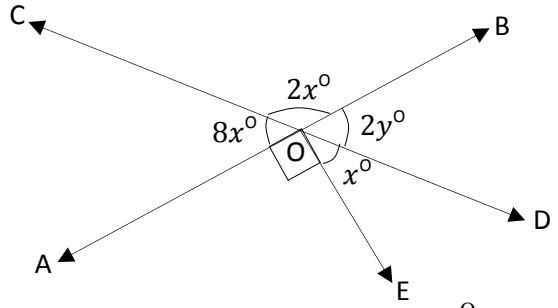
12. Find two supplementary angles one of which is four fifth of the other?

13. Two lines intersect in such of way that one angle, out of the four angles formed by these lines, is right angle. Show that rest three angles will also be right angles.

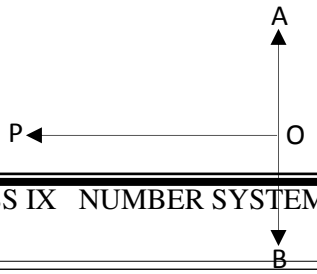
14. Given that $\angle ABC = 60^O$, ray BD is opposite to ray *BA*.
Ray BE bisects the $\angle CBD$. Find: (a) $\angle ABE$ (b) $\angle DBE$



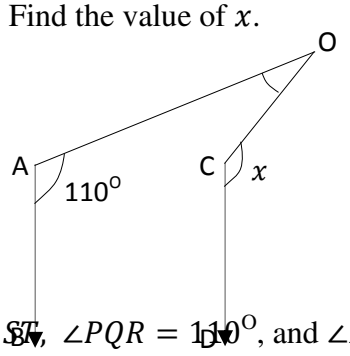
15. In the figure below, AB and CD are two intersecting lines, intersecting each other at O. If $\angle AOE = 90^O$, find x, y and z.



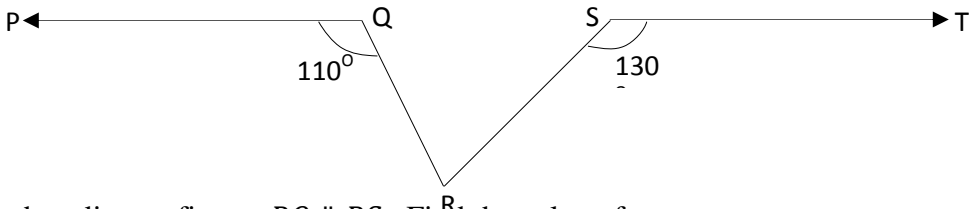
16. In the given figure, each of the adjacent angle is 90^O. Show that *A, O, B* are collinear.



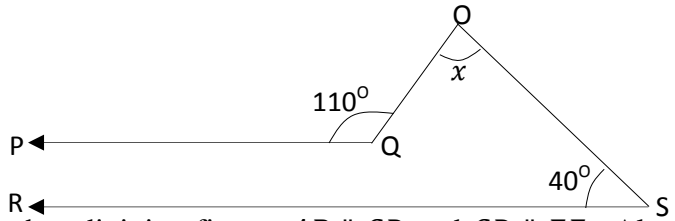
17. In the given figure, AB ∥ CD. Find the value of x.



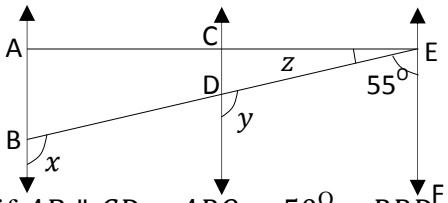
18. In the adjacent figure, if $PQ \parallel ST$, $\angle PQR = 110^O$, and $\angle RST = 130^O$, find $\angle PQR$



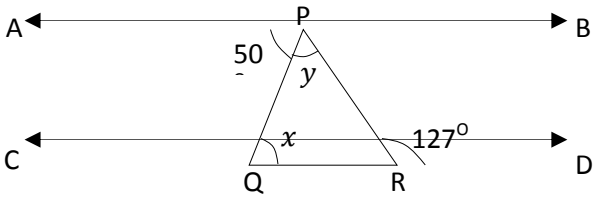
19. In the adjacent figure, $PQ \parallel RS$. Find the value of x.



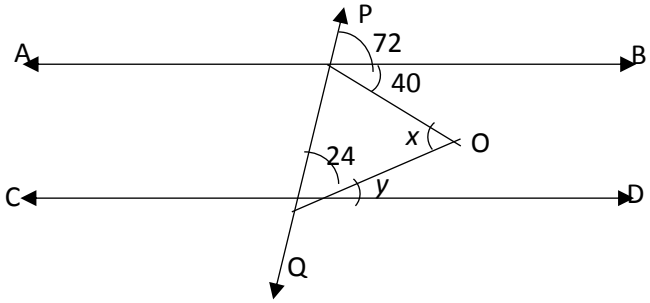
20. In the adjoining figure, $AB \parallel CD$ and $CD \parallel EF$. Also, $EA \perp AB$. If $\angle BEF = 55^O$, find the value of x, y and z.



21. In the adjacent figure if $AB \parallel CD$, $\angle APQ = 50^O$, $\angle PRD = 127^O$, find x and y.



22. In the given figure $AB \parallel CD$ and PQ is transversal. Find the value of x and y.



23. In the adjacent figure,7 find x, y, z if $AB \parallel CD$

24. If in quadrilateral $ABCD$, $AB \parallel DC$ and $AD \parallel BC$, prove that $\angle DAB = \angle BCD$ and $\angle ABC = \angle ADC$.

25. In each of the given figures $AB \parallel CD \parallel EF$, find the value x.

26. If in each of the following figures $AB \parallel CD$, find the value of x in each case.

27. In the given figure show that $AB \parallel EF$

28. In the given figure $x = y$ and $a = b$. Prove that $l \parallel n$.

29. Sum of two angles of a triangle is equal to double that of the third angle. Find the third angle of the triangle.

30. Three angles f a triangle are in the ratio 3 : 4 : 5. Find measure of each angle.

31. In ΔABC, $2\angle A = 3\angle B = 6\angle C$. Find the measures of angles of ΔABC

32. Prove that in a right angled triangle f one of the acute angle is x, then the other acute angle will be $90 - x$

33. Prove that the exterior angle formed by producing a side of a triangle is equal to the sum of the interior opposite angles.

34. Prove that the angle between the internal bisector of one base angle and the external bisector of the other base angle is equal to one half of the vertical angle.

35. The side BC of a triangle ABC is produced to D. The bisector of $\llcorner A$ meets BC at L. Prove that $\angle ABC + \angle ACD = 2 \times \angle ALC$.

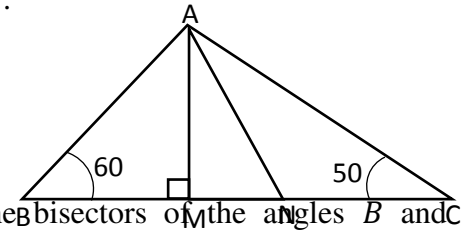
36. The side BC, CA and AB of ΔABC are produced in order, forming exterior angles $\angle ACD$, $\angle BAE$ and $\angle CBF$. Show that $\angle ACD + \angle BAE + \angle CBF = 360^{O}$.

37. The sum of two angles of a triangle is 95^{O} and their difference is 25^{O}. Find all the three angles of the triangle.

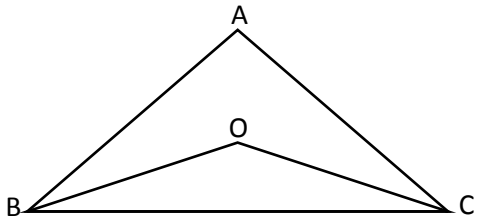
38. If two parallel lines are intercepted by a transversal, prove that the bisectors of the two pairs of interior angles encloses a rectangle.

39. Sides BC, CA and BA of ΔABC are produced to D, E and F respectively. If $\angle ACD = 110^{O}$, and $\angle EAF = 130^{O}$, find all the three angles of the triangle.

40. In the given figure, $AM \perp BC$ and AN is the angle bisector of $\angle A$. If $\angle B = 60^{O}$ and $\angle C = 50^{O}$, find , find $\angle MAN$.



41. In the given figure, the bisectors of the angles B and C meet at O. Prove that $\angle BOC = 90^{O} + \frac{1}{2}\angle A$.



42. A triangle ABC is right angles at A. AL is perpendicular to BC. Prove that $\angle BAL = \angle BCA$.

43. Prove that the sum of three angles of a triangle is 180^{O}.

44. Prove that if a transversal intersects two parallel lines, then each pair of consecutive interior angles are supplementary.

45. Prove that if a transversal intersects two parallel lines, then each pair of alternate interior angles are equal.

46. If two angles of a triangle are 65^{O} and 50^{O}, find the third angle.

47. Define convex and rectangular polygon.

48. Prove that the sum of all five angles of a pentagon is 540^{O}.

49. In ΔABC, the angle bisectors of $\angle ABC$ and $\angle ACB$ meet at O. If $\angle BAC = 80^{O}$, find $\angle BOC$.

50. Prove that the medians of an equilateral triangle are equal.

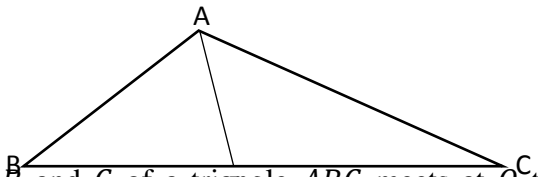
CHAPTER 6
LINES AND TRIANGLES

1. The measures of the angles of a triangles are in the ratio of 4 : 5 : 9. What type of triangle is this?

(a) An acute angled triangle (b) A right angled triangle

(c) An obtuse angled triangle (d) Any of the above

2. In the given figure, find the value x if AE is the bisector of $\angle A$ in the triangle ABC

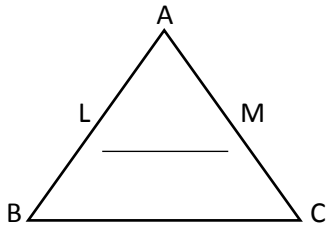


3. If bisector of angle B and C of a triangle ABC meets at O then prove that $\angle BOC = 90 + \frac{1}{2}\angle A$.

4. Sum of two angles of a triangle is 90^O and their difference is 50^O, find all the angles of the triangle.

5. In the given figure $\angle ABC = 30°$, $\angle EDF = (40 - x)°, and\ \angle ADE = (13x + 20)°$. Show that $BC \parallel DE$.

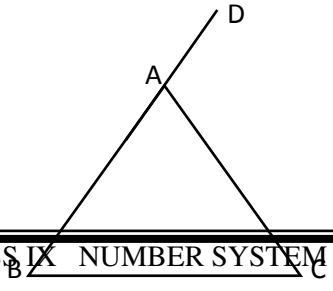
6. ABC is an isosceles triangle in which $AB = AC$ and $LM \parallel BC$. If $\angle A = 50°$, find $\angle LMC$.



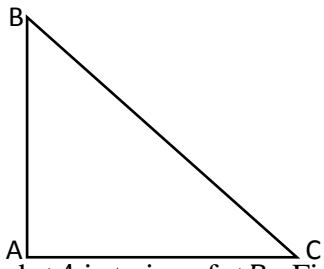
7. AP and DP are the bisectors of two adjacent angles A and D of a quadrilateral $ABCD$. Prove that $2\angle APD = \angle B + \angle C$.

8. In the given figure, AE bisects $\angle CAD$ and $\angle B = \angle C$. Prove that $AE \parallel BC$

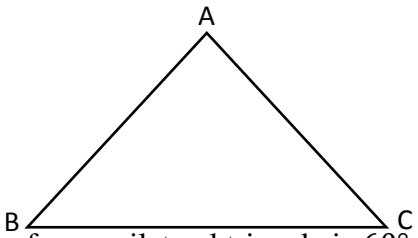
9. ΔABC is an isosceles triangle with $AB = AC$ and exterior angle at A as $110°$. Find $\angle B$ and $\angle C$.



10. ABC is a right angled triangle in which $\angle A = 90°$ and $AB = AC$. Find $\angle B$ and $\angle C$

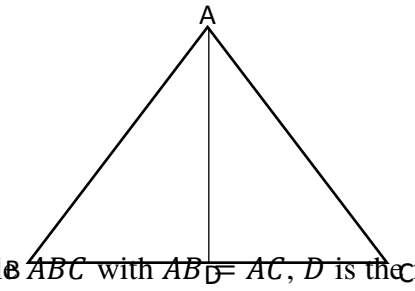


11. In ΔABC, $AB = AC$ and $\angle A$ is twice of $\angle B$. Find the measures of all angles of ΔABC.

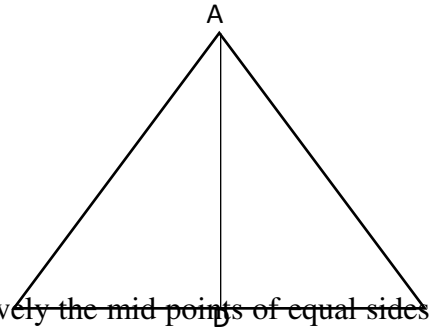


12. Show that each angle of an equilateral triangle is $60°$.

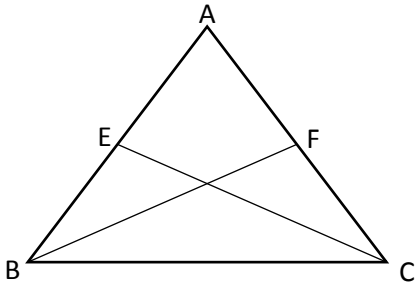
13. In and isosceles triangle ΔABC with $AB = BC$, prove that altitude AD bisects $\angle A$.



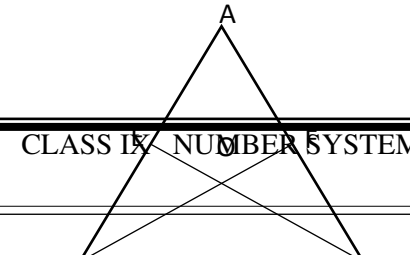
14. In an isosceles triangle ABC with $AB = AC$, D is the mid point of BC. Show that AD is perpendicular to BC.



15. E and F are respectively the mid points of equal sides AB and AC of ΔABC. Show that $BF = FC$.

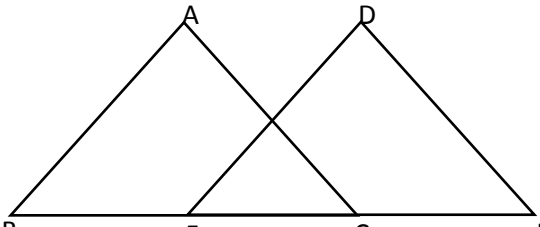


16. In the adjacent figure, BE and CD are bisectors of $\angle B$ and $\angle C$ respectively, meeting each other at O, $\angle BOD = 2x, \angle OBC = x$. Prove that $AB = AC$



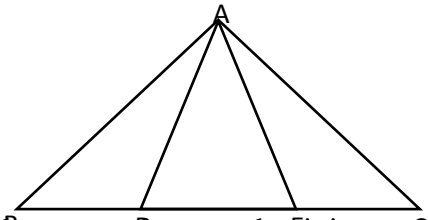
17. In the adjacent figure $\angle B = \angle E, BF = CE$ and $OF = OC$. Prove that:

(a) $\Delta ABC \cong \Delta DEF$ (b) $OA = OD$



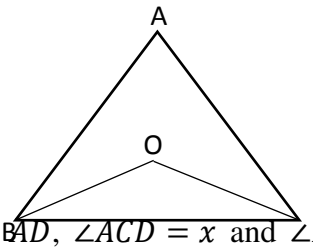
18. Prove that in a right triangle, mid-point of hypotenuse is equidistant from all vertices.

19. In the adjacent figure, $BD = EC$ and $AD = AE$. Show that $AB = AC$

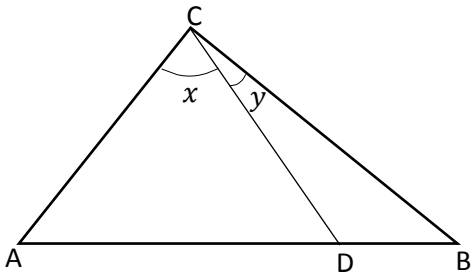


20. If all angles of a triangle are equal, prove that it is an equilateral triangle.

21. In ΔABC, BO and CO are bisectors of $\angle B$ and $\angle C$ respectively, such that $OB = OC$. Prove that $AB = AC$.



22. In the given figure, $AC = AD$, $\angle ACD = x$ and $\angle BCD = y$. Prove that $x = \frac{1}{2}(\angle B + \angle C)$ and $y = \frac{1}{2}(\angle C - \angle B)$.

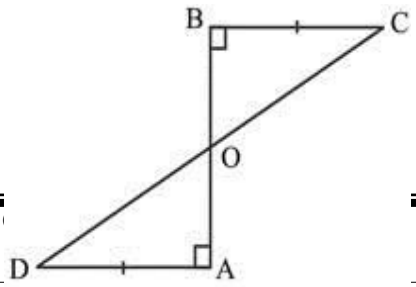


23. In an isosceles triangle ABC with $AB = AC$, $\angle B$ is four times $\angle A$. Find all angles of triangle.

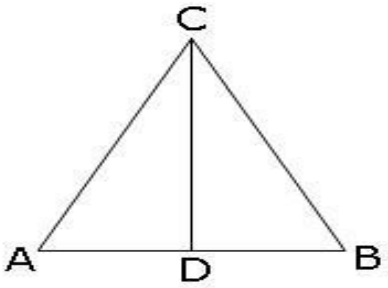
24. In ΔABC, find the ratio $AB : BC : CA$ if each angle of triangle is 60^{O}.

25. In the adjacent figure $AB = AC = AD$. Prove that $\angle BCD = \angle B + \angle D$

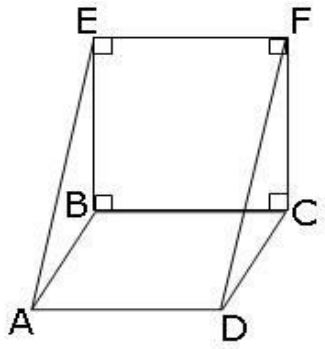
26. D and BC are equal perpendiculars to a line segment AB. Show that CD bisects AB.



27. Triangle *ABC* is an isosceles triangle; *CD* is bisector to the base *AB*. Prove that the altitude, the bisector and the median to the base of triangle *ABC* match.

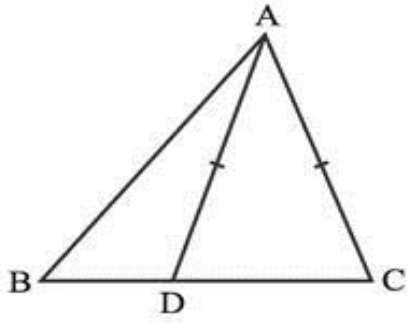


28. *ABCD* is a parallelogram and *BEF*C is a square. Show that triangles *ABE* and *DCF* are congruent.

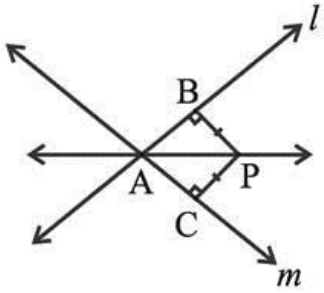


29. Prove that the perimeter of a triangle is greater than the sum of its altitudes.

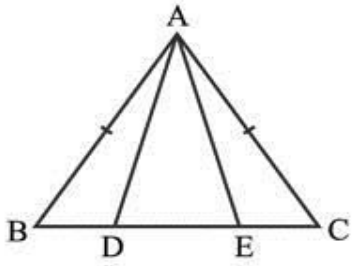
30. D is a point on BC of Δ ABC such that AD = AC. Show that AB > AD.



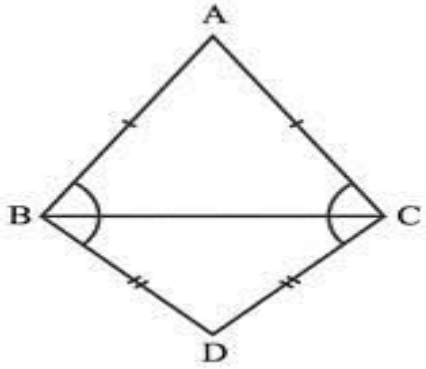
31. P is a point equidistant from two lines l and m intersecting at point A. Show that the line AP bisects the angle between them.



32. In an isosceles triangle ABC with AB = AC, D and E are points on BC such that BE = CD. Show that AD = AE.

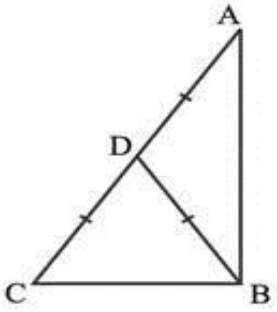


33. ABC and DBC are two isosceles triangles on the same base BC. Show that ∠ABD = ∠ACD.



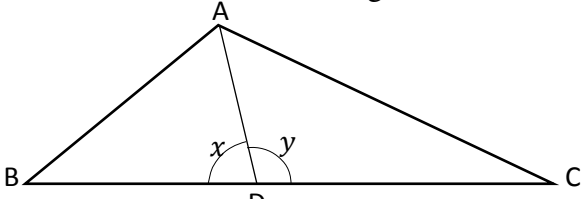
34. AB is a line-segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B. Show that the line PQ is the perpendicular bisector of AB.

35. If D is the mid-point of the hypotenuse AC of a right triangle ABC, prove that BD = ½ AC.

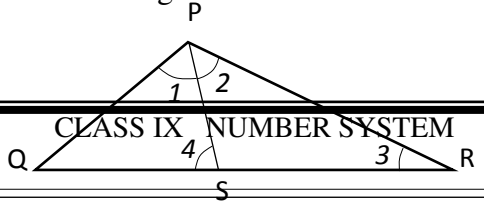


36. S is a point in the interior of $\triangle PQR$. Prove that $SQ + SR < PQ + PR$.

37. In the given figure $AB > AC$ and AD is the angle bisector of $\angle A$. Show that $\angle ABD > \angle ADC$.



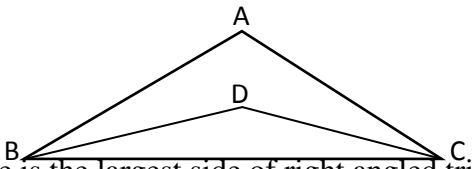
38. In the given figure, PS is the angle bisector of $\angle P$. Prove that $PQ > QS$.



39. In $\triangle ABC$, AD is the median and D Lies on BC. Prove that $AB + AC > 2AD$.

40. In PQR, S is a point on the side QR. Prove that $PQ + QR + RP > 2PS$.

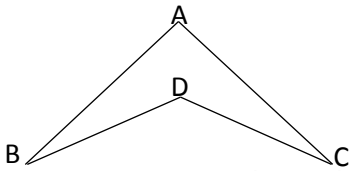
41. In $\triangle ABC$, $AC > AB$ and BD and CD are angle bisectors of B and C respectively. Prove that $DC > BD$.



42. Prove that the hypotenuse is the largest side of right angled triangle.

43. In $\triangle ABC$, $AB = AC$, BE and CF are respectively the bisectors of $\angle B$ and $\angle C$. Prove that
$\triangle EBC \cong \triangle FCB$.

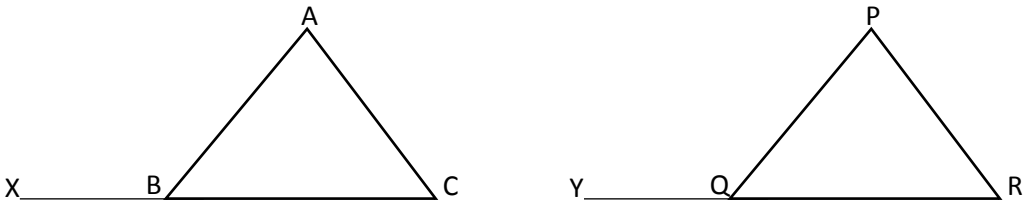
44. In the given figure, $AB = AC$ and $DB = DC$. Prove that $\angle ABD = \angle ACD$



45. $\triangle ABC$ is an isosceles triangle with $AB = AC$. Side BA is produced to D such that $AB = AD$. Prove that $\angle BCD = 90^{O}$

46. In two right triangles, one side and an acute angle of one are equal to the corresponding side and the angle of the other. Prove that the triangles are congruent.

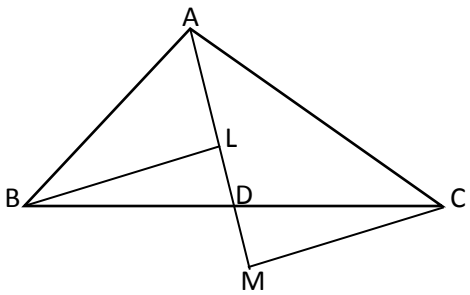
47. In $\triangle ABC$ and $\triangle PQR, AB = PQ, BC = QR$ and CB and RQ are extended to X and Y respectively and $\angle ABX = \angle PQY$. Prove that $\triangle ABC \cong \triangle PQR$.



48. In triangle ABC, altitude BE equals altitude CF. Prove that the triangle is isosceles.

49. In an isosceles triangle $ABC, AB = AC$. Prove that the perpendiculars from the vertices B and C to the opposite sides are equal.

50. In the given figure, AD is the median of $\triangle ABC$. BL and CM are perpendiculars on the median AD. Prove that $BL = CM$.



CHAPTER 12

HERON'S FORMULA

1. Find the area of quadrilateral ABCD in which AB = 10 cm, BC = 24 cm, CD = 26 cm, DA = 20 cm, and the diagonal AC = 26 cm.

2. Two adjacent sides of a parallelogram measure 5 cm and 3.5 cm. On of its diagonals measures 6.5 cm. Find the area of the parallelogram.

3. The perimeter of a rhombus is 20 cm. One of its diagonal measures 8 cm. Find the area of the rhombus and the measure of the other diagonal.

4. A rhombus shaped platform is to be plastered. If each side of the platform is 15 m and its longer diagonal is 24 m, find the cost of plastering it at the rate of Rs. 36 per m^2.

5. Find the area of the trapezium, if the lengths of its parallel sides are 29 cm and 53 cm; and the non-parallel sides are 13 cm and 13 cm.

6. The cross-section of a canal is a trapezium in shape. If the canal is 60 m wide at the top and 36 m wide at the bottom and each of the non-parallel sides are 24 m, find the area of the cross section of the canal.

7. A field in the form of a parallelogram has sides 60 m and 40 m and one of its diagonals is 80 m long. Find the area of the parallelogram.

8. The area of a trapezium is 475 cm^2 and the height is 19 cm. Find the lengths of its two parallel sides if one side is 4 cm greater than the other.

9. The lengths of the sides of a triangle are 10 cm, 24 cm and 26 cm. Find the length of the perpendicular let fall to side 26 cm long from the opposite vertex.

10. Find the area of an equilateral triangle of side 6 cm. (use $\sqrt{3} = 1.73$)

11. Find the cost of leveling a ground in the form of a triangle whose sides are 120 m, 80 m, and 50 m at Rs. 4 per sq. metre (use $\sqrt{15} = 3.88$)

12. Find the area of a quadrilateral ABCD in which AB = 11 cm, BC = 8 cm, CD = 12 cm, DA = 15 cm and AC = 9 cm. (use $\sqrt{35} = 5.92$)

13. The perimeter of a rhombus is 146. One of its diagonals is 55 cm. Find the other diagonal and the area of the rhombus.

14. Two parallel sides of a trapezium are 60 cm and 77 cm and other sides are 25 cm and 26 cm. Find the area of the trapezium.

15. If each side of a triangle is doubled, prove that the area of triangle becomes four times.

16. Using Heron's formula, prove that the area formed by joining the mid points of sides of a given triangle is one- fourth of the area of the given triangle.

17. The perimeter of a triangular field is 432 cm and its sides are in the ratio 12 : 17 : 25. Find its area.

18. A triangle and a parallelogram have the same base and same area. If the sides of the triangle are 28 cm, 38 cm and 42 cm and the longest side is the common base, find the altitude of the parallelogram.

19. Calculate the area of a quadrilateral ABCD when length of the diagonal AC = 20 cm and lengths of perpendiculars from B and D on AC be 10 cm and 12 cm respectively.

20. Perimeter of a rhombus is 146 cm. One of its diagonals is 55 cm. Find the length of the other diagonal and its area.

21. An isosceles right triangle has area 200 sq. cm. What is the length of its hypotenuse?

22. Calculate the area of the shaded portion of the given triangle, given that PR = 52 m, RQ = 48 cm, PS = 12 cm, QS = 16 cm, PS □ QS.

23. The sides of a triangular plate are 8 cm, 15 cm and 17 cm. If the weight is 96 gm., find the weight of the plate per square cm.

24. Find the area of the quadrilateral ABCD in which AD = 24 cm, ∠BAD = 90° and BCD forms an equilateral triangle whose each side is equal to 26 cm.

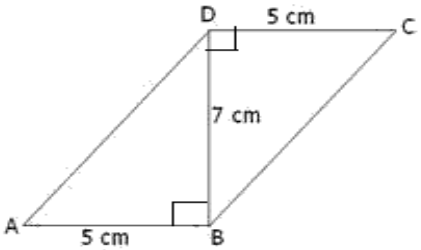
25. Write the area of the rhombus if d_1 and d_2 are the lengths of its diagonals .

26. What is the area of equilateral triangle whose side is a units ?

27. What is the area of an isosceles right angled triangle whose equal side is a units ?

28. What is the side of a rhombus whose diagonal is d_1 and d_2 ?

29. In fig. given below, BD is the diagonal of quadrilateral ABCD. Find the area of ABCD.



31. Find area and perimeter of triangle whose sides are 8cm ,19cm and 15 cm.

32. Find the area of triangle whose sides are 5cm,12cm, 13 cm. Also find the shortest altitude.

33. A kite in the shape of a square with diagonal 32 cm and an isosceles triangle of base 8 cm and equal sides are 6cm how much paper is required to build the kite.

34. The perimeter of a right triangle is 60 cm and its hypotenuse is 26 cm. Find area of triangle and its other two sides.

35. A trapezium whose parallel sides are 25 cm and 10 cm. The non-parallel sides are 14 cm and 13 cm. find the area of the trapezium.

36. The sides of a quadrilateral ABCD, taken in order are 5 cm,12 cm,14 cm and 15 cm respectively, and angle contained between first two sides is a right angle. Find its area.

37. A rhombus sheet, whose perimeter is 32 cm and whose one diagonal is 10 cm long, is painted on both sides at the rate of 5 per sq. cm. Find the cost of painting.

38. Two adjacent sides of a parallelogram are 5cm and 3.5cm and one of its diagonals is 6.5 cm. Find the area of the parallelogram.

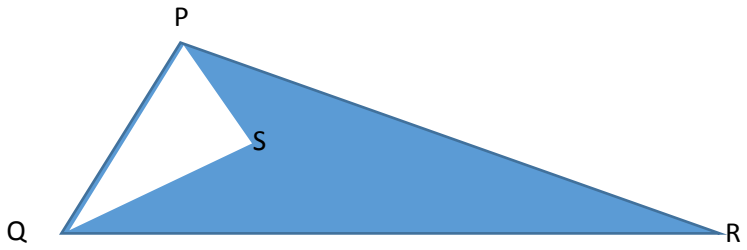
39. The parallel sides of a trapezium are 6cm and 12 cm while its non-parallel sides are 5cm each. Find its area.

40. Perimeter of a rhombus is 146 cm. One of its diagonals is 55 cm. Find the length of the other diagonal and its area.

41. An isosceles triangle has area 200 sq.cm. What is the length of its hypotenuse?

42. The sides of a triangular plate are 8cm, 15 cm, and 17 cm. If its weight is 96 gms, find the weight of the plate per square cm.

43. Calculate the area of the shaded portion of the given triangle, given that PR = 52 cm, RQ=48 cm, PS= 12 cm, QS = 16 cm, PS is perpendicular to QS.



44. Find the area of the quadrilateral ABCD in which AD = 24 cm, < BAD = 90° and BCD forms an equilateral triangle whose each side is equal to 26 cm

45. The perimeter of a right triangle is 12 cm and its hypotenuse is of length 5cm.Find the other two sides and calculate its area. Verify the result using Heron's formula.

46. A triangle has its sides as 13 cm, 14 cm and 15cm.Aparallelogram having double the area of this triangle stands on side 14 cm of this triangle. Find the height of the parallelogram.

47. A triangle and a parallelogram have the same base and same area. If the sides of the triangle are 28cm, 38cm and 42cm and the longest side is the common base, find the altitude of the parallelogram.

48. The perimeter of a triangle is 240m. If two of its sides are 50m and 78m, find the length of the perpendicular on the smallest sides from the opposite vertex.

49. Find the area of a trapezium whose parallel sides are 60cm, 77cm and non-parallel sides are 25cm and 26 cm.