GEOMETRY

SYNOPSIS - 1

BASIC GEOMETRICAL IDEAS:

Explanation of a point, line segment, ray, line, plane and space.

Point: A fine dot marked with a sharp edged pencil represents a point. It has no length, breadth and thickness. Points are denoted by capital letters like A,B,C, etc.,

Point has no dimensions: Point has no thickness or size, generally we should keep a dot as thin as possible to represent a point.

Line Segment: The shortest path connecting two points is called a segment. Let 'A' and 'B' be two points in a plane. Then, the shortest path from A to B is called the line segment AB. Line segment AB is same as line segment BA. It is denoted by $\overline{AB}$ or $\overline{BA}$

$\overline{AB}$ is same as $\overline{BA}$.

Note: A line segment contains infinite number of points

Ray: A line segment extended endlessly in one direction is called a ray.

Note: 1. The ray AB has one end point, namely A, called its initial point.

2. Clearly, a ray has no definite length
3. Usually $\overrightarrow{AB}$ is not same as $\overrightarrow{BA}$.
4. $\overrightarrow{BA}$ is a ray with initial point 'B' and extends endlessly in the direction from 'B' to 'A'

So $\overrightarrow{AB}$ and $\overrightarrow{BA}$ are two different rays.

Can ray has more than one name?

Observe ray AB, its initial points is 'A' and its direction is from 'A' to 'B'. It can aslo be named as ray AD, ray AC but not as ray DC.

Note: A ray contains infinite number of points.

Line: A line segment extended endlessly on both sides is called a line. Thus a line segment $\overline{AB}$ extended on both sides and marked by arrows at two ends represents a line, denoted by $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$ and called as line AB or line BA.

Some times we represent the line by small letters l, m, n etc.

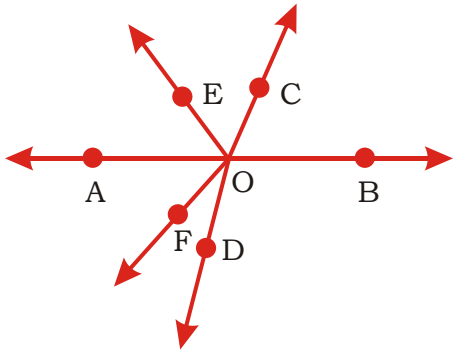
Note: 1. A line has no end points. It contains infinite number of points.
2. It has length but no thickness.
3. The line segment is a part of the line.

Naming a line:

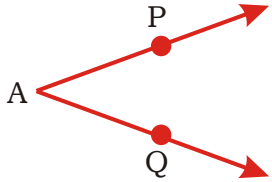
First line can be called as $\overleftrightarrow{AB}$ or $\overleftrightarrow{BA}$.

Second line can be called as $\overleftrightarrow{AB}, \overleftrightarrow{AC}, \overleftrightarrow{AD}, \overleftrightarrow{BC}, \overleftrightarrow{BD}, \overleftrightarrow{CD}, \overleftrightarrow{BA}, \overleftrightarrow{CA}, \overleftrightarrow{DA}, \overleftrightarrow{CB}, \overleftrightarrow{DB}, \overleftrightarrow{DC}$.

Coinitial rays: Unlimited number of rays can be drawn in different directions with a given point say 'O' as the initial point.



$\overrightarrow{OA}, \overrightarrow{OB}, \overrightarrow{OC}, \overrightarrow{OD}, \overrightarrow{OE}, \overrightarrow{OF}$ are called co initial rays



Here, $\overrightarrow{AP}$ and $\overrightarrow{AQ}$ are co - initial rays.

Note: We cannot draw the complete picture of a ray on the paper.

Introduction to Plane: A solid has a surface which may be flat or curved. The surface of a wall is flat and the surface of a ball is curve. Flat surfaces are known as plane surfaces.

Definition: A smooth flat surface which extends endlessly in all directions is called a plane. A plane has infinite length and breadth but has no thickness.

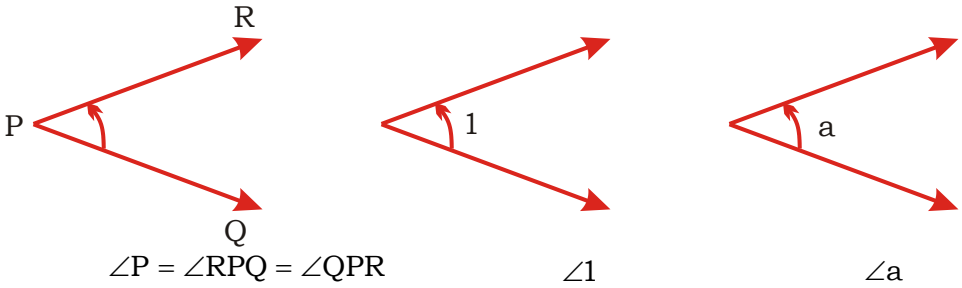
Part of a plane: The surface of the top of a table is a part of a plane, which has a boundary.

Plane figures: Triangle, Rectangle, Circle etc,. are plane figures. We draw them in a plane and call them as plane figures. Cube is not a plane figure.

Angle: An angle is the union of two different rays having the same initial point. (or) Amount of rotation

Representing an angle: Generally we use three capital letters to represent an angle. The above angle is represented by $\angle AOB$ (or) $\angle BOA$ and is read as 'angle AOB' or 'angle BOA'. Note that the middle letter denotes the vertex of the angle. The symbol $\angle$ stands for angle. It can also be represented by $\angle O$. Some times we use numbers or lower case letter to denote angles.

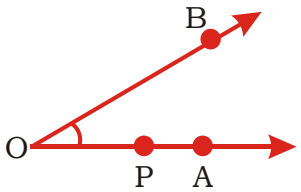
Consider the following angles:



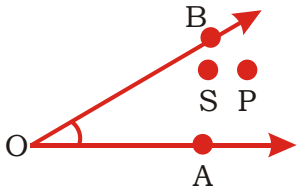
INTERIOR AND EXTERIOR OF AN ANGLE:

An angle divides the plane into three regions.

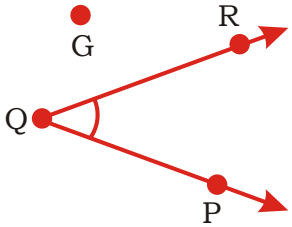
i) Point belongs to the angle: If any point (like P) lying on one of its arms, then that 'P' belongs to the angle.



ii) Interior of an angle: In the following figure, 'S' does not belong to the angle. Note that the points 'S' and 'P' are on the same side of the $\overleftrightarrow{OB}$ and the points 'S' and 'P' are also on the same side of the $\overleftrightarrow{OA}$. Such a point is said to be in the interior of the angle.



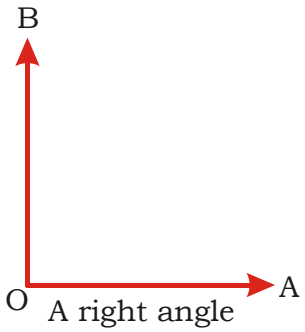
iii) Exterior of an angle: In the following figure, 'G' does not belong to the angle. It is not in the interior of the angle. We say that it is in the exterior of the angle.



Magnitude of an angle: The magnitude of an angle is the amount of rotation through which one of the arms must be rotated about the vertex to bring it to the position of the other.

Measure of an angle: To find out the magnitude to a given angle, we need a standard unit angle. Then we can compare the given angle with the unit angle and say its measure.

i) A quarter turn of a ray $\overrightarrow{OA}$ about O describes an angle which is called a right angle.



A right angle

ii) Units for measuring angle: A right angle is divided into 90 equal parts and each part is called a degree. Degree is the unit for measuring an angle. One degree is written as 1°. One degree is divided into 60 equal parts and each part is called a minute. One minute is divided into 60 equal parts and each part is called a second. 1 minute is denoted by 1^{1}. 1 second is denoted by 1^{11}.

$1^{0} = 60^{1}$ (read as 60 minutes)

$1^{1} = 60^{11}$ (read as 60 seconds).

TYPES OF ANGLES:

Acute angles: An angle whose measure is less than 90° and greater than O° is called an acute angle i.e., If θ is an acute angle, then $0^{\circ} < \theta < 90^{\circ}$

Right angle: An angle whose measure is 90° is called a right angle.

TYPE OF ANGELS:

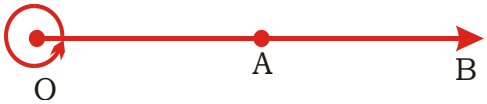
i) Obtuse angle: An angle whose measure is greater than 90° and less than 180° is called obtuse angle.

ii) Straight angle: An angle whose measure is 180° is called a straight angle.

Note: A straight angle = Two right angles.

iii) Reflex angle: An angle whose measure is greater than 180° and less than 360° is called a reflex angle.

iv) Complete angle: An angle whose measure is 360° is called a complete angle

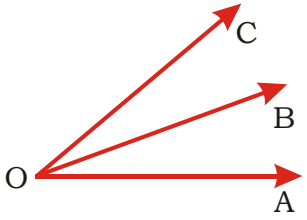


Here $\angle AOB$ is 360°.

Note: A complete angle = Four right angles.

v) Zero angle: If the measure of the angle is zero, it is called a zero angle.

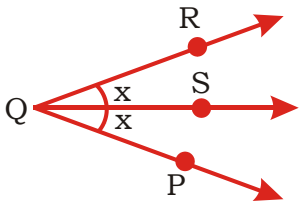
OPERATIONS WITH ANGLES:



Consider $\angle AOB$ and $\angle BOC$ in the above figure. Both $\angle AOB$ and $\angle BOC$ have a common arm $\overrightarrow{OB}$ and a common vertex 'O'. $\therefore \angle AOC = \angle AOB + \angle BOC$.

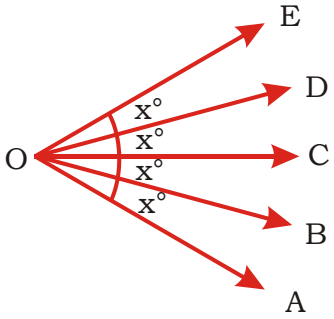
Bisector of the angle:

i)



$\angle PQS$ and $\angle SQR$ have the same measure and congruent. So $\overrightarrow{QS}$ is called the bisector of $\angle PQR$. A ray which divides an angle into two congruent angles is called the bisector of the angle.

ii)



In the above figure, $\angle AOE$ is divided into four congruent angles.

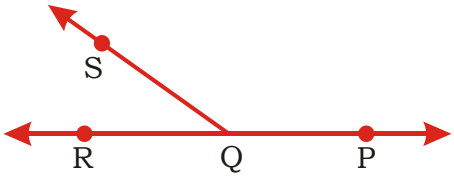
$\angle AOB = \angle BOC = \angle COD = \angle DOE = x^\circ, \angle AOE = 4x^\circ$

$$\angle AOB = \frac{\angle AOE}{4}, \angle AOC = \frac{\angle AOE}{2}, \angle AOD = \frac{3\angle AOE}{4}$$

PAIRS OF ANGLES:

i) Adjacent angles: Two angles in a plane are called adjacent angles, if they have a common vertex, a common side and their interiors do not have a common point.

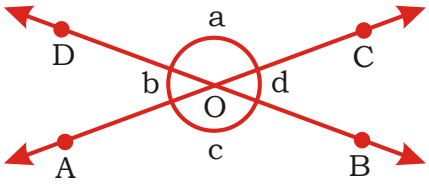
ii) Linear pair:



In the above figure ∠PQS and ∠RQS are adjacent angles, $\overrightarrow{QP}$ and $\overrightarrow{QR}$ are opposite rays.

Such a pair of adjacent angles is called a 'linear pair' (or) the pair of adjacent angles whose non common arms are opposite rays is called a 'linear pair'. Linear pair forms 180°.

iii) Vertically opposite angles: Consider two lines $\overleftrightarrow{AC}$ and $\overleftrightarrow{BD}$ intersecting at 'O'.



Consider the angle ∠a and ∠c. They have a common vertex "O' but do not have common arm. Such angles are called vertically opposite angles. ∠b and ∠d are also vertical opposite angles, which are equal.

iv) Supplementary angles: Two angles are said to be supplementary if the sum of their measure is 180°.

Ans: The measure of the supplementary angle of 20° is 180° – 20° = 160°

Complementary angles: If the sum of the measures of two angles is equal to 90°, then they are called complementary angles.

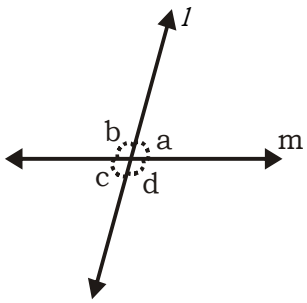
Ans: The measure of the complementary angle of 60° is 90° – 60° = 30°

WORK SHEET - 1

SINGLE ANSWER TYPE

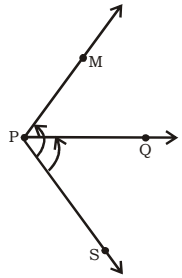
1. Points that don't lie on the same line are called _____
   1) Collinear points 2) Non-Collinear points
   3) Coplaner points 4) Non-Coplanar points
2. If two different lines in a plane have a point in common, then the lines are called
   1) Concurrent lines 2) Intersecting lines
   3) Coplanar lines 4) both (2) & (3)
3. Which of the following statement is true?
   1) A line segment is a set of points
   2) A line segment is always a part of a line
   3) A line segment has two end points
   4) All of the above
4. Of three collinear points A,B, and C), if AB + BC = AC, then we say that
   1) A is between B and C 2) B is between A and C
   3) C is between A and B 4) none of these
5. If A, B and C are three collinear points then which of the following
   1) AB + BC + AC 2) AC – BC = AB
   3) AC – AB = BC 4) All of the above

6. Which of the following statement is false _____
   1) A ray is a part of a line 2) A ray has two end points
   3) A ray is a set of points 4) None of these
7. During the rotation, at one stage two rays becomes opposite rays. Then the angle so formed is called
   1) Zero angle 2) Straight angle 3) Reflex angle 4) No angle can form
8. If the terminal ray coincide with the initial ray without any rotation then the angle formed is
   1) zero angle 2) straight angle 3) complete angle 4) reflex angle
9. An angle whose measure is 90^0 is called
   1) An acute angle 2) Obtuse angle
   3)) Right angle 4) Reflex angle
10. An angle whose measure is 180^0 is called
    1) Right angle 2) Reflex angle 3) Straight angle 4) Obtuse angle
11. Two angles in a plane have the common vertex, a common side and their interiors do not have a common point. Such angles are called
    1) Congruent angles 2) Adjacent angles
    3) Linear angles 4) Supplementary angles
12. If the sum of the measure of two angles is equal to 90^0 they are called
    1) Adjacent angles 2) Complementary angles
    3) Supplementary angles 4) vertically opposite angles
13. If two complementary angles have equal measures, the measure of each angle is
    1) 90^0 2) 45^0 3) 60^0 4) 0^0
14. The measure of an angle is 20^0 more than the measure of its supplement s
    1) 80^0 2) 100^0 3) 70^0 4) 110^0
15. In the given figure, lines 1 and m intersect at a point. If $\angle a = 50^0$, then the measure of $\angle c$ is



    1) 50^0 2) 30^0 3) 60^0 4) 140^0

16. In the adjacent figure, $\angle SPM = 110^0$ & $\angle SPQ = 55^0$ the measure of $\angle MPQ$ is

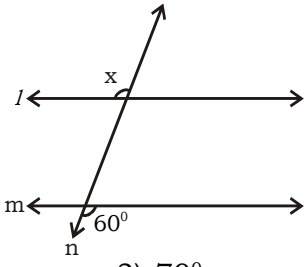


1) 45^0 2) 110^0 3) 55^0 4) 65^0

17. In the given figure, $\angle 1 = 70^0$. If $\overline{AB} \,||\, \overline{CD}$ then $\angle 2 =$

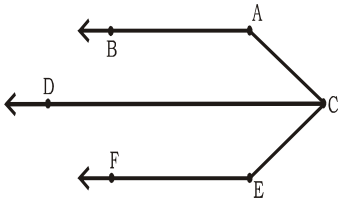
1) 70^0 2) 20^0 3) 110^0 4) 90^0

18. If $l \,||\, m$ and n is the transversal then the value of x is



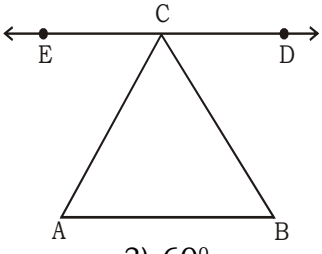
1) 60^0 2) 120^0 3) 70^0 4) 130^0

19. In the adjacent figure, $\overline{AB} \,||\, \overline{CD}$ and $\overline{CD} \,||\, \overline{EF}$. $\overline{CD}$ is the bisector of $\angle ACE$. If $\angle ACE = 80^0$ then the value of $\angle BAC + \angle ACE + \angle CEF$ is



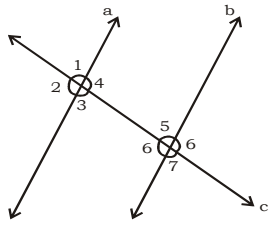
1) 160^0 2) 240^0 3) 180^0 4) 360^0

20. In the following figure, $\overline{DE} \,||\, \overline{AB}$. If $\angle A = 60^0$ & $\angle B = 80^0$, then $\angle ACE + \angle ACB + \angle BCD$ is



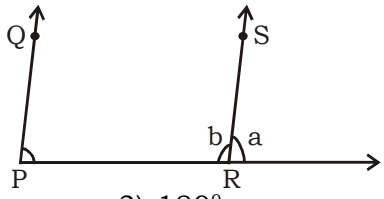
1) 40^0 2) 180^0 3) 60^0 4) 80^0

21. In the adjacent figure a b and c is their transversal. If $\angle I = 45^0$ then $\angle 8$ =



1) 35^0 2) 45^0 3) 145^0 4) 135^0

22. In the adjacent figure $\overline{PQ} \,||\, \overline{RS}$. If $\angle QPR = 60^0$, then $\angle b - \angle a$ =



1) 60^0 2) 120^0 3) 180^0 4) 30^0

MULTI ANSWER TYPE

23. A ray contains
    1) One end point 2) No definite length
    3) Contains infinite number of points 4) Contains finite number of points

24. Which of the following is/are plane figure(s)
    1) Triangle 2) Cube 3) Rectangle 4) Circle

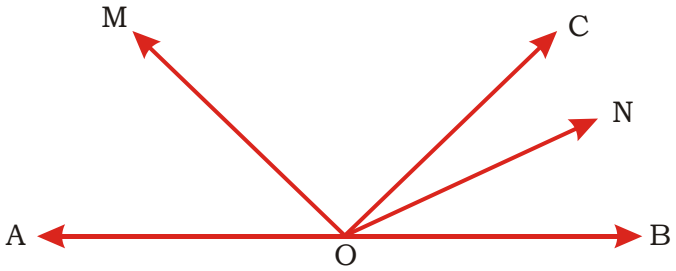
REASONING ANSWER TYPE

25. *Statement-I*: An angle divides the plane into two regions.

    Statement-II: A point in the interior of the angle does not belong to the angle.

    1) Both Statements are true, Statement II is the correct explanation of Statement I.
    2) Both Statements are true, Statement II is not correct explanation of Statement I.
    3) Statement I is true, Statement II is false.
    4) Statement I is false, Statement II is true.

26.



Statement-I: From the diagram $\angle AOC = 100^0$ and OM and ON are bisectors of $\angle AOC$, and $\angle BOC$ respectively, then $OM \perp ON$.

Statement-II: The bisectors of linear pair forms right angle.

1) Both Statements are true, Statement II is the correct explanation of Statement I.
2) Both Statements are true, Statement II is not correct explanation of Statement I.
3) Statement I is true, Statement II is false.
4) Statement I is false, Statement II is true.

COMPREHENSION TYPE

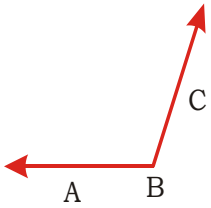
Writeup:1

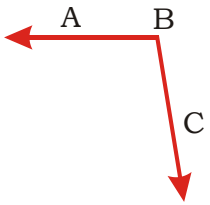
The straight line is generally called as line.Only one straight line is possible through two points on a plane.But we can draw infinite curved line through two points in a plane.

27. Which of the following figure is a straight line?

1) 

2) 

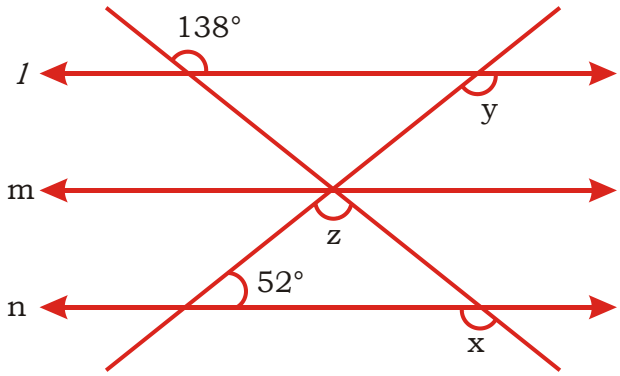
3) 

4) 

28. Two straight lines can't encloses
1) Plane 2) Point 3) Curve 4) Line

29. Number of curves that can be drawn through two points are
1) One 2) Two 3) Infinite 4) Four

Writeup:2



Answer the following from the above diagram

30. The value of X is
1) 52° 2) 138° 3) 90° 4) 69°

31. Valu of Z in degrees is
1) 60° 2) 138° 3) 52° 4) 76°

32. Relation between x and y is
1) Congruent 2) Complementary 3) Supplementary 4) x<y

MATRIX MATCHING TYPE

33.

Column - I	Column - II
a) $90° - x°$	1) Complete angle
b) $180°$	2) Suplement of x
c) $360°$	3) Complement of x
d) $180° - x°$	4) Straight angle
	5) Reflex angle

34.

Column - I	Column - II
a) Vertex of the angle $\angle DEF$ is	1) $\overrightarrow{QP}, \overrightarrow{QR}$
b) In an angle $\angle PQR$ two initial rays are	2) $\overrightarrow{PQ}, \overrightarrow{PR}$
c) In $\angle AEB$ is also represented by angle	3) 2
d) The minimum number of arms required to form an angle is	4) E
	5) 3

INTEGER ANSWER TYPE

35. The angle formed by hands of a clock when the time is 9:00am _____.

SYNOPSIS - 2

LINE SEGMENT: A part of a line with two end points is called a line segment. A line segment whose end points are A and B is denoted by $\overline{AB}$ or $\overline{BA}$.

i. e it has only length but no direction.

A line segment is also a set of infinite points and all the points are in between the end points of the line .

Number of line Segments: If A, B, C, D, E ... are on a line segment $\overline{PQ}$, then the number of line segments determained by the 'n' points lying on $\overline{PQ}$ is $\frac{n(n-1)}{2}$.

Length of a line Segment: The length or measure of a line segment AB is denoted by $\overline{AB}$ and it is a positive number showing the distance between A and B.

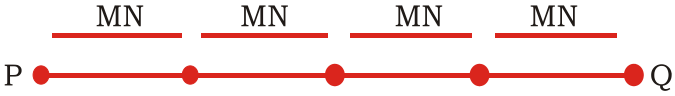
Comparison of line Segments: Two or more line segments can be compared by the virtue of their length. The instruments like ruler, divider, compasscan be used to compare, the line segments.

Congruent line Segments: If the lengths of two line segments is same, then they are called as 'congruent segments'.

i.e. if length of $\overline{AB}$ = length of $\overline{CD}$, then it is denoted by $\overline{AB} \cong \overline{CD}$ where "$\cong$" is the symbol of congruency and read as $\overline{AB}$ is congruent to $\overline{CD}$

Measurement of a line Segment : A line segment can be measured by comparing it with a standard segment called a unit segment. The number of times a unit segment is contained in a given segment is called its measure or length.

Example: A line segment $\overline{PQ}$ is measured by another line segment $\overline{MN}$ of unit measured

i.e 

$\Rightarrow \overline{PQ} = 4\,\overline{MN} = 4$ units.

The basic unit of length in the international system of units (SI) is meter. The other units of length are derived from it as the following :

Unit	Symbol	Relation with meter
Millimeter	mm	$1\text{ mm} = \frac{1}{1000}$ mts
Centimeter	cm	$1\text{ cm} = \frac{1}{100}$ mts
Decimeter	dm	$1\text{ dm} = \frac{1}{10}$ mts
Decameter	dem	1 dem = 10mts
Hectameter	hm	1 hm = 100mts
Kilometer	km	1 km = 1000mts

From the above relation it is noted that

1 cm = 10 mm

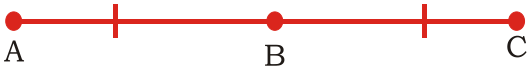
1 dm = 10 cm

1 m = 100 cm = 1000 mm

The instruments like ruler, divider, etc can be used to determine the length of line segments.

The greater lengths like length of claas room, badminton court... etc can be measured by a tape

Betweenness: If A, B and C are any three collinear points and if AB + BC = AC, then we say that B is between A and C. Also if $\overline{AB} = \overline{BC}$ then B is called mid point of $\overline{AC}$. Here B is said to be bisector of $\overline{AC}$



Addition and subtraction of lengths of line segments:

Two line segments of different lengths can be added or subtracted using their measurements.

Example: If AB = 6cm and CD = 4.5 cm then

AB + CD = 6 + 4.5 = 10.5 cm

AB – CD = 6 – 4.5 = 1.5 cm

4 CD – 2 AB = 4 (4.5) – 2 (6)

= 18 – 12 = 6 cm

WORK SHEET - 2

SINGLE ANSWER TYPE

1. A line has _____ end points
   1) One 2) Two 3) No 4) None of these
2. A line extends definitely in _____ directions.
   1) Both 2) Only one direction
   3) Right 4) Left
3. Name the given line :

   1) $\overline{AB}$ 2) $\overline{BC}$ 3) $\overline{BC}$ 4) All of the above
4. Points lying on the same line are called _____
   1) Collinear points 2) Similar points
   3) Coplanar points 4) All
5. No. Of lines can be drawn passing through two different points in a plane is
   1) One 2) Two 3) Infinite 4) No line
6. No. Of curves that can be drawn passing through two points in a plane
   1) One 2) Two 3) Infinite 4) Finite
7. No. Of lines that can be drawn passing through three non collinear points taking two at a time
   1) One 2) Two 3) Three 4) Six
8. No. Of lines that can be drawn passing through three non collinear points taking two at a time
   1) One 2) Two 3) Three 4) Six
9. No. Of lines can we draw passing through three collinear points
   1) One 2) Two 3) Three 4) Infinite
10. The formula for the number of lines joining two points at a time is
    1) $\frac{n(n+1)}{2}$ 2) $\frac{n(n-1)}{2}$ 3) $\frac{n(n-3)}{2}$ 4) $\frac{n(n+3)}{2}$
11. A flat surface extending indefinitely in all directions is called
    1) Plane 2) Line 3) Parallelogram 4) Triangle
12. A plane is a flat surface extending indefinitely in directions
    1) One 2) Two 3) All 4) None
13. No. Of lines can be drawn passing through a given point in a plane.
    1) An Unlimited 2) Only one
    3) Finite 4) None of these
14. Two lines are in the same plane and they are not intersecting. Such lines are called)
    1) Intersecting lines 2) Parallel lines
    3) Non- parallel lines 4) None of these
15. Points belonging to the same plane are called
    1) Collinear points 2) Co-planar points
    3) Non collinear points 4) Intersecting points

16. Lines belonging to the same plane are called
    1) Parallel lines 2) Non - intersecting lines
    3) Intersecting lines 4) Co-planar lines
17. The point through which the concurrent lines pass is called the
    1) Intersecting point 2) Point of concurrence
    3) Collinear point 4) All of the above
18. The set of all points is called _____
    1) Plane 2) Space 3) Surface 4) All
19. Space is set of points.
    1) Finite 2) An Infinite
    3) Collection of 4) None of the above
20. Lines and planes are subsets of
    1) Plane 2) Space 3) Surface Area 4) All
21. Two segments having the same length are called
    1) Equal segments 2) Similar Segments
    3) Congruent segments 4) All of the above
22. If AB = 4.5cm and CD = 2.5cm then the value of 2AB – 3CD is
    1) 2.5cm 2) 2cm 3) 1cm 4) 1.5cm
23. If AB = 8cm and CD = 4.2cm then the value of 4AB + CD/3 is
    1) 3,4cm 2) 16.2cm 3) 18.2cm 4) 33.4cm
24. The line divided into two parts called
    1) Line 2) Line segment 3) Rays 4) All
25. A ray has _____ end point(s)
    1) One 2) Two 3) No end points 4) Infinite
26. Two rays are extending indefinitely in the opposite directions of the same line. Such rays are called
    1) Intersecting rays 2) Opposite rays
    3) Such type of rays does not exist 4) None of these
27. An angle whose measure is greater than 90^0 and less than 180^0 is called
    1) An acute angle 2) An Obtuse angle
    3) Right angle 4) Reflex angle
28. One complete angle = ——— Right angles
    1) 2 2) 4 3) 3 4) 5
29. The magnitude of the angle between the hands of a clock when the time is 3'0 clock
    1) 120^0 2) 150^0 3) 180^0 4) 90^0
30. A ray which divides an angle into two congruent angles is called of the angle
    1) Bisector 2) Congruent 3) Measure 4) None

31. The pair of adjacent angles, whose non common arms are opposite rays is called
    1) A linear pair 2) Adjacent angles
    3) Complementary angles 4) Supplementary angles

32. If two lines intersect, then the angles formed having no common side are called angles
1) Adjacent angles 2) Complementary angles
3) Vertically opposite 4) Supplementary

33. The supplementary angle of 31° is
1) 59^0 2) 139^0 3) 149^0 4) 69^0

34. The complementary angle of 30° is
1) 60^0 2) 150^0 3) 140^0 4) 50^0

35. Angle between two parallel lines is
1)0^0 2)90^0 3) 180^0 4)360^0

36. Angle between two perpendicular lines is
1) 0^0 2) 90^0 3) 270^0 4) 180^0

37. The coplanar lines which do not intersect are called
1) Parallel lines 2) Perpendicular lines
3) Non Intersecting lines 4) none

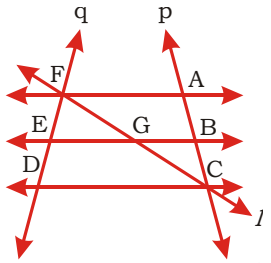
38. A line which intersects two or more given lines at different points is called to the given lines.
1) Parallel 2) Perpendicular 3) Transversal 4) Equal

39. 1, m and n are lines n a plane if $l \| m$ and $m \| n$ then
1) $l \| n$ 2) $n \| l$ 3) $l \| n \| m$ 4) All

40. If $l \perp n$ and $m \perp n$ then
1) $l \perp n$ 2) $l \perp m$ 3) Both 1 & 2 4) None

MULTI ANSWER TYPE

41. A, B, C are collinear if and only if
1) AB + BC = AC 2) BC = AB + AC 3) AB = BC + AC 4) 42. In the given figure, collinear points are _____



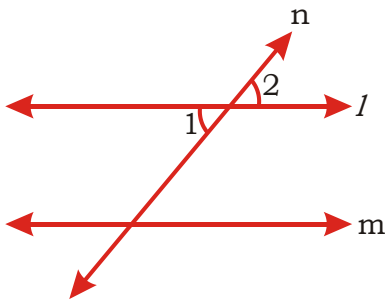
1) A, B, C 2) D, E, F 3) F, G, C 4) D, G, B

REASONING ANSWER TYPE

43. *Statement-I:* If AX = 0.3 cm, XB = 4cm, AB = 3.7 cm then A, B, X are called collinear.
Statement-II: The lines which belong to the same plane are called non - coplanar lines.
1) Both Statements are true, Statement II is the correct explanation of Statement I.
2) Both Statements are true, Statement II is not correct explanation of Statement I.
3) Statement I is true, Statement II is false.
4) Statement I is false, Statement II is true.

44. *Statement-I*: In the given figure *l*, m are parallel lines and n is a transversal, then $\angle 1 = \angle 2$.

Statement-II: In the given figure *l* is parallel to m and vertically opposite angles are equal.



1) Both Statements are true, Statement II is the correct explanation of Statement I.

2) Both Statements are true, Statement II is not correct explanation of Statement I.

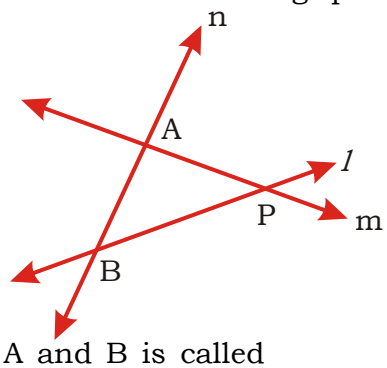
3) Statement I is true, Statement II is false.

4) Statement I is false, Statement II is true.

COMPREHENSION TYPE

Writeup:1

By using given figure answer the following questions



45. The distance between A and B is called

1) $\overline{AB}$ 2) Intercept

3) Length of the line AB 4) None

46. The line 'n' is called

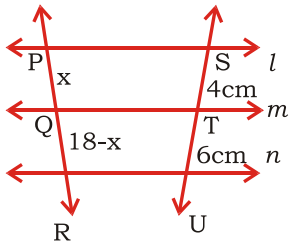
1) Transversal 2) Intersecting lines

3) Parallel line 4) Perpendicular line

47. The lines *l* and m intersecting at

1) A 2) B 3) P 4) Q

Writeup:2



In the given figure $l//m//n$ and PR, SU are transvesals

PR = 18 cm, UT = 6 cm, TS = 4 cm

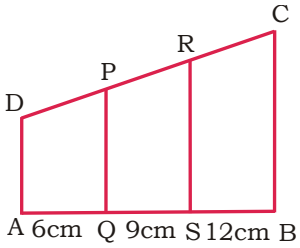
48. The length of QR is
    1) 10.8 cm 2) 5.8 cm 3) 5 cm 4) 4.2 cm
49. The length of PQ
    1) 28.8 cm 2) 7.2 cm 3) 11 cm 4) 132 cm
50. The value of PR + UT is
    1) 20 cm 2) 22.8 cm 3) 24 cm 4) 22 cm

MATRIX MATCHING TYPE

51.

Column - I	Column - II
a) Maximum number of points of intersection at three different lines is	1) Infinite
b) Three points P, Q and R are collinear, if PR + RQ = PQ the point lies between P and Q	2) 3
c) If l ||n and m||n then	3) R
d) Coincident lines have common points	4) l||m

52. In the given figure, AD || PQ || RS || BC. If CD = 30 cm.



Column - I	Column - II
a) the length of DP is	1) $6\frac{2}{3}$cm.
b) the length of PR is	2) $13\frac{1}{3}$cm.
c) the length of RC is	3) 10 cm.
d) CR – DP =	4) 8 cm.
	5) 9 cm.

INTEGER ANSWER TYPE

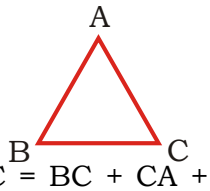
53. The sum of adjacent angles in a linear pair is _____.

SYNOPSIS - 3

Introduction: A simple closed figure bounded by line segments is called a Polygon.

Triangle: A polygon with three sides is called a triangle. The symbol for triangle is 'Δ'

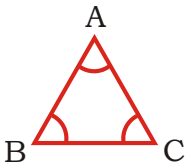
Perimeter of the traiangle: The sides are $\overline{AB}, \overline{BC}, \overline{CA}$. The sum of the measures of $\overline{AB}, \overline{BC}$ and $\overline{CA}$ is called the perimeter of the triangle.



Perimeter of the triangle ABC = BC + CA + AB.

Angles of the triangle: Observe the figure $\overline{BA}$ and $\overline{BC}$ are two line segment having the same end point B, which forms an angle. This angle is '$\underline{|B}$'.

Similarly $\underline{|C}$ and $\underline{|A}$ are the other two angles.



$\therefore$ A triangle has three sides and three angles.

Totally these six are called six components (or) six parts of a triangle.

Note: The sum of the measures of the angles of a triangle is 180°.

INTERIOR AND EXTERIOR OF A TRIANGLE

a) Interior of a triangle: A point is said to be interior of a triangle, if it lies inside the triangle.

b) Lies on a triangle: A point lies on a triangle, if it lies on any one of its sides.

c) Exterior of a triangle: A point lies in the outside of a traingle, if it lies in the plane of the triangle, but neither on the triangle nor in the interior.

Note: A triangle divides a plane in which it lies into three parts.

CLASSIFICATION OF TRIANGLES

a) Classification of triangles according to the sides:

1) Equilateral triangle: A triangle whose sides are equal in length is called an 'equilateral triangle'. All the angles in the equilateral triangle are equal.

2) Isosceles triangle: A triangle in which two sides are equal in length is called 'Isosceles triangle'. In an isosceles triangle the unequal side is called the base of the triangle. The base angles of an isosceles triangle are congruent.

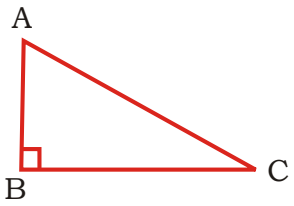
Note: Every equilateral triangle is isoceles.

3) Scalene triangle: If no two sides of a triangle are equal in length, it is called a Scalene triangle.

b) Classification of triangles according to the angles:

1) Acute angled triangle: If each angle of a triangle is an acute angle, then it is called an 'Acute angled triangle'. Measure all angles and observe all are less than 90°.

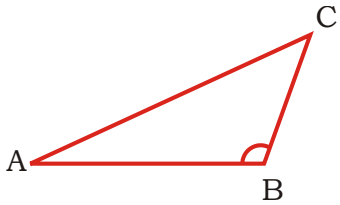
2) Right angled triangle: A triangle in which one of its angles is a right angle is called 'Right angled triangle'



In this triangle $\angle B = 90°$, therefore it is a right angled triangle.

In a right angled triangle, the opposite side of the right angle is called 'Hypotenuse'.

3) Obtuse angled triangle: A triangle containing an obtuse angle is called obtuse angled triangle.



In the figure $\angle B > 90°$, so it is an obtuse angled triangle.

CONCURRENT LINES IN A TRIANGLE:

Median: A line segment which joins a vertex of a triangle to the mid point of the opposite side is called median. The number of such line segments that can be drawn in the triangle are three. The median which joins the vertex A of a triangle to the mid point of side a is denoted by M_a it is given, in terms of the sides of a triangle, the formula $M_a = \frac{1}{2}\sqrt{2b^2 + 2c^2 - a^2}$

Altitude: The perpendicular drawn from any vertex of the triangle to the opposite side or its extension is called altitude. The number of such line segments that can be drawn in the triangle are 3.

Note: In an obtuse angled triangle, two altitudes fall on the extensions of the sides outside the triangle, and the third altitude falls inside the triangle. In an acute angled triangle all three altitudes lie within the triangle. In a right angled triangle the legs serve as altitudes.

Perpendicular bisector: The line passing through the mid point of the side and perpendicular to the same side is called perpendicular bisector. The number of such lines that can be drawn in the triangle are 3.

Angular bisector: An angular bisector of triangle is the line segment which divides any angle into two equal halves.

Concurrent lines: Three or more lines passing through the same point are called concurrent lines. That common point is called point of concurrence.

1. **Centroid:** The point of concurrence of the medians of a triangle is called centroid. It is denoted by 'G'

Note: 'G' divides AD in the ratio 2:1.

2. **Orthocentre:** The point of concurrence of the altitude of a triangle is called orthocentre. It is denoted by 'O' (or) 'H'

3. **Circumcentre:** The point of concurrence of perpendicular of the sides of a triangle is called circumcentre. It is denoted by 'S'.

Note: Circumcentre is equidistance to its vertices.

In a right angle triangle 's' is the mid point of the hypotenuse.

S.No.	Type of Triangle	Position of circum centre
1.	Acute	Interior of the triangle
2.	Obtuse	Exterior of the triangle
3.	Right	Mid point of hypotenuse

4. **Incentre:** The point of concurrent of internal angular bisectors of a triangle is called incentre. It is denoted by 'I'.

Note: Incentre is equi distance to its sides.

5. **Excentre:** The point of concurrence of internal bisector of one angle and the external bisectors of other two angles is called excentre.

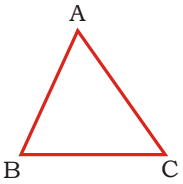
Note: A triangle has three ex-centres.

Properties of triangles:

I. Inequalities of a triangle:

1. The sum of the lengths of any two sides of a triangle is greater than the length of the third side.
2. The difference of the lengths of any two sides of a triangle is smaller than the length of the third side.

In the adjacent triangle ABC



3) In the adjacent triangle ABC,

(i) $AB + AC > BC$, $AC + BC > AB$, $BC + AB > AC$ (OR)
$c + b > a$, $b + a > c$, $a + c > b$

(ii) $AB - AC < BC$, $AC - BC < AB$, $BC - AB < AC$ (OR)
$c - b < a$, $b - a < c$, $a - c < b$

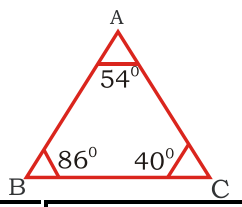
Example:- Can the following be the measures of the sides of triangle ?
7 cm,12 cm,13 cm

Sol:- Here, $7 + 12 = 19 > 13$; $12 + 13 = 25 > 7$; $7 + 13 = 20 > 12$.
Also, $12 - 7 = 5 < 13$; $13 - 12 = 1 < 7$; $13 - 7 = 6 < 12$.
So, 7 cm,12 cm,13 cm are the sides of a triangle.

II. Relation between sides and angles of a triangle:

1. In a triangle, the angle opposite to longer side is the greatest angle.
2. In a triangle, the angle opposite to shorter side is the smallest angle.
3. Example:- Consider the triangle ABC, clearly $\angle C < \angle A < \angle B$, then

AC is the longest side and AB is smallest side.



Note:

1) No two angles of a scalene triangle are congruent.

2) In a right angle triangle hypotenuse is the longest side and it is opposite to right angle.

3) In a right angle triangle, angles other than right angle are smaller than 90°.

4) Exterior angle of a triangle is equal to sum of its interior opposite angles greater than each of its interior opposite angles.

5) In an equilateral triangle , all the three angles are congruent and each angle is 60^o

6) In an isosceles triangle , two of the angles are congruent and the sides opposite to congruent angles are congruent.

WORK SHEET - 3

SINGLE ANSWER TYPE

1. In a triangle ABC, $\angle A = 60$ and AB = AC then the triangle ABC is _____
   1) Equilateral 2) Isosceles 3) Both a & b 4) None
2. A simple closed figure bounded by line segment is called a
   1) Segment 2) polygon 3) line 4) ray
3. A polygon with three sides is called
   1) Parallelogram 2) pentagon
   3) decagon 4) triangle
4. A point lies on a triangle if it lies on any one of its
   a) Sides b) angles c) both (1) and (2) d) neither (a) or (b)
5. A triangle divides a plane in sets of points
   a) Two b) three c) four d) one
6. A triangle has six components namely
   a) 4 sides, 4 angles b) 2 sides, 2 angles
   c) 5 sides, 5 angles d) 3 sides, 3 angles
7. Sum of the angles of a triangle.
   a) 360^0 b) 180^0 c) 540^0 d) 1080^0
8. A triangle in which all sides are equal
   a) E equilateral b) Isosceles
   c) scalene d) none of these
9. A Triangle in which two sides are equal is called an
   a) Equilateral b) Isosceles c) scalene d) none of these
10. In isosceles triangle the unequal side is called _____ of triangle
    a) Base b) angle c) both (a) and (b) d) height
11. The base angles of a Isosceles triangle are
    a) congruent b) not congruent c) both (a) & (b) d) unequal
12. If each angle of a triangle is less than 90° it is called angled triangle
    a) Acute b) obtuse c) right d) none
13. In a triangle if one of the angles is 90° it is called angled triangle
    a) acute b) Right c) obtuse d) none

14. In triangle ABC $\angle A = 80^0$, $\angle B = 70^0$, $\angle C$ = ?
    a) 30^0 b) 40^0 c) 20^0 d)50^0
15. No. of obtuse angles can triangle have
    a) one b) two c) Three d) Four
16. Can a triangle have two right angles?
    a) No b) Yes c) both d) None
17. A triangle having 90^0, 45^0 angles, then the triangle is
    a) Right angled isosceles triangle b) acute angled
    c) obtuse angled d) None
18. A triangle having $100^0.60^0.20^0$ angles then the triangle is
    a) obtuse angled b) Right angled
    c) acute angled d) None
19. A Triangle having 45^0,55^0,80^0 angles is called
    a) Acute angled b) obtuse angled
    c) Right angled d) None
20. The sides are 15cm, 8crn, 4cm. can you form a triangle?
    a) No b) Yes c) both d) None
21. Sum of any two sides in a triangle is _____ than third side
    a) greater b) less c) equal d) both (a)&(b)
22. If two sides of a triangle are unequal the measure of the angle opposite to the longer side is then the measure of an angle opposite to the shorter side
    a) greater b) bigger c) both (a) and (b) d) smaller
23. If two angle of a triangle are unequal, then the side opposite to the greater angle is then the side opposite to smaller angle.
    a) longer b) shorter c) smaller d) both (b) & (c)
24. Each angle of an equilateral triangle is _____
    a) Congruent b) equal c) unequal d) both (a) & (B)
25. The side opposite to right angle is called _____
    a) hypotenuse b) adjacent side c) opposite side d) small side
26. In the triangle PQR $\angle P = \angle Q, \angle R = 60^0$ then the triangle PQR is
    a) scalene b) isosceles c) acute angled d) equilateral
27. The sum of lengths of sides is called its
    a) perimeter b) volume c) area d) both a & b
28. Perimeter of a triangle ABC is
    a) BC+CD+AB b) a+b+c c) both a & b d) a b c
29. If measure of three angles of a triangle are X – 2, X + 6, x + 8 then the angles are
    a) 54^0, 62^0, 64^0 b) 53^0, 63^0, 66^0
    c) 53^0, 36^0, 64^0 d) 57^0, 63^0, 60^0
30. Which of the following are false?
    I) Every equilateral triangle is an Isosceles Triangle
    II) A triangle can have two obtuse angles
    III) A triangle must have three acute angles

a) I & II b) II & III c) III & I d) I, II, III

31. If 2x, x 3x are angles of a triangle, then the angles are
a) 60^0, 30^0, 80^0 b) 60^0, 30^0, 90^0
c) 50^0, 40^0, 90 d) 60^0,60^0,60^0

32. If 3x – 5, x + 10 4x + 5 are angles, find the angles ?
a) $58\frac{3^0}{4},31\frac{1^0}{4},90^0$ b) $58^0,32^0,90^0$
c) $90^0,1^0,90^0$ d) $49^0,71^0,60^0$

WORK SHEET – 1 (KEY)

1) 2	2) 4	3) 4	4) 2	5) 4
6) 2	7) 2	8) 1	9) 3	10) 3
11) 2	12) 2	13) 2	14) 2	15) 1
16) 3	17) 3	18) 1	19) 4	20) 2
21) 4	22) 1	23) 1,2,3	24) 1,3,4	25) 4
26) 1	27) 1	28) 1	29) 3	30) 2
31) 4	32) 1	33) (2,3)(3,5) (1,2), (2)	34) 4,1,4,3	35) 90

WORK SHEET – 2 (KEY)				
1) 3	2) 1	3) 4	4) 1	5) 1
6) 3	7) 3	8) 1	9) 2	10) 1
11) 3	12) 1	13) 2	14) 2	15) 4
16) 2	17) 2	18) 2	19) 2	20) 4
21) 4	22) 3	23) 3	24) 1	25) 2
26) 3	27) 2	28) 2	29) 4	30) 1
31) 1	32) 3	33) 3	34) 1	35) 1
36) 2	37) 1	38) 3	39) 4	40) 2
41) 1,2,3	42) 1,2,3	43) 3	44) 1	45) 2
46) 1	47) 3	48) 1	49) 2	50) 3
51) 1,3,4,1	52) 1,3,2,1	53) 180		

WORK SHEET – 3 (KEY)				
1) 1	2) 2	3) 4	4) 1	5) 2
6) 4	7) 2	8) 1	9) 2	10) 1
11) 1	12) 1	13) 2	14) 1	15) 1
16) 1	17) 1	18) 1	19) 1	20) 1
21) 1	22) 3	23) 1	24) 2	25) 1
26) 4	27) 1	28) 4	29) 1	30) 2
31) 2	32) 1			