

CHAPTER – 5

LINES AND ANGLES

Class- 7

Module- $\frac{1}{3}$

- **INTRODUCTION:**
- **Point-** It has no length, breadth and height, it has only the position.
- A point can be drawn by using the sharp end of a pencil. It is named by using a capital letter.
- Such that. A It is called point A.

- **Line segment-** Line segment is made of infinite numbers of points. It has two end points. It has a definite length, so we can measure it.



- It is named as \overline{AB} .

- **Line** - If two end points of a line segment are extended up to infinity in both the directions, then it is called a line. It has no end points. Line does not have a definite length, so cannot be measured.
- It cannot be drawn, but we can represent it by the following way.

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- It is named as \overleftrightarrow{PQ} .

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- Line is also named by using a small letter. line m .

- **Ray**- If one end point of a line segment is extended up to infinity only in one direction then it is called a ray.

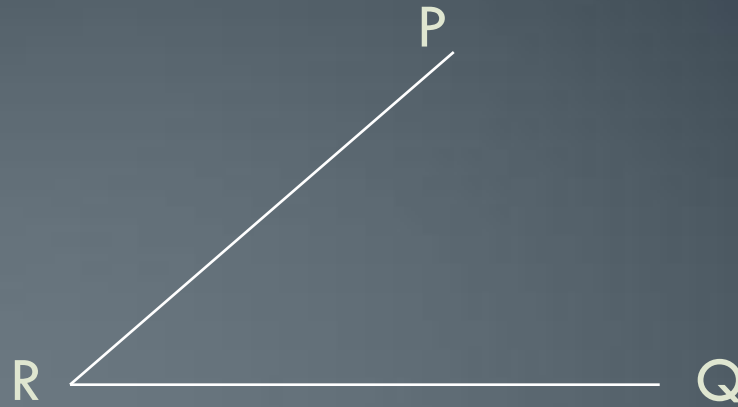
- A \longrightarrow B

- It is named as \overrightarrow{AB}

- A \longleftarrow B

- It is named as \overrightarrow{BA}

- **Angle** – When two rays, two line segments or two lines meet together at a point, then the inclination made by them is called an angle.
- It has two arms and a vertex. The point of intersections of two line segment or rays or lines is called vertex.



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- It is named as $\angle PQR$ or $\angle RQP$, vertex should always be at the middle of three letters

- On the basis of the measure of the angles we can divide it into the following categories-
- **Acute angle** – The angle whose measure is greater than 0° and less than 90° is called an acute angle.
- Example –
 $1^{\circ}, 20^{\circ}, 60^{\circ}, 75^{\circ}, 89^{\circ}, 89.999^{\circ}$ -----

- **Obtuse angle-** The angle whose measure is greater than 90° and less than 180° is called an obtuse angle
- **Example-**
 $90.5^{\circ}, 91^{\circ}, 100^{\circ}, 110^{\circ}, 120^{\circ}, 150^{\circ}, 170^{\circ}$
 $, 179.9^{\circ}$ -----
- **Right angle –** The angle whose measure is 90° is called a right angle.

- **Straight angle** – The angle whose measure is 180° is called a straight angle.
- **Complete angle** – The angle whose measure is 360° is called a complete angle.
- **Reflex angle** – The angle whose measure is greater than 180° and less than 360° is called a reflex angle.
- **Example-**
 $181^{\circ}, 190^{\circ}, 198^{\circ}, 200^{\circ}, 270^{\circ}, 300^{\circ}, 320^{\circ}$ etc.

- **RELATED TO ANGLES –**
- **COMPLEMENTARY ANGLES –**
- If the sum of two angles is 90° , then they are said to be complementary angles, and one angle is complement to each other.
- Example- 60° and 30° are complementary angles.
- $60^{\circ} + 30^{\circ} = 90^{\circ}$. 60° is complement of 30° and 30° is complement of 60° .

- Q1. Are 50° and 45° complementary angles?
- $50^{\circ} + 45^{\circ} = 95^{\circ}$
- No, they are not complementary angles as their sum is more than 90° .

- Q2. Are 30° and 55° complementary angles?
- $30^{\circ} + 55^{\circ} = 85^{\circ}$
- No, they are not complementary angles as their sum is less than 90° .

- Q3. Can two acute angles be complement to each other?
- Yes, as the measure of acute angle is less than 90° , so the sum of some acute angles may be 90° .
- Example. 60° and 30° are complementary angles. $60^{\circ} + 30^{\circ} = 90^{\circ}$. Like this many pairs are there whose sum is 90° .

- Q4. Can two obtuse angles be complement to each other?
- No, as the measure of obtuse angle is more than 90° and less than 180° , so the sum of two obtuse angles is always more than 90° .
- Q5. What is the measure of the complement of 55° ?
- Let the complement of $55^{\circ} = x$
- So, $x + 55^{\circ} = 90^{\circ}$
- $x = 90^{\circ} - 55^{\circ} = 35^{\circ}$

- Q6. Find the angle which is equal to its complement?
- Let one of the equal angles = x
- $x + x = 90^{\circ}$
- $2x = 90^{\circ}$
- $x = \frac{90^{\circ}}{2} = 45^{\circ}$

- **SUPPLEMENTARY ANGLES –**
- If the sum of two angles is 180° , then they are said to be supplementary angles, and one angle is supplement to each other.
- Example- 70° and 110° are supplementary angles.
- $70^{\circ} + 110^{\circ} = 180^{\circ}$. 70° is supplement of 110° and 110° is supplement of 70° .

- Q1. Are 150° and 45° supplementary angles?
- $150^\circ + 45^\circ = 195^\circ$
- No, they are not supplementary angles as their sum is more than 180° .
- Q2. Are 30° and 145° supplementary angles?
- $30^\circ + 145^\circ = 175^\circ$
- No, they are not supplementary angles as their sum is less than 180° .

- Q3. Can two acute angles be supplement to each other?
- No, as the measure of acute angle is less than 90° , so the sum of two acute angles is always less than 180° .

- Q4. Can two obtuse angles be supplement to each other?
- No, as the measure of obtuse angle is more than 90° and less than 180° , so the sum of two obtuse angles is always more than 180° .

- Q5. What is the measure of the supplement of 85° ?
- Let the supplement of $85^{\circ} = x$
- So, $x + 85^{\circ} = 180^{\circ}$
- $x = 180^{\circ} - 85^{\circ} = 95^{\circ}$.

- Q6. Find the angle which is equal to its supplement?
- Let one of the equal angles = x
- $x + x = 180^{\circ}$
- $2x = 180^{\circ}$
- $x = \frac{180^{\circ}}{2} = 90^{\circ}.$

- **What we have learnt?**
- a.Point: It has only the position.
- b.Line segment: It has two end points and has a definite length.
- c.Line: It does not have any end points and it can be extended up to infinity in both the directions.

- d. Ray: It has one end point and it can be extended up to infinity in one direction only.
- e. Angle: When two line segments or rays meet together, then the inclination made by them is called an angle.
- f. Complementary angles: Two angles whose sum is 90° are called complementary angles.
- g. Supplementary angles: Two angles whose sum is 180° are called supplementary angles.

- **ASSIGNMENTS -**
- 1.Fill in the blanks:-
- (a) The sum of two complementary angles is ----- .
- (b) The sum of two supplementary angles is ----- .

- (c) The angle which is equal to its complement is ----- .
- (d) The angle which is equal to half of its supplement is -----.
- (e) The angle whose measure is 90° is called ----- angle.

- 2. Check whether the following pair of angles are complementary angles:
 - (a) 47° and 43°
 - (b) 65° and 35°
 - (c) 56° and 24°
 - (e) 70.5° and 19.5°

- 3. Check whether the following pair of angles are supplementary angles:
 - (a) 145° and 43°
 - (b) 105° and 75°
 - (c) 67° and 74°
 - (e) 170.5° and 9.5°

- 4. Find the angle which is double of its complement?
- 5. Find the angle which is two-third of its complement.
- 6. Find the angle which is double of its supplement?
- 7. Find the angle which is one-third of its supplement?

• G.P.JANA,AECS-2,TARAPUR