
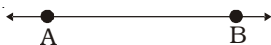


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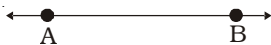
LINES AND ANGLES

- **Point:** A fine dot made by a sharp pencil on a sheet of paper. 

- **Line:** Fold a piece of paper, the crease in the paper represents a line. A line can be extended to any length on both sides. It has no end points. A line has no breadth and named using any two points on it i.e. \overleftrightarrow{AB} or by a single small letter l or m or n etc.

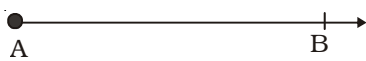


- **Line Segment :** The portion of the line between two points A and B is called a line segment and will be named \overline{AB} or \overline{BA} . A line segment has two end points.

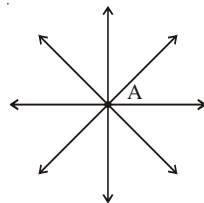


- **Ray :** A line segment AB when extended in one direction. It is denoted by \overrightarrow{AB} .

Ray has one end point, called the initial point.



- **Plane :** A flat surface, which extends indefinitely in all directions e.g. surface of smooth wall, sheet of a paper etc.
- An infinite number of lines can be drawn through a point. All lines are called concurrent lines.

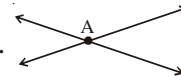


- One and only one line can be drawn passing through two given points.

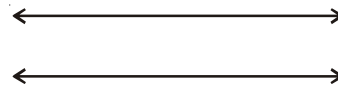


- If a line can pass through three or more points, then these points are said to be collinear otherwise points are non-collinear.

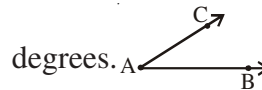
- Two distinct lines can not have more than one point in common.



- Two lines in the same plane are called parallel lines if both have no points in common or if the distance between the lines is same every where



- Angle is formed by two rays with a common initial point called vertex and measured in



- **Acute angle :** An angle whose measure is less than 90° .

- **Right angle :** An angle whose measure is 90° .



- **Obtuse angle :** An angle whose measure is more than 90° but less than 180° .



- **Straight angle :** An angle whose measure is 180° .



- **Reflex angle :** An angle whose measure is more than 180° and less than 360° .



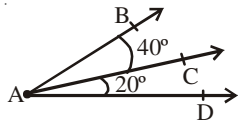
- Two lines or rays making a right angle with each other are called perpendicular lines.



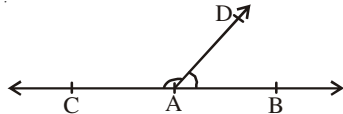
- **Complementary angles :** Two angles are said to be complementary to each other if the sum of their measures is 90° .

- **Supplementary angles :** Two angles are said to be supplementary if the sum of their measures is 180° .

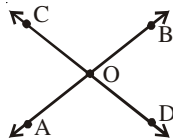
- **Adjacent angles :** Two angles having a common vertex, a common arm and non common arms on opposite sides of the common arm. $\angle BAC$ and $\angle CAD$ are a "pair of adjacent angles".



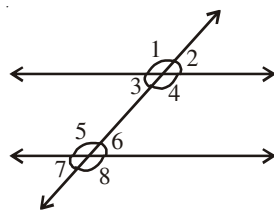
- **Linear Pair** : If AB and AC are opposite rays and AD is any other ray then $\angle BAD$ and $\angle CAD$ are said to form a linear pair.



- **Vertically opposite angles** : Two angles are called a pair of vertically opposite angles, if their arms form two pairs of opposite rays. $\angle AOC$ and $\angle BOD$, $\angle AOD$ and $\angle COB$ are pairs of vertically opposite angles.



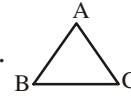
- When a transversal intersects two parallel lines, then
 - each pair of corresponding angles are equal.
 - each pair of alternate angles are equal.
 - each pair of interior angles on the same side of the transversal are supplementary.
 For example :
 - $\angle 2 = \angle 6$, $\angle 3 = \angle 7$
 - $\angle 3 = \angle 6$ and $\angle 4 = \angle 5$
 - $\angle 3 + \angle 5 = 180^\circ$ and $\angle 4 + \angle 6 = 180^\circ$



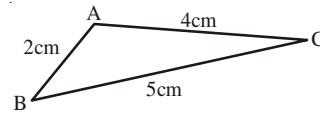
- When a transversal intersects two lines in such a way that
 - any pair of corresponding angles are equal

or (ii) any pair of alternate angles are equal
or (iii) any pair of interior angles on the same side of transversal are supplementary, then the two lines are parallel.

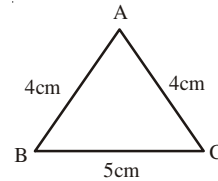
- **Triangle** : A plane figure bounded by three line segments.



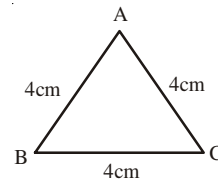
- **Scalene Triangle** : A triangle in which all the sides are of different lengths.



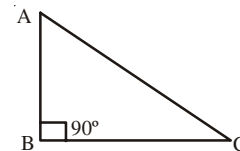
- **Isosceles Triangle** : A triangle having two sides equal.



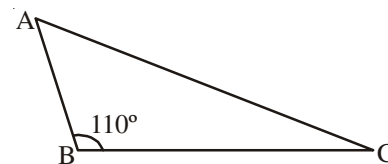
- **Equilateral Triangle** : A triangle having all sides equal.



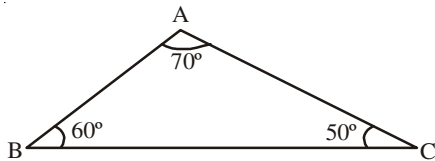
- **Right-angled Triangle** : A triangle in which one of the angles is right angle.



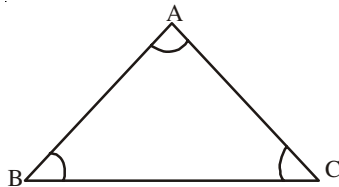
- **Obtuse angled triangle** : A triangle in which one of the angles is obtuse angle.



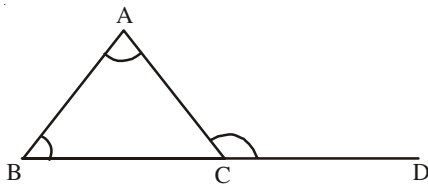
- **Acute angled triangle :** A triangle in which all the three angles are acute.



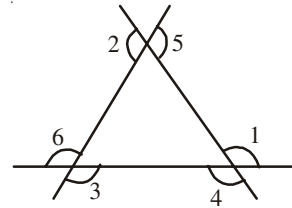
- The sum of the three interior angles of a triangle is 180° .
 $\angle A + \angle B + \angle C = 180^\circ$



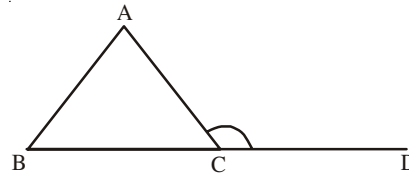
- The angle formed by a produced side of the triangle and another side of the triangle is called an exterior angle of the triangle.
 $\angle ACD$ is an exterior angle.



or $\angle 1, \angle 2, \angle 3, \angle 4, \angle 5$ and $\angle 6$ all are exterior angles.



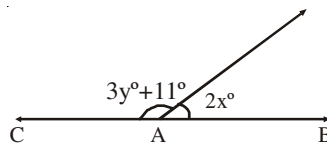
- Interior opposite angles are the angles of the triangle not forming a linear pair with the given exterior angle.
- An exterior angle of a triangle is equal to the sum of the two interior opposite angles.
 $\angle ACD = \angle ABC + \angle BAC$



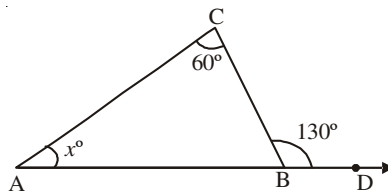
- Locus of a point moving under certain conditions is the path or the geometrical figure, every point of which satisfies the given conditions.
- The locus of a point equidistant from two given points is the perpendicular bisector of the line segment joining two points.
- The locus of a point equidistant from two intersecting lines is the pair of lines, bisecting the angles formed by the given lines.

CHECK YOUR PROGRESS

1. In figure AB and AC are opposite rays, if $x = 32^\circ$, then value of y is :
 A. 45° B. 32° C. 35° D. 105°

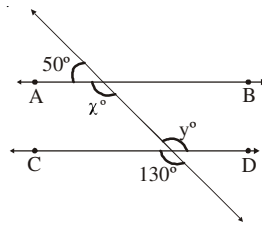


2. In given figure value of x is:

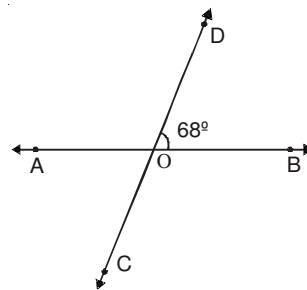


- A. 45° B. 130° C. 30° D. 70°

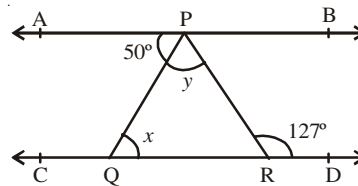
3. In the figure, if $AB \parallel CD$ then values of x & y respectively are:



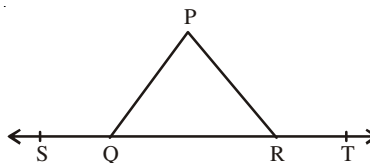
- A. $130^\circ, 130^\circ$ B. $130^\circ, 50^\circ$ C. $50^\circ, 130^\circ$ D. $50^\circ, 50^\circ$
4. In figure value of $\angle COB$ is



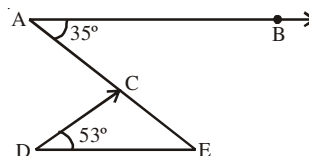
- A. 36° B. 68° C. 112° D. 12°
5. The angles of a triangle are in the ratio 1:2:3, the smallest angle of triangle is :
- A. 30° B. 60° C. 90° D. 6°
6. In the fig., if $AB \parallel CD$, $\angle APQ = 50^\circ$ and $\angle PRD = 127^\circ$, find x any y .



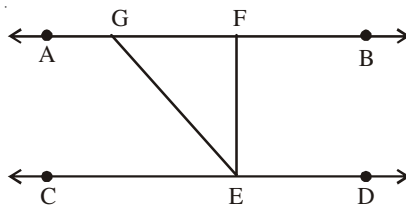
7. In fig. if $\angle PQR = \angle PRQ$, then prove that $\angle PQS = \angle PRT$.



8. Prove that the sum of all interior angles of a triangle is 180° .
9. In fig. if $AB \parallel DE$, $\angle BAC = 35^\circ$ and $\angle CDE = 53^\circ$ find $\angle DCE$.

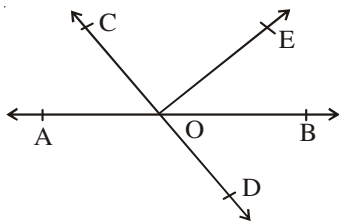


10. In fig., if $AB \parallel CD$, $EF \perp CD$ and $\angle GED = 126^\circ$ find $\angle AGE$, $\angle GEF$ and $\angle FGE$.

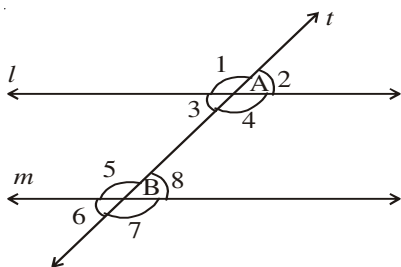


STRETCH YOURSELF

1. In fig., lines AB and CD intersect at O. If $\angle AOC + \angle BOE = 70^\circ$ and $\angle BOD = 40^\circ$ find $\angle BOE$ and reflex $\angle COE$.



2. In fig. $l \parallel m$ and transversal 't' intersects l and m at A and B respectively. If $\angle 1 : \angle 2 = 3 : 2$, determine all the eight angles.



ANSWERS

CHECK YOUR PROGRESS :

- C
- D
- A
- C
- A
- $x = 50^\circ, y = 77^\circ$
- 92°
- $\angle AGE = 126^\circ, \angle GEF = 36^\circ, \angle FGE = 54^\circ$

STRETCH YOURSELF :

- $\angle BOE = 30^\circ, \text{Reflex } \angle COE = 250^\circ$
- $\angle 1 = 108^\circ, \angle 2 = 72^\circ, \angle 3 = 72^\circ, \angle 4 = 108^\circ, \angle 5 = 108^\circ, \angle 6 = 72^\circ, \angle 7 = 108^\circ, \angle 8 = 72^\circ$