Geometry

Polygon: Two types of angle

- 1. Exterior
- 2. Interior
- 1. Exterior Angle: Sum of exterior Angle of the polygon is 360°,

If the polygon is regular polygon then each exterior angle is $\frac{360^{\circ}}{n}$, where 'n' is number of sides.

Interior Angle: Sum of the interior angle of the polygon is $(n - 2) \times 180$.

If the polygon is regular polygon then each interior angle is equal to $\frac{(n-2)180}{n}$ Number of diagonals of the polygon $=\frac{n\times(n-3)}{2}$

2. Vertical opposite angle always be same



 $-: \angle 1 = \angle 3$ and $\angle 1 + \angle 2 = 180^{\circ}$

 $-: \angle 2 = \angle 4$ and $\angle 3 + \angle 4 = 180^{\circ}$

3. Corresponding angles:

∠ 4 + ∠ 5 = 180°

 $\angle 3 + \angle 6 = 180^{\circ}$



4. Sum of 2 interior angle opposite to exterior angle



5. In the given fig. AB = AC, then AD which is median of the triangle also be height of triangle



• In the given fig. ABCD is a cyclic quadrilateral.



 $\angle A + \angle C = 180^{\circ}$ (opp. Angle)

∠ B + ∠ D = 180°

 \Rightarrow opposite interior angle is equal to exterior angle.

• Centres of the triangle:

Type of centres:

- Centroid
- Incentre
- Circum-centre
- Ortho centre

(1) Centroid: Intersecting points of the medians of triangle is known as centroid of the triangle.



Area of \triangle ABD = \triangle ACD

AG : GD = 2 : 1

Area of \triangle BGC = \triangle AGC = \triangle AGB

Area of \triangle nzGY : \triangle ABC

2:36

1:18

Example: PS is the median of a triangle PQR and O is centroid such that PS = 27 cm. The length of PO is

Sol. PS is the median and O is the centroid — (given)

PS = 27 cm

Ratio of PO : OS

(2) Incentre: Intersecting points of angle bisector of triangle is known as Incentre of the triangle



Ix = Iy = Iz = radius



Example: O is the incentre of triangle PQR, \angle PQR = 70° and \angle PRQ = 60°, Then find the value of \angle QOR.

Sol. Acc. to Question



QO and RO are the angle bisector

 $\therefore \angle RQO = 35^{\circ} \text{ and } \angle QRO = 30^{\circ}$

In \triangle QOR, \angle RQO + \angle QRO + \angle QOR = 180°

 $35^\circ + 30^\circ + \angle QOR = 180^\circ$

 \angle QOR = 180° - 65° \Longrightarrow 115°

(3) Circum-centre: Intersecting point of the perpendicular bisector of triangle is known as circum-centre of the triangle



AO = OB = OC = Radius

 $\angle BOC = 2 (\angle BAC)$

In right $\angle \Delta$ circum-centre is formed on the mid-point of hypotenuse.



(4) Ortho-centre: intersecting points of the altitudes of triangle is known as orthocentre of the triangle



Example: In an obtuse angled triangle ABC, $\angle B$ is obtuse angled and O is orthocentre. $\angle AOC = 69^{\circ}$ and $\angle ABC$ is

Sol. \angle ABC = 180° $- \angle$ AOC

= 180° - 69°

= 111°

Some important facts of the triangle:

1. **Mid-Point Theorem:** In triangle ABC, P and Q are mid – point of AB and AC. Then PQ always || to BC (PQ || BC).



1. Median theorem: In \triangle ABC, AD is Median



Example: If the length of the three sides of a triangle is a 9 cm, 40 cm, and 41 cm then find the length of median to its greatest side.

Sol. This is a right-angled triangle



• Angle bisector theorem: Internal angle bisector



External angle bisector:



• In the right Triangle ABC, F and D is the mid – points of AB and BC



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