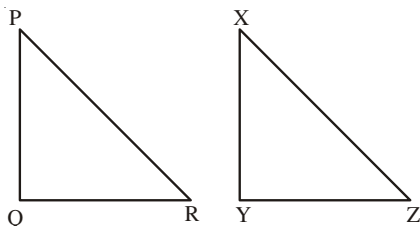


11

CONGRUENCE OF TRIANGLES

- Two figures, which have the same shape and same size are called congruent figures and this property is called congruence.
- Two line segments are congruent when they are of equal length.
- Two squares are congruent if their sides are equal.
- Two triangles are congruent, if all the sides and all the angles of one are equal to the corresponding sides and angles of other.

For example in triangles PQR and XYZ



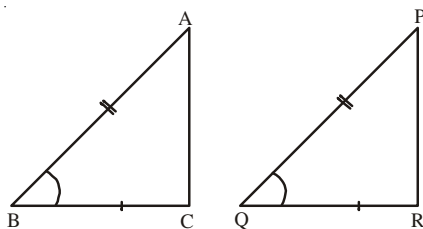
$$PQ = XY, PR = XZ, QR = YZ$$

$$\angle P = \angle X, \angle Q = \angle Y, \angle R = \angle Z$$

Thus $\triangle PQR$ is congruent to $\triangle XYZ$ and we write $\triangle PQR \cong \triangle XYZ$ where \cong is symbol of congruence.

- **SAS Criterion of congruence:** If the two sides and the included angle of one triangle are equal to the corresponding sides and included angle of the other triangle, the two triangles are congruent.

For example:

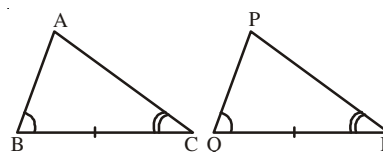


$$AB = PQ, BC = QR, \angle ABC = \angle PQR$$

$$\text{Hence } \triangle ABC \cong \triangle PQR$$

- **ASA or AAS Criterion of Congruence:-** If any two angles and one side of a triangle are equal to corresponding angles and the side of the another triangle, then the two triangles are congruent.

For example

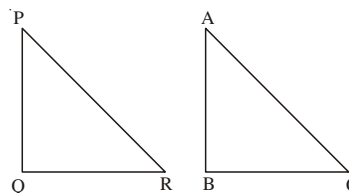


$$\angle ABC = \angle PQR, \angle ACB = \angle PRQ \text{ and } BC = QR$$

Hence $\triangle ABC \cong \triangle PQR$

- **SSS Criterion of Congruence:** If the three sides of one triangle are equal to the corresponding sides of another triangle, then the two triangles are congruent.

For example:

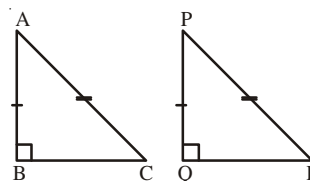


$$AB = PQ, BC = QR, AC = PR,$$

$$\text{Hence } \triangle ABC \cong \triangle PQR$$

- **RHS Criterion of Congruence:** If the hypotenuse and a side of one right triangle are respectively equal to the hypotenuse and a side of another right triangle, then the two triangles are congruent.

For example



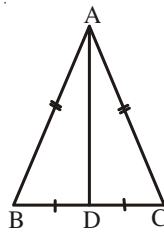
$$AC = PR, AB = PQ, \angle ABC = \angle PQR = 90^\circ$$

$$\text{Hence } \triangle ABC \cong \triangle PQR$$

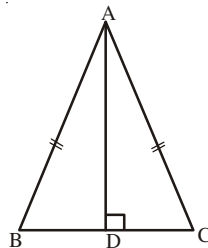
- The angles opposite to equal sides of a triangle are equal.
- The sides opposite to equal angles of a triangle are equal.
- Perpendiculars or altitudes drawn on equal sides, from opposite vertices of an isosceles triangle are equal.
- If two sides of a triangle are unequal, then the longer side has the greater angle opposite to it.
- In a triangle, the greater angle has longer side opposite to it.
- Sum of any two sides of a triangle is greater than the third side.

CHECK YOUR PROGRESS:

1. In triangle ABC if $\angle C > \angle B$, then :
 A. $BC > AC$ B. $AB > AC$ C. $AB < AC$ D. $BC < AC$
2. In figure if $AB = AC$ and $BD = DC$, then $\angle ADB$ is :

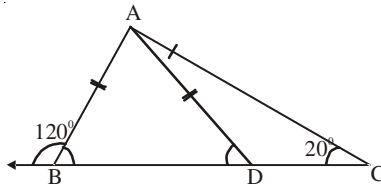


- A. 45° B. 90° C. 60° D. None of these
3. Two sides of a triangle are of length 6 cm and 2.5 cm. The length of the third side of the triangle can not be :
 A. 4.5 cm B. 5 cm C. 6 cm D. 3.2 cm
 4. In $\triangle PQR$, $QR = PQ$ and $\angle Q = 40^\circ$, then $\angle P$ is equal to -
 A. 40° B. 70° C. 50° D. 80°
 5. In $\triangle ABC$, if $\angle B = \angle C$ and $AD \perp BC$, then $\triangle ABD \cong \triangle ACD$ by the criterion:

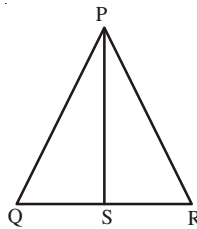


- A. RHS B. ASA C. SAS D. SSS
6. $\triangle ABC$ is a right triangle in which $\angle B = 90^\circ$ and $AB = BC$. Find $\angle A$ and $\angle C$.

7. In figure. Find $\angle DAC$

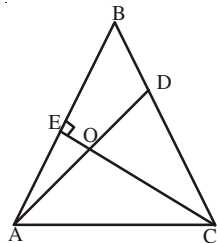


8. Prove that angles opposite to equal sides of a triangle are equal.
 9. Prove that each angle of an equilateral triangle is 60° .
 10. S is any point on side QR of a $\triangle PQR$. Show that $PQ + QR + RP > 2PS$



STRETCH YOURSELF

- Show that in a quadrilateral ABCD, $AB + BC + CD + DA > AC + BD$.
- A triangle ABC is right angled at A. AL is drawn perpendicular to BC. Prove that $\angle BAL = \angle ACB$.
- Prove that the medians of a triangle are equal.
- In figure $\angle A = \angle C$ and $AB = AC$. Prove that $\triangle ABD \cong \triangle CBE$.



ANSWERS:

CHECK YOUR PROGRESS :

- B
- B
- D
- B
- A
- $\angle A = 45^\circ, \angle B = 45^\circ$
- $\angle DAC = 40^\circ$