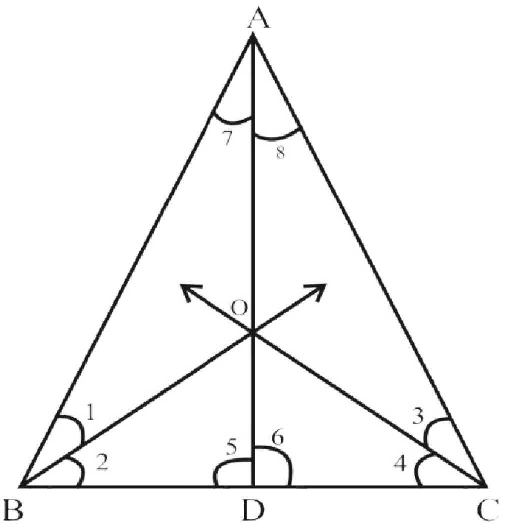
Exercise 12.3

Q.1 Prove that the bisectors of the angles of base of an isosceles triangle intersect each other on its altitude.



Given

ΔABC

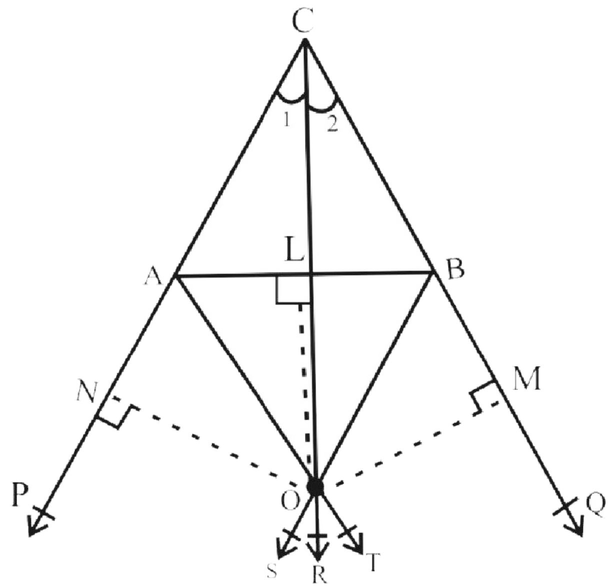
$\overline{AB} = \overline{AC}$ Due to isosceles triangle

Bisect $\angle B$ and $\angle C$ to intersect at point O Join A to D and extend to BC at D $\overline{AD}$ is the altitude of ΔABC $\overline{AD} \perp \overline{BC}$

Proof

Statements	Reasons
In ΔABC	
$\overline{AB} \cong \overline{AC}$	Given
$\angle B \cong \angle C$	Due to isosceles triangle opposite angle are congruent
$\frac{1}{2} m\angle B = \frac{1}{2} m\angle C$	Dividing both side by 2
$\angle 1 \cong \angle 3$	
$\Delta ABO \leftrightarrow \Delta ACO$	
$\overline{AO} = \overline{AO}$	
$\overline{AB} = \overline{AC}$	
$\overline{BO} \cong \overline{CO}$	Given
$\Delta ABO \cong \Delta ACO$	Due to isosceles triangle
$\Delta ABD \leftrightarrow \Delta ACD$	
$\overline{AD} \cong \overline{AD}$	
$\angle 7 \cong \angle 8$	
$\overline{AB} \cong \overline{AC}$	
$\Delta ABD \cong \Delta ACD$	
$\angle 5 + \angle 6 = 180$	
$\angle 5 = \angle 6 = 90^{\circ}$	
So $\overline{AD} \perp \overline{BC}$	Supplementary angles
$\overline{AD}$ Passes from point O	

Q.2 Prove that the bisectors of two exterior and third interior angle of a triangle are concurrent



Given

ΔABC

Exterior angles are $\angle ABQ$ and $\angle BAP$ $\overrightarrow{AT}$ and $\overrightarrow{BS}$ intersect each other at point O therefore join O to C

Draw the angle bisecter of C

$\angle 1 \cong \angle 2$

Construction

$\overline{OM} \perp \overrightarrow{CQ}, \overline{OL} \perp \overline{AB}$, $\overline{ON} \perp \overrightarrow{CP}$

Proof

Statements	Reasons
$\overline{ON} \cong \overline{OM}$..........(i)	
$\overline{OL} \cong \overline{OM}$..........(ii)	
$\overline{ON} \cong \overline{OL}$	
Hence Angle Bisector of C	Comparing equation (i) and (ii)
i,e $\angle 1 \cong \angle 2$	