Exercise 7.3

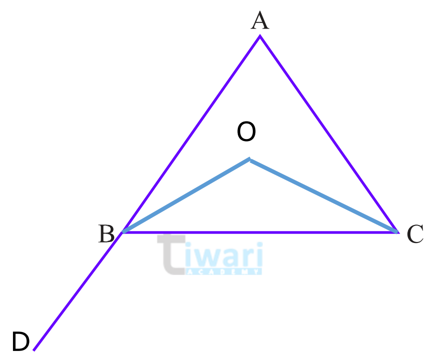
Question 10:

Bisectors of the angles B and C of an isosceles triangle ABC with AB = AC intersect each other at O. Show that external angle adjacent to ∠ABC is equal to ∠BOC.

Answer 10:

Given: In ΔABC, AB = AC and OB & OC are the bisectors of ∠B & ∠C respectively.

To Prove: ∠CBD = ∠BOC.



Proof: In ΔABC, AB = AC [∵ Given]

∠ABC = ∠ACB [∵ Angles opposite to equal sides]

$\Rightarrow \frac{1}{2}\angle ABC = \frac{1}{2}\angle ACB$

$\Rightarrow \angle OBC = \angle OCB$ [∵ OB & OC are the bisectors of ∠B & ∠C]

Now, in ΔOBC,

$\Rightarrow \angle BOC + \angle OBC + \angle OCB = 180°$

$\Rightarrow \angle BOC + \angle OBC + \angle OBC = 180°$ [∵ ∠OBC = ∠OCB]

$\Rightarrow \angle BOC + 2\angle OBC = 180°$

$\Rightarrow \angle BOC + \angle ABC = 180°$ … (i) [∵ OB is the bisector of ∠B]

But $\angle CBD + \angle ABC = 180°$ … (ii) [∵ Linear pair]

From (i) and (ii), we get

$\angle CBD + \angle ABC = \angle BOC + \angle ABC$

$\Longrightarrow \angle CBD = \angle BOC$

Hence Proved.