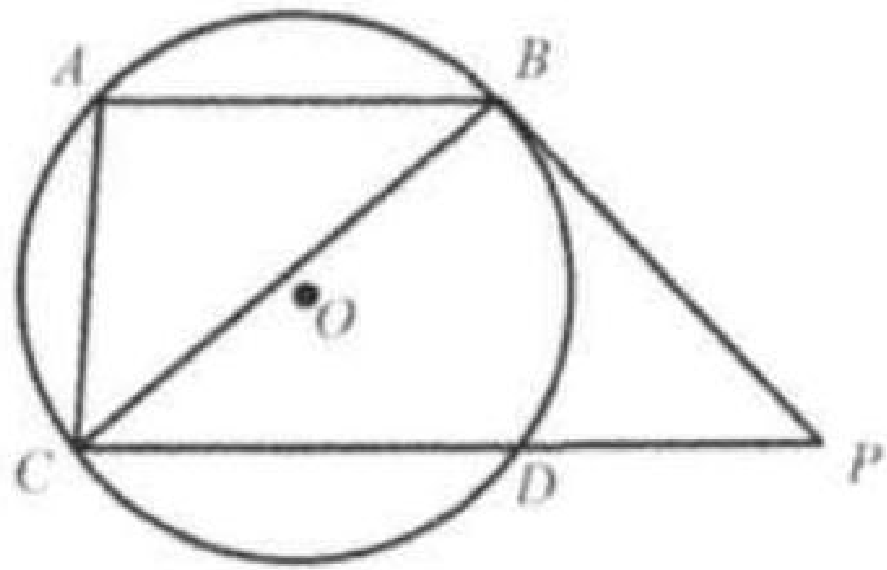
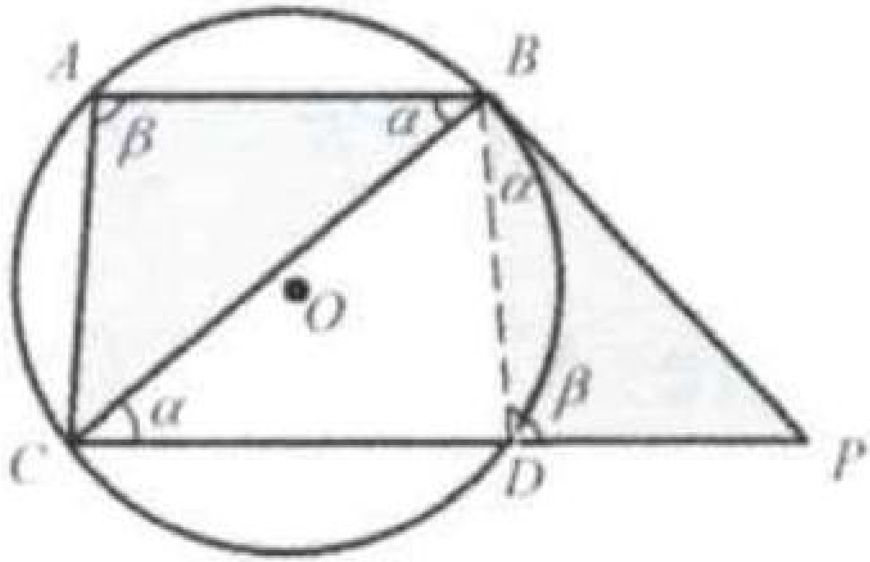
## Problem

Triangle $ABC$ is inscribed in the circle $O$. Draw $CD//AB$. Draw tangent line through $B$ to meet the extension of $CD$ at $P$. Show that
$PB \times CA = CB \times PD$.




## Solution

Connect $BD$. Since $BP$ is tangent to circle $O, \angle PBD = \angle BCD = \alpha$ (both angles face the same arc $BD$ ).
Since $AB//CD, \angle BCD = \angle CBA = \alpha$.
So $\angle PBD = \angle CBA = \alpha$.
Since points $A, B, D$, and $C$ are concyclic, $\angle PDB = \angle CAB = \beta$.
Thus $\triangle PDB \sim \triangle CAB$.




Thus $\frac{AC}{PD} = \frac{CB}{PB} \quad \Rightarrow \quad PB \times CA = CB \times PD.$