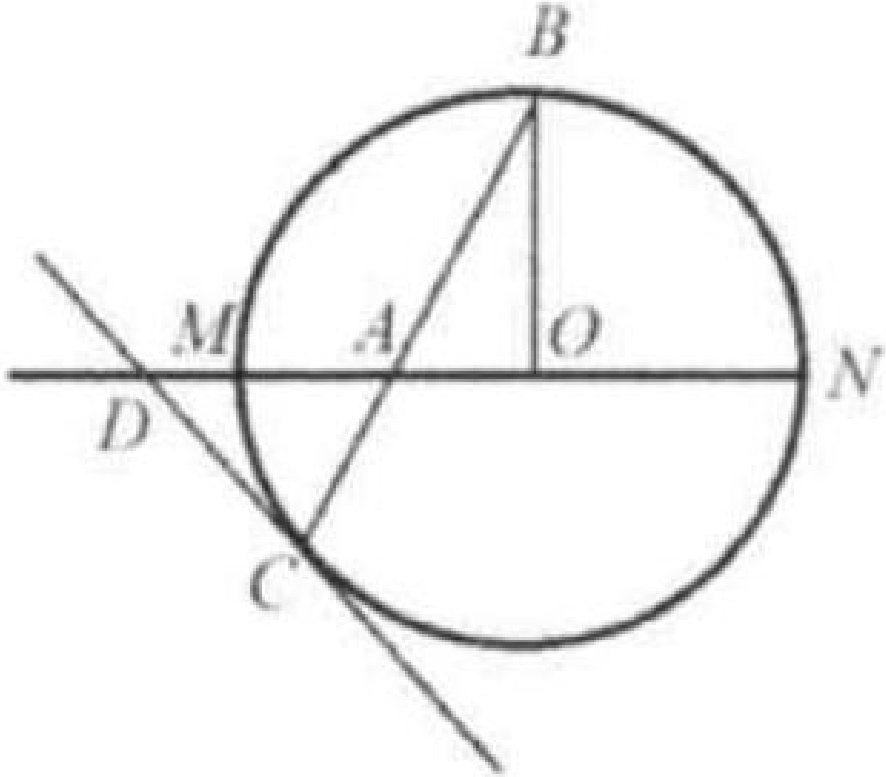


### Problem 3

#### Problem

$MN$  is the diameter of circle  $O$ .  $A$  is any point on  $MN$ .  $BC$  is a chord going through  $A$ .  $CD$  is the tangent to circle  $O$  at  $C$ , and meets the extension of  $NM$  at  $D$ . Prove:  $DC = DA$  if  $BO \perp MN$ .



#### Solution

Connect  $OC$ . Since  $OB = OC$ ,  $\angle OBC = \angle OCB = \alpha$ .  
Since  $BO \perp MN$  and  $CD \perp OC$ ,  $\angle DCO = \angle AOB = 90^\circ$ ,

We see that  $\angle OAB = \angle DAC = 90^\circ - \alpha = \beta$  and  $\angle DCA = 90^\circ - \alpha = \beta$ .  
 Thus  $\angle DCA = \angle DAC = \beta$ , and  $DC = DA$ .

