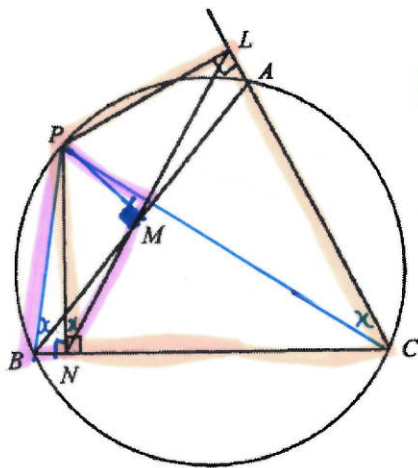


(a)



$ABC$  is an acute-angled triangle inscribed in a circle.  $P$  is a point on the minor arc  $AB$  of the circle.  $PL$  and  $PN$  are the perpendiculars from  $P$  to  $CA$  (produced) and  $CB$  respectively.  $LN$  cuts  $AB$  at  $M$ .

- (i) Copy the diagram
- (ii) Explain why  $PNCL$  is a cyclic quadrilateral.
- (iii) Show that  $\angle PBM = \angle PNM$ .
- (iv) Hence show that  $PM$  is perpendicular to  $AB$ .

1  
3  
3

(ii)  $\angle PNC + \angle PLC$   
 $= 90 + 90$   
 $= 180^\circ$

$\therefore PNCL$  is a cyclic quadrilateral (the opposite angles of a cyclic quadrilateral are supplementary).

(iii) let  $\angle PBM = x$   
 $B, M, A$  are collinear

$\angle PBM = \angle PCA = x$  (angles at the circumference subtended by the same arc  $PA$ )

$C, A, L$  are collinear

$\therefore \angle PCA = \angle PCL = \angle PNL = \angle PNM = x$

$\therefore \angle PBM = \angle PNM = x$

(iv) since  $\angle PBM = \angle PNM = x$ ,  $PMNB$  is a cyclic quadrilateral (angles at the circumference subtended by the same arc  $PM$ )

$\therefore \angle PNB = \angle PMB = 90^\circ$  (angles at the circumference subtended by arc  $PB$ )

$\therefore PM \perp AB$