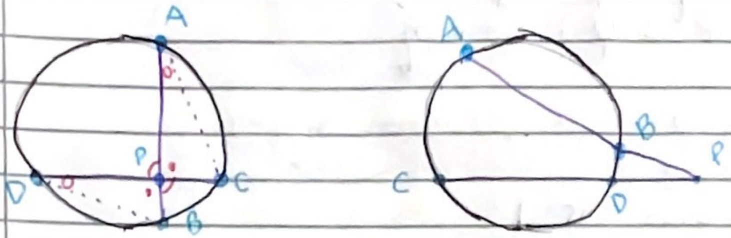
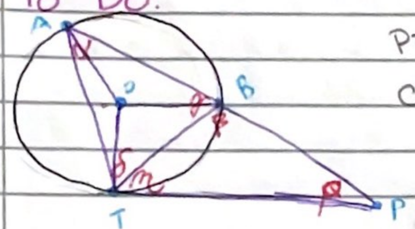
Recall:



Either way, $|PA|\cdot|PB| = |PC|\cdot|PD|$

To Do:



PT is tangent to the circle at T

Proof: (Then $|PT|^2 = |PA|\cdot|PB|$)
Connect A to T & B to T
Show: $\triangle APT \sim \triangle TPB$

Obviously, $\angle APT = \angle TPB = \varphi$

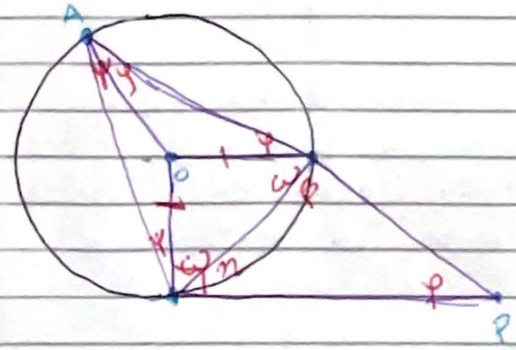
① $\gamma = \varphi + \eta$ (external angle)
② $\alpha + \gamma + \delta = \pi$
③ $\beta + \eta + \varphi = \pi$
④ $\beta = \alpha + \delta$ (external angle)

Try to get $\beta = \delta + \eta$ or $\eta = \alpha$ ③

① & ② $\Rightarrow \alpha + \varphi + \eta + \delta = \pi = \beta + \eta + \varphi$

$\Rightarrow \alpha + \delta = \beta$ ④

Connect the centre O to A, B, & T. OT (radius) $\perp$ PT (tangent)



To show: $\eta = \psi + \varphi$

or $\beta = \psi + \omega + \eta$

$\angle TBP = B$

$B = \psi + \varphi + \psi + \omega$ (external angle)

$= 2\psi + \varphi + \omega$

$2\psi + 2\varphi + 2\omega = \pi$

$\Rightarrow \psi + \omega + \varphi = \pi/2 = \llcorner$

$\therefore B = \llcorner + \psi$

$\angle APT = \psi + \llcorner = B = \angle TBP$

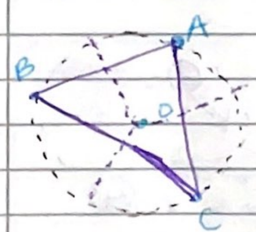
$\therefore \Delta APT \sim \Delta TBP$

$$\Rightarrow \frac{|PA|}{|PT|} = \frac{|PT|}{|PB|}$$

$\Rightarrow |PA| \cdot |PB| = |PT| \cdot |PT| = |PT|^2$ //

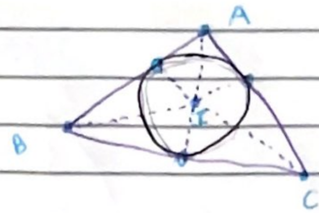
Triangles & their Centres

Proposition: The perpendicular bisectors of the sides of ΔABC are concurrent (meet at one point) in a point O (circumcentre of ΔABC) which it's centre of a circle (circumcircle of ΔABC) passing through A, B, & C.



Proof: Finding the centre of a circle... we did this then //

Proposition: The angle bisectors of the internal angles of ΔABC are concurrent in point I (the incentre) which is the centre of a circle tangent to all three sides of the triangle



Proof. The angle bisector of $\angle BAC$ is the collection of points equidistant from AB & AC
Similarly, the angle bisector of $\angle ABC$ is the collection of points equidistant from AB & BC.
Their intersection I is equidistant from all three of AB, AC & BC.
A circle with radius equal to that distance about I must touch each side only once.

Proposition: suppose D,E,F are the midpoints of the sides BC, AC, AB (resp.) of $\triangle ABC$ then the medians AD, BE, CF intersect at the centroid G of the triangle