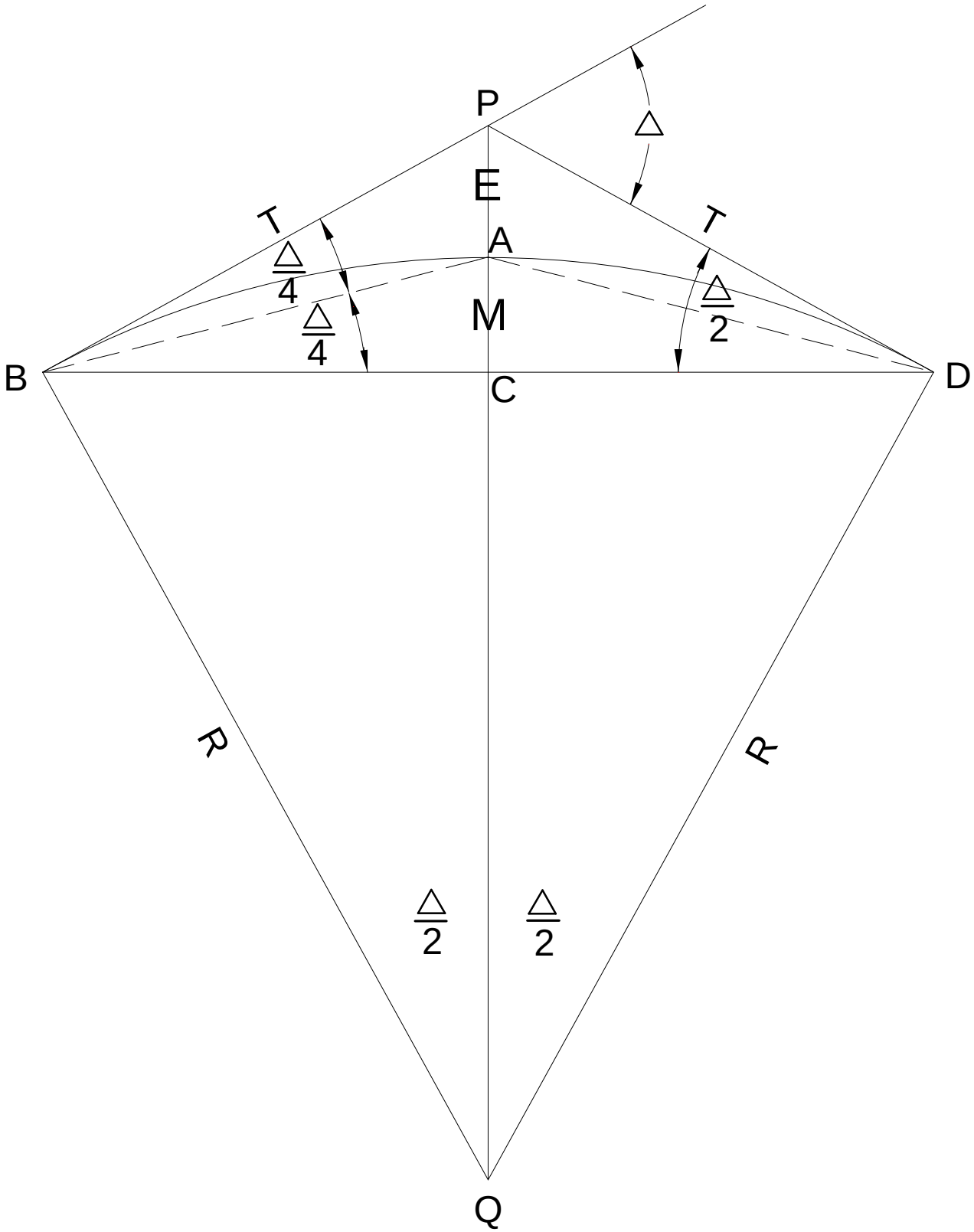
PRAS3SOL

SHOW THAT TAN $\frac{\Delta}{4} = \frac{E}{T}$ AND COS $\frac{\Delta}{2} = \frac{M}{E}$



PROBAS3ANS

Draw BA & AD.

Because angle PQB = $\frac{\triangle}{2}$, angle PBA = $\frac{\triangle}{4}$, being the deflection to that point.

Angle $ABC = \frac{\triangle}{2} - \frac{\triangle}{4} = \frac{\triangle}{4}$

$$\tan\frac{\triangle}{4} = \frac{M}{BC} = \frac{R - R\cdot\cos\frac{\triangle}{2}}{R\cdot\sin\frac{\triangle}{2}} = \frac{R\cdot(1-\cos\frac{\triangle}{2})}{R\cdot\sin\frac{\triangle}{2}} = \frac{(1-\cos\frac{\triangle}{2})}{\sin\frac{\triangle}{2}}$$

$$\cos\frac{\triangle}{2} = \frac{R}{R+E} \text{ and } \sin\frac{\triangle}{2} = \frac{T}{R+E}$$

$$\tan\frac{\triangle}{4} = \frac{1-\frac{R}{R+E}}{\frac{T}{R+E}}, = \frac{\frac{R+E-R}{R+E}}{\frac{T}{R+E}} = \frac{E}{T}, \quad \text{Q.E.D.}$$

AND:

$$M = R - R\cos\frac{\triangle}{2} = R(1-\cos\frac{\triangle}{2})$$

$$E = \frac{R}{\cos\frac{\triangle}{2}} - R = \frac{R - R\cos\frac{\triangle}{2}}{\cos\frac{\triangle}{2}} = \frac{M}{\cos\frac{\triangle}{2}}$$

$\cos\frac{\triangle}{2} = \frac{M}{E}$, Q.E.D.