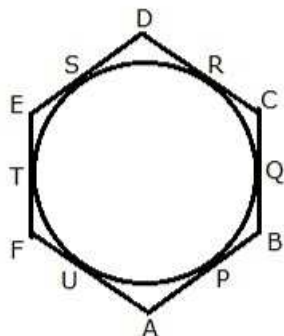


①



to prove
proof

$$AB + CD + EF = BC + DE + FA$$

$$AP = AU \dots \textcircled{i}$$

$$BP = BQ \dots \textcircled{ii}$$

$$CR = CQ \dots \textcircled{iii}$$

$$DR = DS \dots \textcircled{iv}$$

$$ET = ES \dots \textcircled{v}$$

$$FT = FU \dots \textcircled{vi}$$

[tangents from
same external
point]

$$\textcircled{i} + \textcircled{ii} + \textcircled{iii} + \textcircled{iv} + \textcircled{v} + \textcircled{vi} + \textcircled{vii} + \textcircled{viii}$$

$$AP + BP + CR + DR + ET + FT = AU + BQ + CQ + DS + ES + FU$$

$$\Rightarrow AB + CD + EF = BC + DE + AF$$

NCERT Exemplar Solutions by Dev Anoop (Bathinda)

② given - $s = \frac{a+b+c}{2}$, where $a = BC, b = AC, c = AB$

to prove $BD = s - b$

proof

tangents from same external point are equal

$$BD = BF = x$$

$$AF = AE = c - x$$

$$CD = CE = a - x$$

$$AC = AE + CE$$

$$b = c - x + a - x$$

$$b + 2x = a + c$$

adding b on both sides

$$2b + 2x = a + b + c$$

$$b + x = \frac{a+b+c}{2}$$

$$= s$$

$$\Rightarrow x = s - b$$

$$BD = s - b$$

