Ex - 7.4

Q1. Show that in a right angled triangle, the hypotenuse is the longest side.

Sol. ΔABC is right angled at B. AC is hypotenuse.

Now, $\angle B = 90°$

and $\angle A + \angle C = 90°$

$\Rightarrow \angle A < 90°$

and $\angle C < 90°$

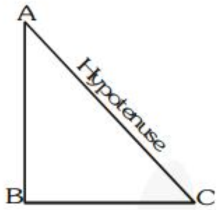
$\Rightarrow \angle B > \angle A$

and $\angle B > \angle C$

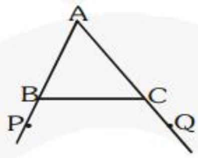
$\Rightarrow AC > BC$

and $AC > AB$.

$\therefore$ Hypotenuse AC is the longest side of the right angled ΔABC.



Q2. In figure, sides AB and AC of ΔABC are extended to points P and Q respectively. Also, $\angle PBC < \angle QCB$. Show that $AC > AB$



Sol. Sides AB and AC of ΔABC are extended to points P and Q

To prove : $AC > AB$

Proof : $\angle PBC < \angle QCB$ (Given)

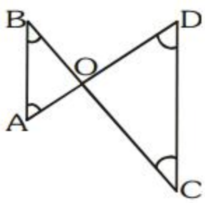
$180 - \angle PBC > 180 - \angle QCB$

$\angle ABC > ACB$

$\Rightarrow AC > AB$

(sides opposite to greater angle is longer)

Q3. In fig, $\angle B < \angle A$ and $\angle C < \angle D$. Show that $AD < BC$.



Sol. $\angle B < \angle A$ in $\Delta OAB \Rightarrow OA < OB$ ...(1)

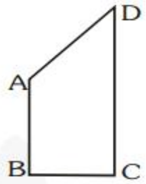
Also, $\angle C < \angle D$ in $\Delta OCD \Rightarrow OD < OC$ ...(2)

Adding (1) and (2),

OA + OD < OB + OC

⇒ AD < BC

Q4. AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see figure). Show that ∠A > ∠C and ∠B > ∠D.



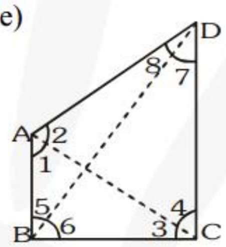
Sol. In quadrilateral ABCD, AB is the smallest side and CD is the longest side. Join AC and BD.

In ΔABC, BC > AB (∵ AB is smallest side)

⇒ ∠1 > ∠3 ...(1)

In ΔACD, CD > AD (∵ CD is longest side)

⇒ ∠2 > ∠4 ...(2)



Ading (1) and (2), we have

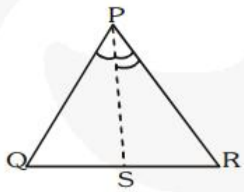
∠1 + ∠2 > ∠3 + ∠4

⇒ ∠A > ∠C

Similarly, we can prove that

∠B > ∠D

Q5. In figure, PR > PQ and PS bisects ∠QPR. Prove that ∠PSR > ∠PSQ.



Sol. Given : PR > PQ, PS bisect ∠QPR.

To prove : ∠PSR > ∠PSQ

Proof : In ΔPQR

PR > PQ (Given)

∠PQR > ∠PRQ ...(1)

(angle opposite to longer side is greater)

PS bisects ∠QPR

⇒ ∠QPS = ∠RPS

In ΔPQS

∠PQR + ∠QPS + ∠PSQ = 180° ...(2)

In ΔPRS

∠PSR + ∠SPR + ∠SRP = 180° ...(3)

From (2) and (3)

$\angle PQR + \angle QPS + \angle PSQ$

$= \angle PSR + \angle SPR + \angle SRP$

$\angle PQR + \angle PSQ = \angle PSR + \angle PRS$

$\angle PRS + \angle PSR = \angle PQR + \angle PSQ$

$\angle PRS + \angle PSR > \angle PRQ + \angle PSQ$

$\angle PRQ + \angle PSR > \angle PRQ + \angle PSQ$

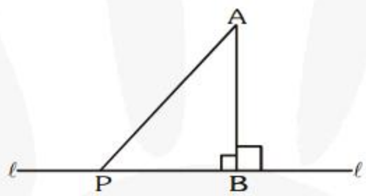
$\angle PSR > \angle PSQ$

Q6. Show that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

Sol. Let us have AB as the perpendicular line segment and AP is any other line segment. Now ΔABP is right angled and AP is hypotenuse.

Here, $\angle B > \angle P$ $\quad (\because \angle B = 90°)$

$\Rightarrow AP > AB$



Thus perpendicular line segment is smallest.