SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

Q.1 Show that in a right angle's triangle, the hypotenuse is the longest side.

Ans. Given: Let ABC be a right-angled triangle, right angled at B.

To prove: Hypotenuse AC is the longest side.

Proof: In right angled triangle ABC,

$\angle A + \angle B + \angle C = 180°$

$\Rightarrow \angle A + 90° + \angle C = 180°$ [$\therefore \angle B = 90°$]

$\Rightarrow \angle A + \angle C = 180° - 90°$

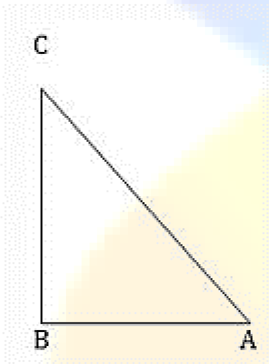
And $\angle B = 90°$

$\Rightarrow B > C$ and $B > A$

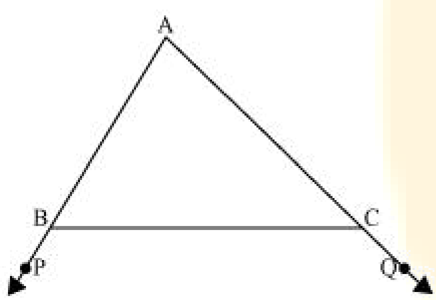
Since the greater angle has a longer side opposite to it.

$\Rightarrow AC > AB$ and $AC > AB$

Therefore, B being the greatest angle has the longest opposite side AC, i.e. hypotenuse.



Q.2 In figure, sides AB and AC of Δ ABC are extended to points P and Q respectively. Also $\angle PBC < \angle QCB$. Show that $AC > AB$.



Ans. Given: In Δ ABC, ∠ PBC < ∠ QCB

To prove: AC > AB

Proof: In Δ ABC,

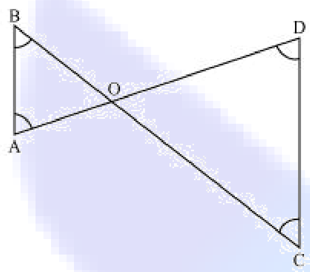
∠ 4 > ∠ 2 [Given]

Now ∠ 1 + ∠ 2 = ∠ 3 + ∠ 4 = [Linear pair]

∴ ∠ 1 > ∠ 3 [∴ ∠ 4 > ∠ 2]

⇒ AC > AB [Side opposite to greater angle is longer]

Q.3 In figure, ∠ B < A and ∠ C < ∠ D. Show that AD < BC.



Ans. In Δ AOB,

∠ B < ∠ A [Given]

⇒ OA < OB .... (i) [Side opposite to greater angle is longer]

In Δ COD,

∠ C < ∠ D [Given]

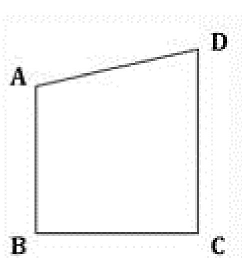
⇒ OD < OC .... (ii) [Side opposite to greater angle is longer]

Adding eq. (i) and (ii),

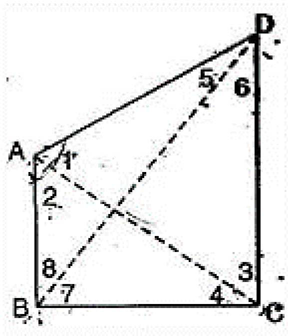
OA + OD < OB + OC

⇒ AD < BC

Q.4 AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (See figure). Show that ∠A > ∠ C and ∠ B > ∠ D.



Ans. Given: ABCD is a quadrilateral with AB as smallest and CD as longest side.



To prove: (i) $\angle A > \angle C$ (ii) $\angle B > \angle D$

Construction: Join AC and BD.

Proof: (i) In Δ ABC, AB is the smallest side.

$\therefore\ \angle 4 < \angle 2$ .... (i)

[Angle opposite to smaller side is smaller]

In Δ ADC, DC is the longest side.

$\therefore\ \angle 3 < \angle 1$ .... (ii)

[Angle opposite to longer side is longer]

Adding eq. (i) and (ii),

$\angle 4 + \angle 3 < \angle 1 + \angle \Rightarrow 2\ C < \angle A$

(ii) In ABD, AB is the smallest side.

$\therefore\ \angle 5 < \angle 8$ ....(iii)

[Angle opposite to smaller side is smaller]

In Δ BDC, DC is the longest side.

$\therefore\ \angle 6 < \angle 7$ ....(iv)

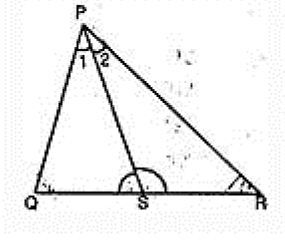
[Angle opposite to longer side is longer]

Adding eq. (iii) and (iv),

$\angle 5 + \angle 6 < \angle 7 + \angle 8$

$\Rightarrow\ \angle D < \angle B$

Q.5 In figure, PR > PQ and PS bisects $\angle$ QPR. Prove that $\angle PSR > \angle PSQ$.



Ans. In Δ PQR, PR > PQ [Given]

$\therefore\ \angle PQR > \angle PRQ$ .... (i) [Angle opposite to longer side is greater]

Again $1 = 2$ …. (ii) [∵PS is the bisector of $\angle P$]

$\therefore \angle PQR + 1 > \angle PRQ + \angle 2$ ………. (iii)

But $\angle PQS + \angle 1 + \angle PSQ = \angle PRS + \angle 2 + \angle PSR =$ [Angle sum property]

$\Rightarrow \angle PQR + \angle 1 + \angle PSQ = \angle PRQ + \angle 2 + \angle PSR$ ………(iv)

[$\angle PRS = \angle PRQ$ and $\angle PQS = \angle PQR$]

From eq. (iii) and (iv),

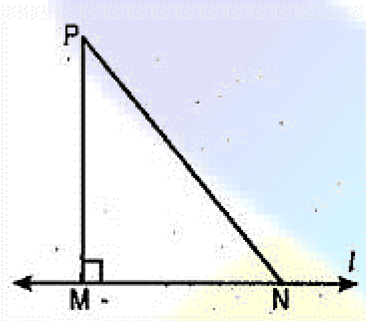
$\angle PSQ < \angle PSR$

Or $\angle PSR > \angle PSQ$

Q.6 Show that all the line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

Ans. **Given:** is a line and P is point not lying on l. PM ⊥ l

N is any point on l other than M.



To prove: $PM < PN$

Proof: In Δ PMN $\angle M$ is the right angle.

N is an acute angle. (Angle sum property of Δ)

$\therefore \angle M > \angle N$

$\therefore PN > PM$ [Side opposite greater angle]

$\Rightarrow PM < PN$

Hence of all line segments drawn from a given point not on it, the perpendicular is the shortest.