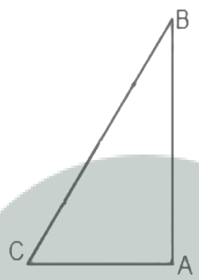
NCERT Solutions for Class 9 Maths Chapter 7 Triangles Ex 7.4

Question 1.

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

Solution.

ABC is a triangle right angled at B



Now,

$\angle A + \angle B + \angle C = 180^o$

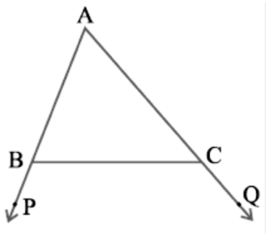
$\angle A + \angle C = 90^o$

And $\angle B$ is 90^o

Since, B is the largest angle of the triangle, the side opposite to it must be the largest

So, BC is the hypotenuse which is the largest side of the right angled triangle ABC

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



Solution.

It is given in the question that:

$\angle PBC < \angle QCB$

Now,

$\angle ABC + \angle PBC = 180^{o}$

$\angle ABC = 180^{o} - \angle PBC$

Also,

$\angle ACB + \angle QCB = 180^{o}$

$\angle ACB = 180^{o} - \angle QCB$

Since,

$\angle PBC < \angle QCB$ therefore,

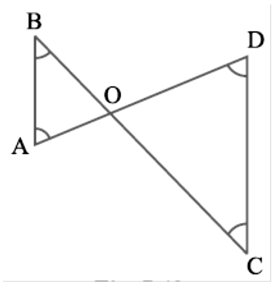
$\angle ABC > \angle ACB$

Thus,

AC > AB as sides opposite to the larger angle is larger

Question 3.

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



Solution.

It is given in the question that:

$\angle B < \angle A$ and,

$\angle C < \angle D$

Now,

AO < BO (i) (Side opposite to the smaller angle is smaller)

OD < OC (ii) (Side opposite to the smaller angle is smaller)

Adding (i) and (ii), we get

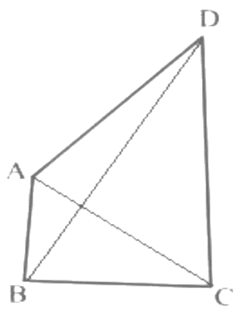
AO + OD < BO + OC

AD < BC

Question 4.

AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see Fig. 7.50). Show that $\angle A > \angle C$ and $\angle B > \angle D$

Solution.



It is given in the question that:

In ΔABD,

AB < AD < BD

Therefore,

∠ADB < ABD (i) (Angles opposite to longer side is larger)

Now,

In ΔBCD,

BC < Dc < BD

Therefore,

∠BDC < ∠CBD (ii)

Adding (i) and (ii), we get

∠ADB + ∠BDC < ∠ABD + ∠CBD

∠ADC < ∠ABC

∠B > D

Similarly,

In ΔABC,

∠ACB < ∠BAC (iii) (Angle opposite to longer side is larger)

Now,

In ΔADC,

∠DCA < ∠DAC (iv)

Adding (iii) and (iv), we get

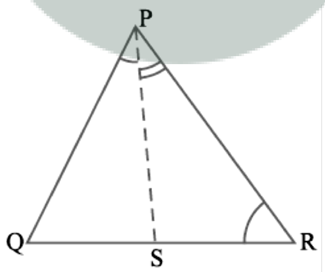
∠ACB + ∠DCA < ∠BAC + ∠DAC

∠BCD < ∠BAD

∠A > ∠C

Question 5.

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



Solution.

It is given in the question that:

PR > PQ and PS bisects ∠QPR

To prove: ∠PSR > PSQ

Proof: ∠PQR > ∠PRQ (i) (PR > PQ as angle opposite to larger side is larger)

∠QPS = ∠RPS (ii) (PS bisects ∠QPR)

∠PSR = ∠PQR + ∠QPS (iii) (Exterior angle of a triangle equals to the sum of opposite interior angles)

∠PSQ = ∠PRQ + ∠RPS (iv) (Exterior angle os a triangle equals to the sum of opposite interior angles)

Adding (i) and (ii), we get

∠PQR + ∠QPS > ∠PRQ + ∠RPS

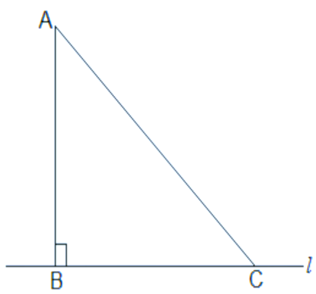
∠PSR > ∠PSQ [From (i), (ii), (iii) and (iv)]

Question 6.

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

Solution.

Let l is a line segment and B is a point lying to it. We draw a line AB perpendicular to l. Let C be any other point on l



To prove: AB < AC

Proof: In ΔABC,

$\angle B = 90^o$

Now,

$\angle A + \angle B + \angle C = 180^o$

$\angle A + \angle C = 90^o$

Therefore,

$\angle C$ must be acute angle or $\angle C < \angle B$

AB < AC (Sides opposite to the larger angle is larger)