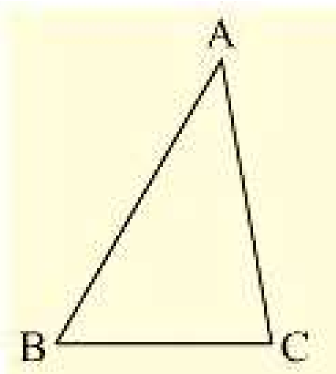
RD SHARMA
Solutions
Class 9 Maths
Chapter 10
Ex *10.6*

(1) In Δ ABC, if ∠ A = 40° and ∠ B = 60°. Determine the longest and shortest sides of the triangle.

Solution:

Given that in Δ ABC, ∠ A = 40° and ∠ B = 60°



We have to find longest and shortest side

We know that,

Sum of angles in a triangle 180°

∠ A + ∠ B + ∠ C = 180°

40° + 60° + ∠ C = 180°

∠ C = 180° − ((10)0°) = 80°

∠ C = 80°

Now,

=> 40° < 60° < 80° = ∠ A < ∠ B < ∠ C

=> ∠ C is greater angle and ∠ A is smaller angle.

Now, ∠ A < ∠ B < ∠ C

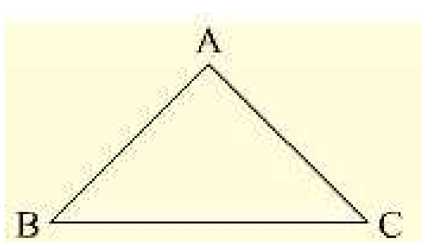
=> BC < AAC < AB [Side opposite to greater angle is larger and side opposite to smaller angle is smaller]

AB is longest and BC is smallest or shortest side.

(2) In a Δ ABC, if ∠ B = ∠ C = 45°, which is the longest side?

Solution: Given that in Δ ABC,

∠ B = ∠ C = 45°



We have to find longest side

We know that.

Sum of angles in a triangle =180°

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

$\angle A + 45° + 45° = 180°$

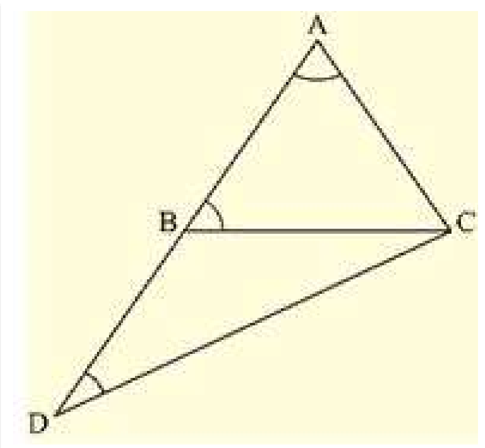
$\angle A = 180° - (45° + 45°) = 180° - 90° = 90°$

$\angle A = 90°$

(3) In Δ ABC, side AB is produced to D so that BD = BC. If $\angle B = 60°$ and $\angle A = 70°$. prove that: (i) AD > CD (ii) AD > AC

Sol: Given that, in Δ ABC, side AB is produced to D so that BD = BC.

$\angle B = 60°$, and $\angle A = 70°$



To prove,

(i) AD > CD (ii) AD > AC

First join C and D

We know that,

Sum of angles in a triangle =180°

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

$70° + 60° + \angle C = 180°$

$\angle C = 180° - (130°) = 50°$

$\angle C = 50°$

$\angle ACB = 50°$……(i)

And also in Δ BDC

$\angle DBC = 180 - \angle ABC$ [ABD is a straight angle]

$180 - 60° = 120°$

and also BD = BC[given]

$\angle BCD = \angle BDC$ [Angles opposite to equal sides are equal]

Now,

$\angle DBC + \angle BCD + \angle BDC = 180°$ [Sum of angles in a triangle =180°]

$\Rightarrow 120° + \angle BCD + \angle BCD = 180°$

$\Rightarrow 120° + 2\angle BCD = 180°$

$\Rightarrow 2\angle BCD = 180° - 120° = 60°$

$\Rightarrow \angle BCD = 30°$

$\Rightarrow \angle BCD = \angle BDC = 30°$ ....(ii)

Now, consider ΔADC.

$\angle BAC \Rightarrow \angle DAC = 70°$ [given]

$\angle BDC \Rightarrow \angle ADC = 30°$ [From (ii)]

$\angle ACD = \angle ACB + \angle BCD$

$= 50° + 30°$[From (i) and (ii)] $=80°$

Now, $\angle ADC < \angle DAC < \angle ACD$

$AC < DC < AD$ [Side opposite to greater angle is longer and smaller angle is smaller]

$AD > CD$ and $AD > AC$

Hence proved

Or,

We have,

$\angle ACD > \angle DAC$ and $\angle ACD > \angle ADC$

$AD > DC$ and $AD > AC$ [Side opposite to greater angle is longer and smaller angle is smaller]

(4) Is it possible to draw a triangle with sides of length 2 cm, 3 cm and 7 cm?

Sol:

Given lengths of sides are 2cm, 3cm and 7cm.

To check whether it is possible to draw a triangle with the given lengths of sides

We know that,

A triangle can be drawn only when the sum of any two sides is greater than the third side.

So, let's check the rule.

$2 + 3 \ngtr 7$ or $2 + 3 < 7$

$2 + 7 > 3$

and $3 + 7 > 2$

Here $2 + 3 \ngtr 7$

So, the triangle does not exit.

(5) O is any point in the interior of ΔABC. Prove that

(i) $AB + AC > OB + OC$

(ii) $AB + BC + CA > OA + QB + OC$

(iii) OA + OB + OC > (1/2)(AB + BC +CA)

Solution:

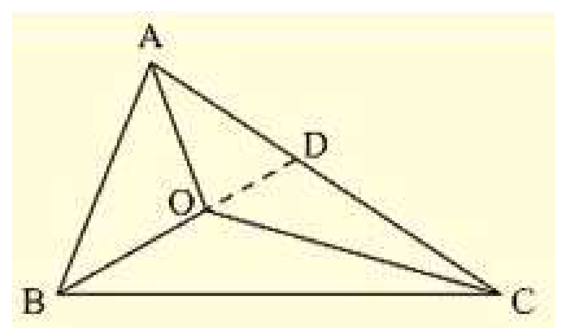
Given that O is any point in the interior of Δ ABC

To prove

(i) AB + AC > OB + OC

(ii) AB + BC + CA > OA + QB + OC

(iii) OA + OB + OC > (1/2)(AB + BC +CA)



We know that in a triangle the sum of any two sides is greater than the third side.

So, we have

In Δ ABC

AB + BC > AC

BC + AC > AB

AC + AB > BC

In Δ OBC

OB + OC > BC…….(i)

In Δ OAC

OA + OC > AC……(ii)

In Δ OAB

OA + OB > AB……(iii)

Now, extend (or) produce BO to meet AC in D.

Now, in Δ ABD, we have

AB + AD > BD

AB + AD > BO + OD …….(iv) [BD = BO + OD]

Similarly in Δ ODC, we have

OD + DC > OC……(v)

(i) Adding (iv) and (v), we get

AB + AD + OD + DC > BO + OD + OC