Board – CBSE | **Class – 7th** | **Topic – The Triangle and Its Properties 6.4**

Q.1 Is it possible to have a triangle with the following sides?

(i) 2 cm, 3 cm, 5 cm (ii) 3 cm, 6 cm, 7 cm (iii) 6 cm, 3 cm, 2 cm

Sol: In a triangle, the sum of the lengths of either two sides is always greater than the third side.

(i) Given that, the sides of the triangle are 2 cm, 3 cm, 5 cm.

It can be observed that,

$2 + 3 = 5$ cm

However, 5 cm $= 5$ cm

Hence, this triangle is not possible.

(ii) Given that, the sides of the triangle are 3 cm, 6 cm, 7 cm.

Here, $3 + 6 = 9$ cm > 7 cm

$6 + 7 = 13$ cm > 3 cm

$3 + 7 = 10$ cm > 6 cm

Hence, this triangle is possible.

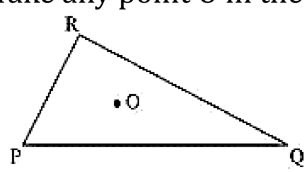
(iii) Given that, the sides of the triangle are 6 cm, 3 cm, 2 cm.

Here, $6 + 3 = 9$ cm > 2 cm

However, $3 + 2 = 5$ cm < 6 cm

Hence, this triangle is not possible.

Q.2 Take any point O in the interior of a triangle PQR. Is



(i) $OP + OQ > PQ$?

(ii) $OQ + OR > QR$?

(iii) $OR + OP > RP$?

Sol: If O is a point in the interior of a given triangle, then three triangles ΔOPQ, ΔOQR, and ΔORP can be constructed. In a triangle, the sum of the lengths of either two sides is always greater than the third side.

(i) Yes, as ΔOPQ is a triangle with sides OP, OQ, and PQ.

$OP + OQ > PQ$

(ii) Yes, as ΔOQR is a triangle with sides OR, OQ, and QR.

$OQ + OR > QR$

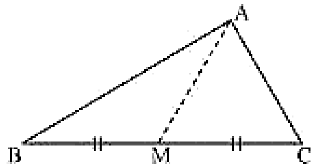
(iii) Yes, as ΔORP is a triangle with sides OR, OP, and PR.

$OR + OP > PR$

Q.3 AM is a median of a triangle ABC.

Is $AB + BC + CA > 2\,AM$?

(Consider the sides of triangles ΔABM and ΔAMC.)



Sol: In a triangle, the sum of the lengths of either two sides is always greater than the third side.

In ΔABM,

$AB + BM > AM$ (i)

Similarly, in ΔACM,

$AC + CM > AM$ (ii)

Adding equation (i) and (ii),

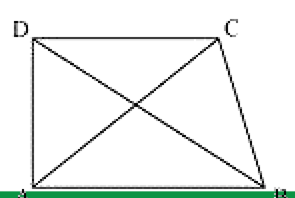
$AB + BM + MC + AC > AM + AM$

$AB + BC + AC > 2AM$

Yes, the given expression is true.

Q.4 ABCD is quadrilateral.

Is $AB + BC + CD + DA > AC + BD$?



Sol: In a triangle, the sum of the lengths of either two sides is always greater than the third side.

Considering ΔABC,

AB + BC > CA(i)

In ΔBCD,

BC + CD > DB (ii)

In ΔCDA,

CD + DA > AC (iii)

In ΔDAB,

DA + AB > DB (iv)

Adding equations (i), (ii), (iii), and (iv), we obtain

AB + BC + BC + CD + CD + DA + DA + AB > AC + BD + AC + BD

2AB + 2BC + 2CD +2DA > 2AC + 2BD

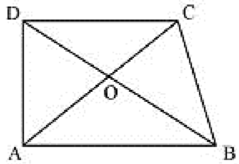
2(AB + BC + CD + DA) > 2(AC + BD)

(AB + BC + CD + DA) > (AC + BD)

Yes, the given expression is true.

Q.5 ABCD is quadrilateral.

Is AB + BC + CD + DA < 2 (AC + BD)?



Sol: In a triangle, the sum of the lengths of either two sides is always greater than the third side.

Considering ΔOAB,

OA + OB > AB (i)

In ΔOBC,

$OB + OC > BC$ (ii)

In ΔOCD,

$OC + OD > CD$ (iii)

In ΔODA,

$OD + OA > DA$ (iv)

Adding equations (i), (ii), (iii), and (iv), we obtain

$OA + OB + OB + OC + OC + OD + OD + OA > AB + BC + CD + DA$

$2OA + 2OB + 2OC + 2OD > AB + BC + CD + DA$

$2OA + 2OC + 2OB + 2OD > AB + BC + CD + DA$

$2(OA + OC) + 2(OB + OD) > AB + BC + CD + DA$

$2(AC) + 2(BD) > AB + BC + CD + DA$

$2(AC + BD) > AB + BC + CD + DA$

Yes, the given expression is true.

Q.6 The lengths of two sides of a triangle are 12 cm and 15 cm. Between what two measures should the length of the third side fall?

Sol: In a triangle, the sum of the lengths of either two sides is always greater than the third side and also, the difference of the lengths of either two sides is always lesser than the third side. Here, the third side will be lesser than the sum of these two (i.e., $12 + 15 = 27$) and also, it will be greater than the difference of these two (i.e., $15 - 12 = 3$). Therefore, those two measures are 27cm and 3 cm.