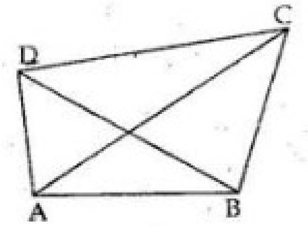
Exercise 9A

Question 9:
Given: ABCD is a quadrilateral and AC is one of its disgonals.



To Prove:

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

(ii) $AB + BC + CD > DA$

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

Construction: Join BD.

Proof: (i) In ΔABC,

$AB + BC > AC$ ...(1)

and, in ΔACD

$AD + CD > AC$ ...(2)

Adding both sides of (1) and (2), we get:

$AB + BC + CD + DA > 2AC$ ...(3)

(ii) In ΔABC,

$AB + BC > AC$

On adding CD to both sides of this inequality, we have,

$AB + BC + CD > AC + CD$ ...(4)

Now, in ΔACD, we have,

$AC + CD > DA$ ...(5)

From (4) and (5) we get

$AB + BC + CD > DA$ ...(6)

(iii) In ΔABD and ΔBDC, we have

$AB + DA > BD$ ...(7)

and $BC + CD > BD$ ...(8)

On adding (7) and (8), we get

$AB + BC + CD + DA > 2BD$ ...(9)

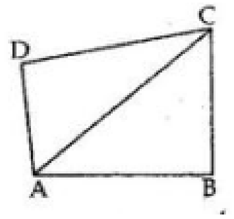
Adding (9) and (3), we have,

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

i.e. $AB + BC + CD + DA > BD + AC$

[Dividing both sides by 2]

Question 10:
Given: ABCD is a quadrilateral.



To Prove : $\angle A + \angle B + \angle C + \angle D = 360^\circ$

Construction : Join AC

Proof : In ΔABC

$\angle CAB + \angle B + \angle BCA = 180^\circ$ ...(i)

In ΔACD,

$\angle DAC + \angle ACD + \angle D = 180^\circ$ ...(ii)

Adding both sides of (i) and (ii) we get

$\angle CAB + \angle B + \angle BCA + \angle DAC + \angle ACD + \angle D = 180^\circ + 180^\circ$

$\Rightarrow \quad \angle CAB + \angle DAC + \angle B + \angle BCA + \angle ACD + \angle D = 360^\circ$

$\Rightarrow \quad \angle A + \angle B + \angle C + \angle D = 360^\circ$

*********** END **********