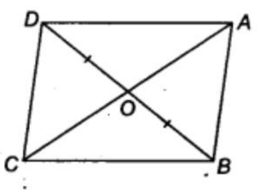
lengths.
∴ BDEF is a parallelogram.

(ii) We have proved that BDEF is a parallelogram.
Similarly, DCEF is a parallelogram and DEAF is also a parallelogram.
Now, parallelogram BDEF and parallelogram DCEF are on the same base EF and between the same parallels BC and EF.
∴ ar($||^{gm}$ BDEF) = ar($||^{gm}$ DCEF)
⇒ $\frac{1}{2}$ar($||^{gm}$ BDEF) = $\frac{1}{2}$ar($||^{gm}$ DCEF)
⇒ ar(ΔBDF) = ar(ΔCDE) ...(1)
[Diagonal of a parallelogram divides it into two triangles of equal area]
Similarly, ar(ΔCDE) = ar(ΔDEF) ...(2)
and ar(ΔAEF) = ar(ΔDEF) ...(3)
From (1), (2) and (3), we have
ar(ΔAEF) = ar(ΔFBD) = ar(ΔDEF) = ar(ΔCDE)
Thus, ar(ΔABC) = ar(ΔAEF) + ar(ΔFBD) + ar(ΔDEF) + ar(ΔCDE) = 4 ar(ΔDEF)
⇒ ar(ΔDEF) = $\frac{1}{4}$ar(ΔABC)

(iii) We have, ar ($||^{gm}$ BDEF) = ar(ΔBDF) + ar(ΔDEF)
= ar(ΔDEF) + ar(ΔDEF) [∵ ar(ΔDEF) = ar(ΔBDF)]
2ar(ΔDEF) = 2[$\frac{1}{4}$ar(ΔABC)]
= $\frac{1}{2}$ar(ΔABC)
Thus, ar ($||^{gm}$ BDEF) = $\frac{1}{2}$ar(ΔABC)

Ex 9.3 Class 9 Maths Question 6.
In figure, diagonals AC and BD of quadrilateral ABCD intersect at 0 such that OB = OD. If AB = CD, then show that
(i) ar(DOC) = ar(AOB)
(ii) ar (DCB) = ar (ACB)
(iii) DA || CB or ABCD is a parallelogram



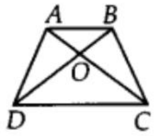
Ex 9.3 Class 9 Maths Question 15.

Diagonals AC and BD of a quadrilateral ABCD intersect at 0 in such a way that ax(AOD) = ar(BOC). Prove that ABCD is a trapezium.

Solution:

We have a quadrilateral ABCD and its diagonals AC and BD intersect at O such that

ar(ΔAOD) = ar(ΔBOC) [Given]



Adding ar(ΔAOB) to both sides, we have

ar(ΔAOD) + ar(ΔAOB) = ar(ΔBOC) + ar(ΔAOB)

⇒ ar(ΔABD) = ar(ΔABC)

Also, they are on the same base AB.

Since, the triangles are on the same base and having equal area.

∴ They must lie between the same parallels.

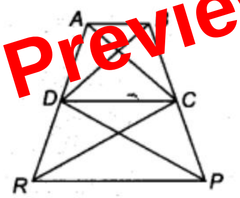
∴ AB || DC

Now, ABCD is a quadrilateral having a pair of opposite sides parallel.

So, ABCD is a trapezium.

Ex 9.3 Class 9 Maths Question 16.

In figure ax(DRC) = ar(DPC) and ai(BDP) = ar(ARC). Show that both the quadrilaterals ABCD and DCPR are trapeziums.



Solution:

tfclfiftWe have, ar(ΔDRC) = ar(ΔDPC) [Given]

And they are on the same base DC.

∴ ΔDRC and ΔDPC must lie between the same parallels.

So, DC || RP i.e.r a pair of opposite sides of quadrilateral DCPR is parallel.

∴ Quadrilateral DCPR is a trapezium.

Again, we have

ar(ΔBDP) = ar(ΔARC) [Given] ...(1)

Also, ar(ΔDPC) = ar(ΔDRC) [Given] ...(2)

Subtracting (2) from (1), we get

ar(ΔBDP) – ar(ΔDPC) = ar(ΔARQ – ar(ΔDRQ

⇒ ar(ΔBDC) = ar(ΔADC)

And they are on the same base DC.

∴ ABDC and AADC must lie between the same parallels.