Chapter - 9

(Area of parallelograms and triangles)

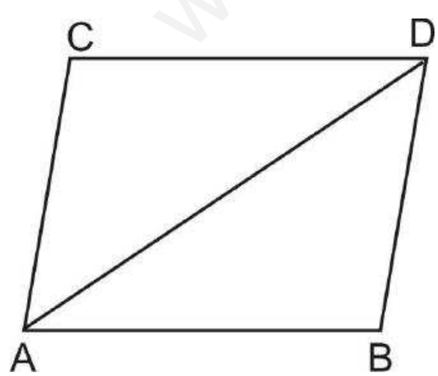
Key Concepts

* Area of a parallelogram = (base X height)
* Area of a triangle = ½ X base X height
* Area of a trapezium = $\frac{1}{2} \times (sum\ of\ parallel\ sides) \times distance\ between\ them$
* Area of rhombus = $\frac{1}{2} \times product\ of\ diagonals$
* Parallelogram on the same base and between the same parallels are equal in area.
* A parallelogram and a rectangle on the same base and between the same parallels are equal in area.
* Triangles on the same base and between the same parallels are equal in area.
* If a triangle and parallelogram are on the same base and between the same parallels, then.

  (Area of triangle) $= \frac{1}{2}(area\ of\ the\ parallelogram)$
* A diagonal of parallelogram divides it into two triangles of equal areas.

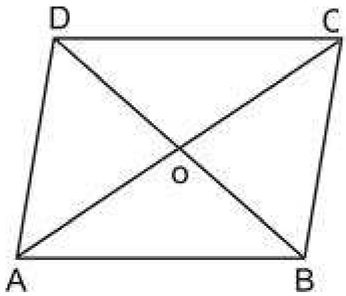
  In parallelogram ABCD, we have

  Area of $\Delta ABD = area\ of\ \Delta ACD$



* The diagonals of a parallelogram divide it into four triangles of equal areas therefore

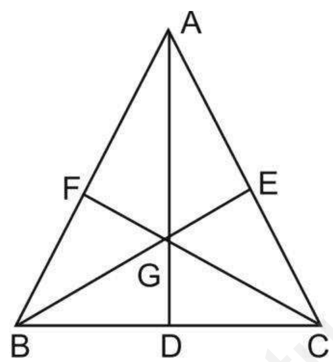
$ar(\Delta AOB) = ar\ (\Delta COD) = ar\ (\Delta AOD) = ar(\Delta BOC)$



* A median AD of a ΔABC divides it into two triangles of equal areas. Therefore $ar(\Delta ABD) = ar(\Delta ACD)$

* If the medians of a ΔABC intersect at G, then

$ar(\Delta AGB) = ar(\Delta AGC) = ar(\Delta BGC) = \frac{1}{3} ar(\Delta ABC)$



Section - A

Q.1 If E, F, G & H are mid points of sides of parallelogram ABCD, then show that $ar(EFGH) = \frac{1}{2}\ ar(ABCD)$

Q.2 Point P and Q are on the sides DC and AD of a parallelogram respectively. Show that. $ar(APB) = ar(BQC)$

Q.3 Show that a median of a triangle divides it into two triangle of equal area.

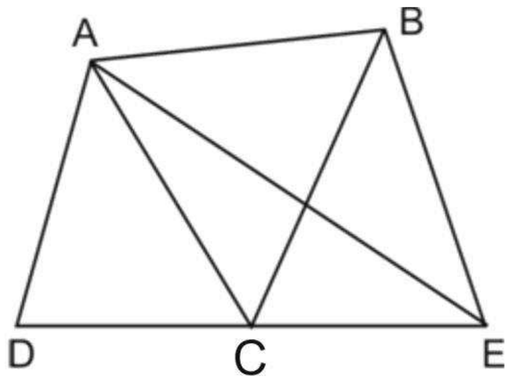
Q.4 PQRS and ABRS are two parallelograms and X being any point on side BR. Show that.

(i) $ar(PQRS) = ar(ABRS)$

(ii) $ar(A \times S) = \frac{1}{2}\ ar(PQRS)$

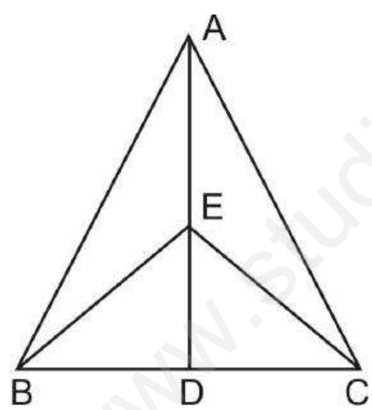
Section - B

Q.5 In given figure ABCD is a quadrilateral and BE||AC is such that BE meets at E on the extended CD. Show that area of triangle ADE is equal to the area of quadrilateral ABCD.



Q.6 In given figure E be any point on the median AD of triangle, show that

$ar(ABE) = ar\ (ACE)$



Q.7 Show that the diagonals of a parallelogram divides it into four triangles of equal area. OR

OR D, E & F are mid points of sides of triangle BC, CA & AB respectively. Show that

(i) BDEF is a parallelogram

(ii) $ar(DEF) = \frac{1}{4}\ ar(ABC)$

(iii) $ar\ (BDEF) = \frac{1}{2}\ ar(ABC)$

Section - C

Q.8 ABCD is a trapezium in which AB||CD and diagonals AC and BD intersect at 0. Prove that $ar(\Delta AOD) = ar(\Delta BOC)$

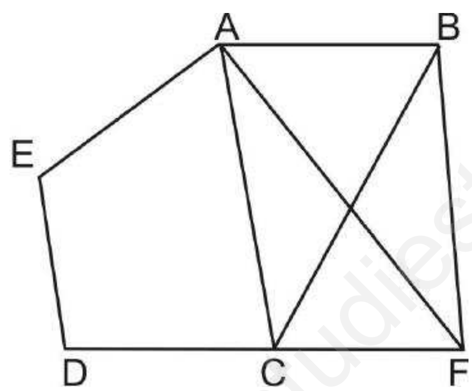
Q.9 XY is a line parallel to side BC of a triangle ABC. If BE||AC and CF||AB meet XY at E and F respectively.

$ar(ABE) = ar(ACF)$

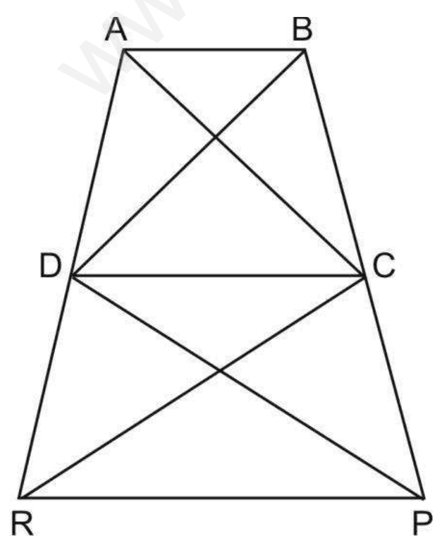
Q.10 In adjoining figure ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show that

(i) $ar(ACB) = ar(ACF)$

(ii) $ar(AEDF) = ar(ABCDE)$

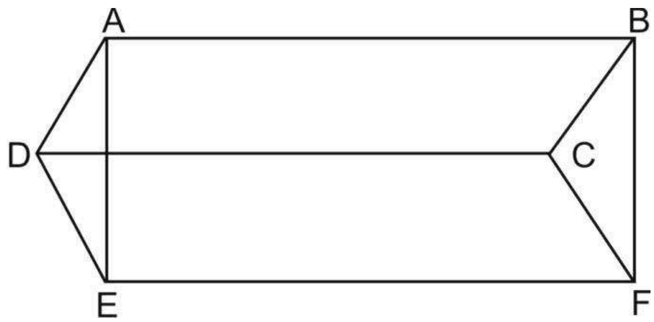


Q.11 In given figure $ar(DRC) = ar(DPC) and\ ar(BDP) = ar(ARC)$ show that both quadrilaterals ABCD and DCPR are trapeziums.



Self Evaluation

Q.12 In given figure ABCD, DCFE and ABFE are parallelogram show that ar (ADE) = ar (BCF)



Q.13 P and Q are respectively the mid points of sides AB and BC of a triangle ABC and R is the mid-point of AP, show that.

(i) $ar(PQR) = \frac{1}{2}\, ar(ARC)$

(ii) $ar(RQC) = \frac{3}{8}\, ar(ABC)$

(iii) $ar(PBQ) = ar(ARC)$

Q.14 Parallelogram ABCD and rectangle ABEF are on the same base and have equal areas. Show that perimeter of the parallelogram is greater than that of rectangle.
