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Chapter 9

Q1. A diagonal of a parallelogram divides it into two triangles of equal area.

Q2. Parallelograms on the same base and between the same parallels are equal in area.

Q3. A parallelogram and a rectangle on the same base and between the same parallels are equal in area.

Q4. The area of a parallelogram is the product of its base and the corresponding altitude.

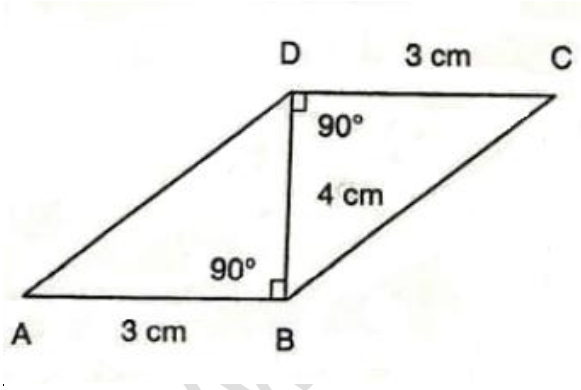
Q5. Parallelograms on equal bases and between the same parallels are equal in area.

Q6. The area of a triangle is half the product of any of its sides and the corresponding altitude.

Q7. If a triangle and a parallelogram are on the same base and between the same parallels, the area of the triangle is equal to half of the parallelogram.

Q8. The area of a trapezium is half the product of its height and the sum of parallel sides.

Q9. ABCD is a quadrilateral and BD is one of its diagonals as shown in Figure. Show that ABCD is a parallelogram and find its area.



Q10. In parallelogram ABCD, AB = 10 cm. The altitudes corresponding to the sides AB and AD are respectively 7 cm and 8 cm. Find AD.

Q11. Show that the segment joining the mid-points of a pair of opposite sides of a parallelogram, divides it into two equal parallelograms.

Q12. The diagonals of a parallelogram ABCD intersect at O. A line through O meets AB in X

and CD in Y. Show that

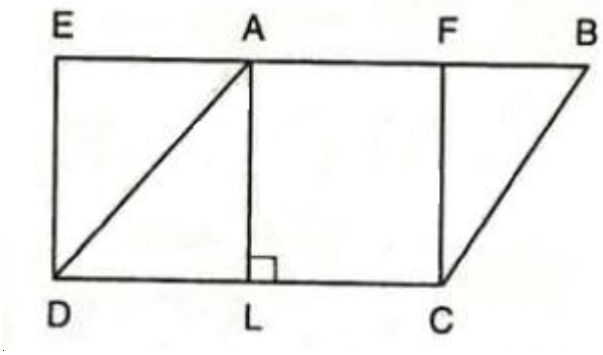
ar (□AXYD) = $\frac{1}{2}$ ar (II^{gm} ABCD)

Q13. Prove that of all parallelograms of which the sides are given, the parallelogram which is rectangle has the greatest area.

Q14. In Figure, ABCD is a parallelogram and EFCD is a rectangle. Also AL ⊥ DC.

Prove that

(i) ar(ABCD) = ar (EFCD) (ii) ar (ABCD) = DC x AL



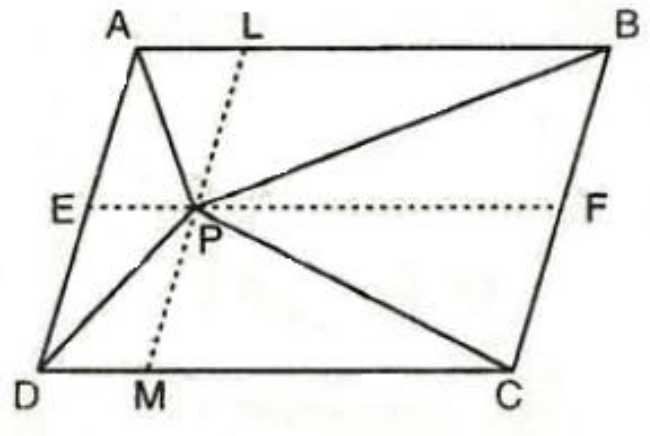
Q15. If E, F, G and H are respectively the mid-points of the sides of a parallelogram ABCD, Show that ar (EFGH) = $\frac{1}{2}$ar(ABCD).

Q16. P and Q are any two points lying on the sides DC and AD respectively of a parallelogram ABCD. Show that ar (ΔAPB) = ar (ΔBQC).

Q17. In Figure, P is a point in the interior of a parallelogram ABCD. Show that

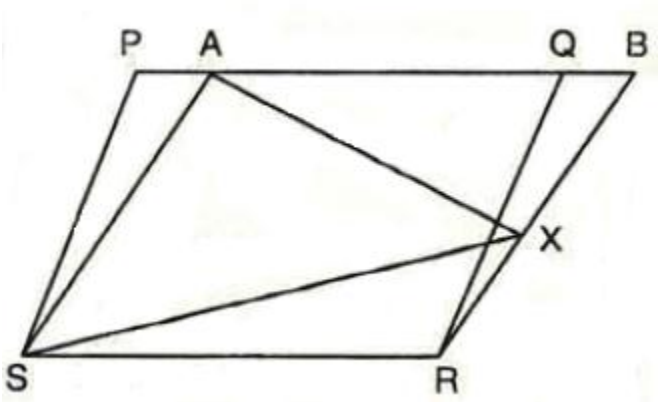
(i) ar (ΔAPB) + ar (ΔPCD) = 1ar (II^{gm} ABCD)

(ii) ar (ΔAPD) + ar (ΔPBC) = ar (ΔAPB) + ar (ΔPCD)



Q18. In Figure., PQRS and ABRS are parallelograms and X is any point on side BR. Show that

(i) ar (II^{gm} PQRS) = ar (II^{gm} ABRS) (ii) ar (ΔAXS) = $\frac{1}{2}$ ar (II^{gm} PQRS)



Q19. Triangles on the same base and between the same parallels are equal in area.

Q20. Triangles having equal areas and having one side of one of the triangles, equal to one side of the other, have their corresponding altitudes equal.

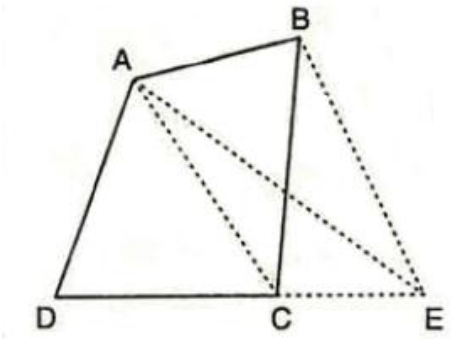
Q21. Two triangles having the same base (or equal bases) and equal areas lie between the same parallels.

Q22. Show that a median of a triangle divides it into two triangles of equal area.

Q23. AD is one of the medians of a ΔABC. X is any point on AD. Show that ar{ΔABX) = ar {Δ ACX).

Q24. In a ΔABC, E is the mid-point of median AD. Show that ar (ΔBED) = $\frac{1}{4}$ ar(ΔABC).

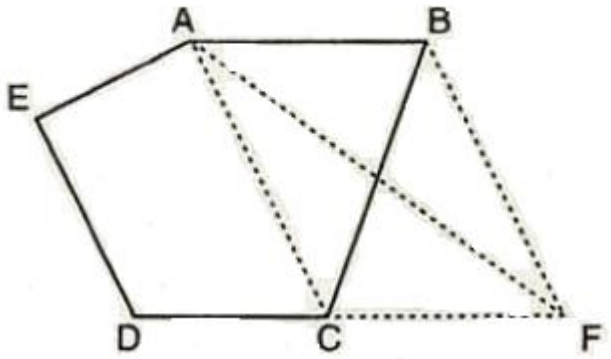
Q25. In Fig. 15.32, ABCD is a quadrilateral and BE II AC and also BE meets DC produced at E. Show that area of ΔADE is equal to the area of the quadrilateral ABCD.



Q26. Diagonals AC and BD of a trapezium ABCD with AB II DC intersect each other at O.Prove that ar (Δ AOD) = ar (Δ BOC) .

Q27. In Figure, ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show that

(i) ar (ΔACB) = ar (ΔACF) (ii) at (AEDF) = ar (ABCDE)



Q28. Show that the diagonals of a parallelogram divide it into four triangles of equal area.

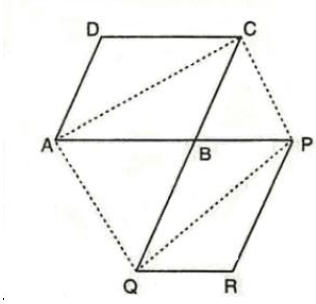
Q29. The diagonals of quadrilateral ABCD , AC and BD intersect in O. Prove that if BO = OD, the triangles ABC and ADC are equal in area.

Q30. If the diagonals AC, BD of a quadrilateral ABCD, intersect at 0, and separate the quadrilateral into four triangles of equal area, show that quadrilateral ABCD is a parallelogram.

Q31. If each diagonal of a quadrilateral separates it into two triangles of equal area then show that the quadrilateral is a parallelogram.

Q32. Show that the area of a rhombus is half the product of the lengths of its diagonals.

Q33. The side AB of a parallelogram ABCD is produced to any point P. A line through A and parallel to CP meets CB produced at Q and then parallelogram PBQR is completed as shown in Figure. Show that ar (II^{gm} ABCD) = ar (II^{gm} PBQR).

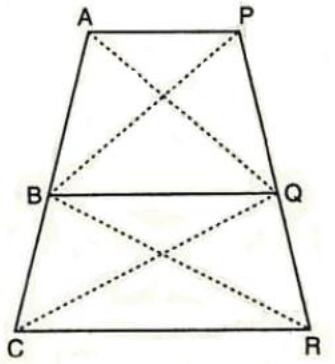


Q34. A villager Itwari has a plot of land of the shape of a quadrilateral. The Gram Panchayat of the village decided to take over some portion of plot from one of the comers to construct a Health centre. Itwari agrees to the above proposal with the condition that he should be given equal amount of land in lieu of his land adjoining his plot so as to form a triangular plot. Explain how his proposal will be implemented.

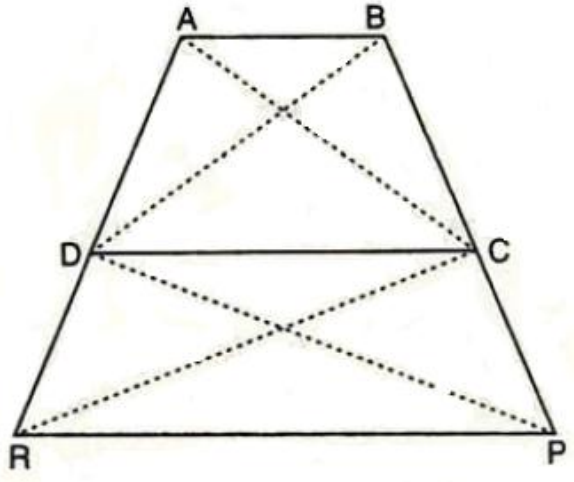
Q35. ABCD is a trapezium with AB II DC. A line parallel to AC intersects AB at X and BC at Y. Prove that ar (Δ ADX) = ar (Δ ACY).

Q36. Diagonals AC and BD of a quadrilateral ABCD intersect at O in such a way that ar (Δ AOD) = ar (Δ BOC) . Prove that ABCD is a trapezium.

Q37. In Figure, AP II BQ II CR. Prove that ar (ΔAQC) = ar (PBR)



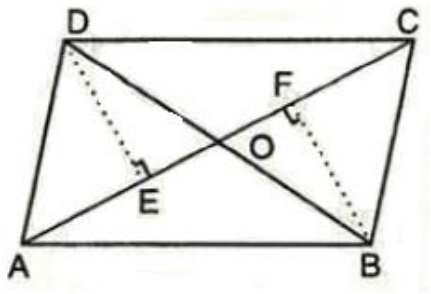
Q38. In Figure, ar (ΔDRC) = ar (ΔDPC) and ar (ΔBDP) = ar (ΔARC) . Show that both the quadrilaterals ABCD and DCPR are trapeziums.



Q39. In Figure, diagonals AC and BD of quadrilateral ABCD intersect at O such that OB = OD. If AB = CD, show that:

(i) ar (ΔAOD) = ar (ΔBOC) (ii) ar (ΔABD) = ar (ΔABC)

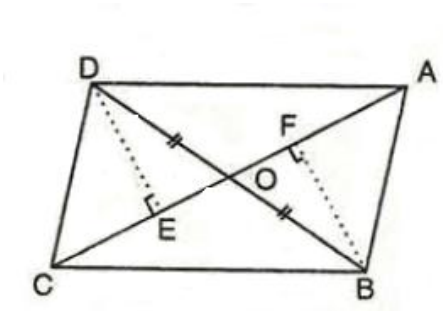
(iii) DA II CB or, ABCD is a parallelogram.



Q40. In Figure, diagonals AC and BD of quadrilateral ABCD intersect at O such that OB= OD. If AB = CD, show that:

(i) ar (ΔAOB) = ar (ΔDOC) (ii) ar (ΔACB) = ar (ΔDCB)

(iii) DA II CB or, ABCD is a parallelogram.



Q41. A point O inside a rectangle ABCD is joined to the vertices. Prove that the sum of the areas of a pair of opposite triangles so formed is equal to the sum of the other pair of triangles.

Q42. Prove that the area of a rhombus is equal to half the rectangle contained by its diagonals.

Q43. ABCD is a parallelogram and O is any point in its interior. Prove that:

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

(ii) ar(ΔAOB) + ar (ΔCOD) = $\frac{1}{2}$ ar(ll^{gm} ABCD)

Q44. A quadrilateral ABCD is such that diagonal BD divides its area in two equal parts. Prove that BD bisects AC.

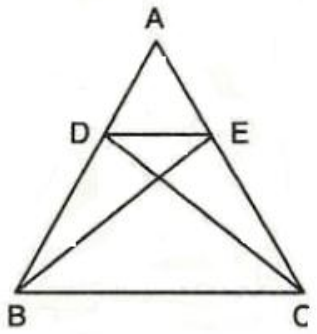
Q45. Parallelogram ABCD and rectangle ABEF have the same base AB and also have equal areas. Show that the perimeter of the parallelogram is greater than that of the rectangle.

Q46. O is any point on the diagonal BD of the parallelogram ABCD. Prove that

ar(ΔOAB) = ar(ΔOBC)

Q47. Triangles ABC and DBC are on the same base BC with A, D on opposite sides of line BC, such that ar (ΔABC) = ar (ΔDBC). Show that BC bisects AD.

Q48. In Figure, D, E are points on sides AB and AC respectively or Δ ABC, such that ar(ΔBCE) = ar(ΔBCE). Show that DE II BC.



Q49. If the medians of a Δ ABC intersect at G, show that

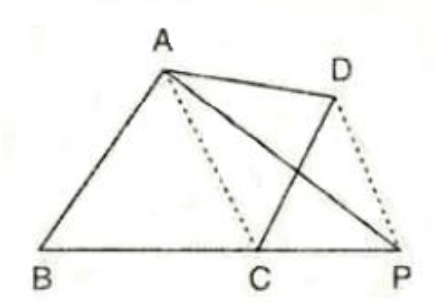
ar(ΔAGB) = ar(ΔAGC) = ar(ΔBGC) $= \frac{1}{3}$ ar(ΔABC).

Q50. D, E, F are the mid-points of the sides BC, CA and AB respectively of ΔABC, prove that BDEF is a parallelogram whose area is half that of ΔABC. Also, show that ar (ΔDEF) = $\frac{1}{4}$ ar(ΔABC) and ar (II^{gm} BDEF) = $\frac{1}{2}$ ar (ΔABC)

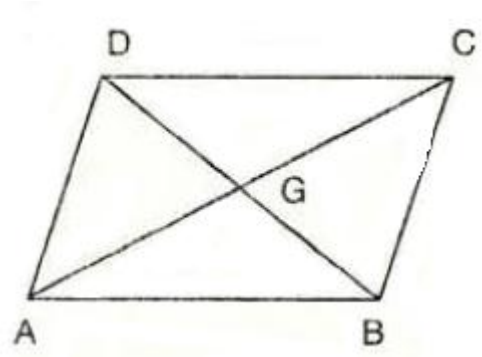
Q51. BD is one of the diagonals of a quadrilateral ABCD. AM and CN are the perpendiculars from A and C respectively, on BD. Show that .

ar (quad. ABCD) = $\frac{1}{2}$BD (AM + CN)

Q52. ABCD is a quadrilateral. A line through D, parallel to AC, meets BC produced in P as shown in Figure. Prove that ar (ΔABP) = ar(quad. ABCD).



Q53. In Figure, it is given that AD II BC Prove that ar (ΔCGD) = ar (ΔABG).



Q54. XY is a line parallel to side BC of ΔABC. BE II AC and CF II AB meet XY in E and E respectively. Show that ar (ΔABE) = ar(ΔACF).

Q55. E, F, G, H are respectively, the mid-points of the sides AB, BC, CD and DA of parallelogram ABCD. Show that the quadrilateral EFGH is a parallelogram and that its area is half the area of the parallelogram ABCD.

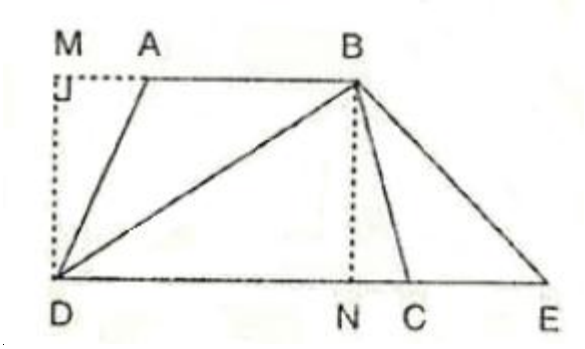
Q56. The side AB of a parallelogram ABCD is produced to any point P. A line through A parallel to CP meets CB produced in Q and the parallelogram PBQR completed. Show that ar (II^{gm} ABCD) = ar(II^{gm} BPRQ).

Q57. Any point D is taken in the base BC of a triangle ABC and AD is produced to E, making DE equal to AD. Show that ar (ΔBCE) = ar (ΔABC).

Q58. In ΔABC, D is the mid-point of AB. P is any point of BC. CQ II PD meets AB in Q. Show that ar (ΔBPQ) = $\frac{1}{2}$ ar (ΔABC).

Q59. In a parallelogram ABCD, E, F are any two points on the sides AB and BC respectively. Show that ar (Δ ADF) = ar (ΔDCE).

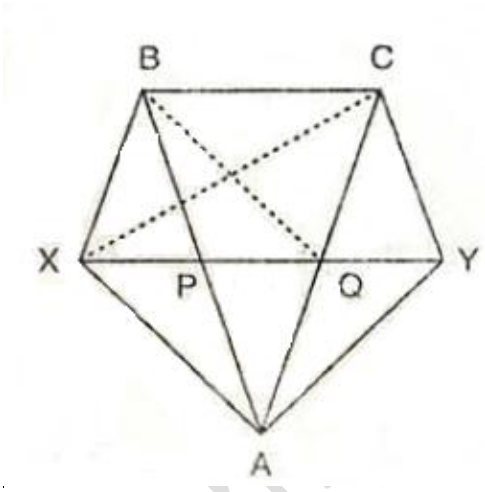
Q60. In Figure, ABCD is a trapezium in which AB II DC. DC is produced to E such that CE = AB, prove that ar (ΔABD) = ar(ΔBCE).



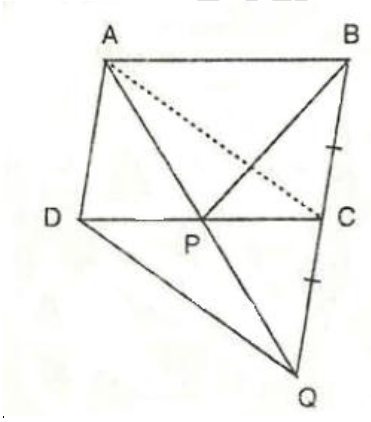
Q61. Prove that the area of an equilateral triangle is equal to $\frac{\sqrt{3}}{4}a^2$, where a is the side of the triangle.

Q62. In Figure, BC II XY, BX II CA and AB II YC Prove that:

ar(ΔABX) = ar(ΔACY)



Q63. In Figure, ABCD is a parallelogram. Prove that: ar(ΔBCP) = ar(ΔDPQ).



Q64. ABC is a triangle in which D is the mid-point of BC and E is the mid-point of AD. Prove that area of Δ BED = $\frac{1}{4}$ area of ΔABC.

Q65. ABCD is a parallelogram X and Yare the mid-points of BC and CD respectively.

Prove that ar(ΔAXY) = $\frac{3}{8}$ ar(ll^{gm} ABCD).

Q66. The diagonals of a parallelogram ABCD intersect at a point O. Through O, a line is drawn to intersect AD at P and BC at Q. Show that PQ divides the parallelogram into two parts of equal area.

Q67. The medians BE and CF of a triangle ABC intersect at G. Prove that area of ΔGBC = area of quadrilateral AFGE.