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CLASS 9 MATHS NOTES

AREAS OF PARALLELOGRAMS AND TRIANGLES

CHAPTER-9

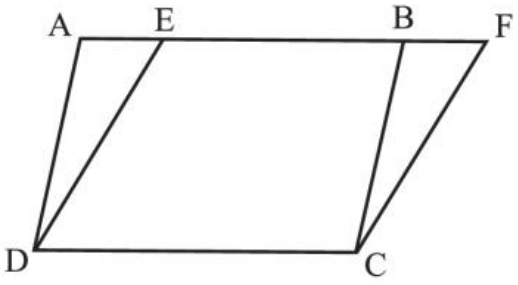
AREAS OF PARALLELOGRAMS & TRIANGLES

KEY POINTS

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

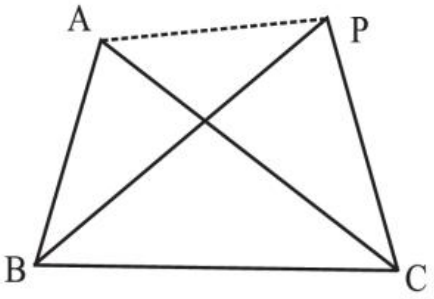
   Two parallelograms ABCD and EFCD on the same base DC and between same parallels AF and DC

   ar (ABCD) = ar (EFCD)



2. Two triangles on the same base and between the same parallels are equal in area.

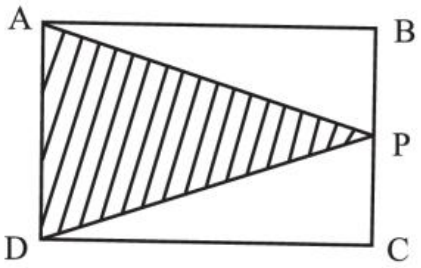
   Two triangles ABC and PBC on the same base BC and between same Parallel lines BC and AP in the given figure then ar (ΔABC) = ar (ΔPBC)



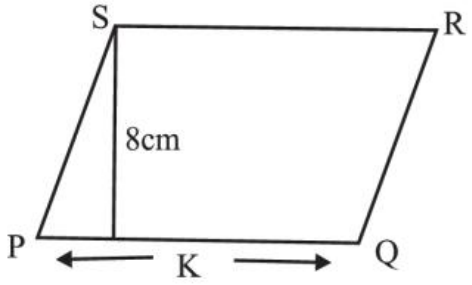
3. Two triangles having the same base and equal areas lies between the same parallels.

Important Questions with Solutions

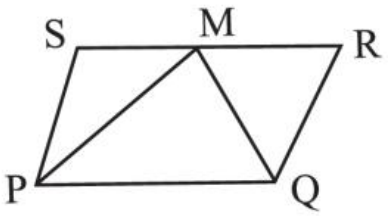
1. If area of Parallelogram ABCD is 80 cm^2. Find the area of ΔAPD.



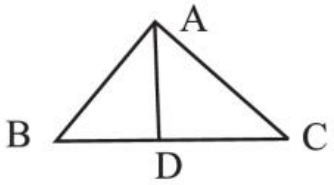
2. If area of Parallelogram PQRS is 88 cm^2 find K.



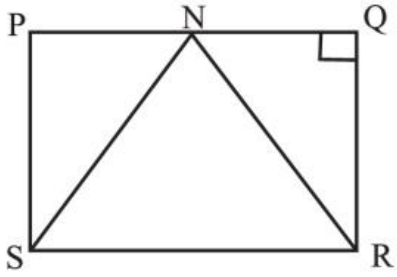
3. PQRS is a Parallelogram and PQM is a triangle. If area of PQM = 18cm^2. Find the area of PQRS.



4. In ΔABC, AD is median. If area of $\Delta ABD = 25cm^2$ find the area of ΔABC.



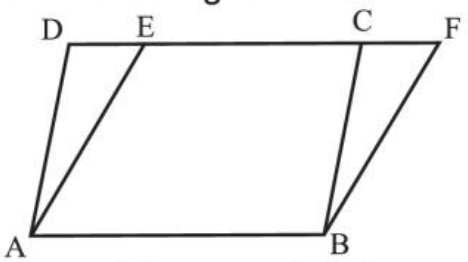
5. In the given figure area of $\Delta SRN = 21cm^2$ RQ = 6cm find PQ.



6. In the figure ABCD and ABFE are Parallelograms then find ar (ΔBCF).

If ar ($\Delta ABCE$) = 18 cm^2

ar ($\Delta ABCD$) = 25 cm^2



7. If two parallelogram are on equal base and between the same parallels, then what is the ratio of their areas?

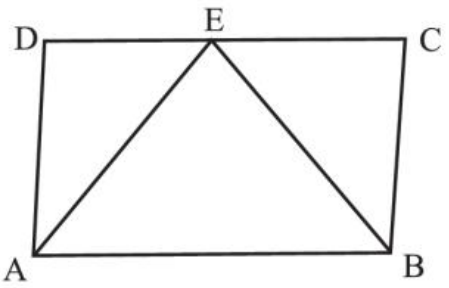
8. A triangle and a Parallelograms are on the same base as well as between the same parallels then find the ratio of areas of triangle to that of the parallelogram.

9. In ΔABC, D, E, F are respectively the mid points of the sides AB, BC and AC. Find ratio of the area of ΔDEF and area of ΔABC.

10. If the base of a parallelogram is 8 cm and its altitude is 5 cm then find its area.

11. If two triangles are on the same base and between the same parallels. Then find the ratio of area of the two triangles.

12. In given figure. If area of parallelogram ABCD is 30 cm^2 then find ar (ΔADE) + ar (ΔBCE)



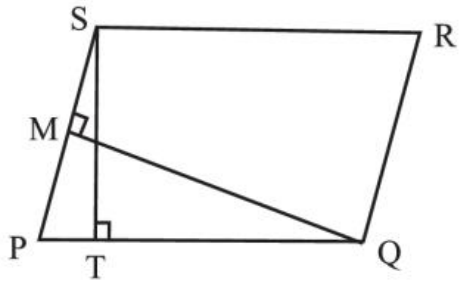
Part – B

13. Show that the median of a triangle divides it into two triangles of equal areas.

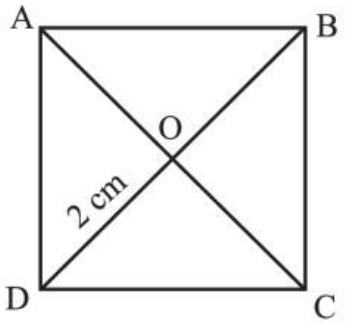
14. P and Q are any two points lying on the side DC and AD respectively of a parallelogram ABCD. Show that ar (APB) = ar (BQC).

15. If the ratio of altitude and area of the parallelogram is 2:11 then find the length of the base of parallelogram.

16. In figure if PQRS is a parallelogram in which PQ=12cm, ST=9cm, QM=6cm, ST $\perp$ PQ, QM $\perp$ SP then find length of SP.

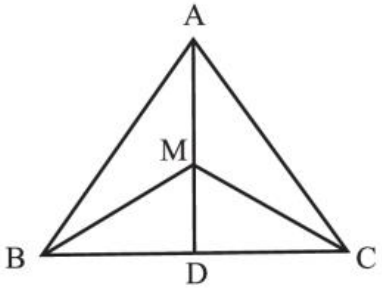


17. In given fig. ABCD is a square whose diagonals are interesting at O. If OD = 2 cm then find the length of AB.



18. Show that the diagonals of a parallelogram divides it into four triangles of equal area.

19. M is any point on the median AD of ∆ABC. Show that ar (AMB) = ar (AMC).



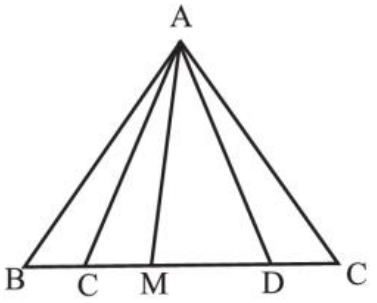
20. If D, E and F are respectively the mid points of sides BC, CA, and AB of ∆ABC show that.

    i) BDEF is a parallelogram.

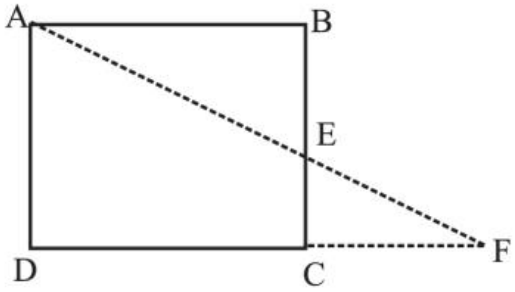
    ii) ar (DEF) = 1/4 ar (∆ABC)

21. In the given figure BC = CD = DE

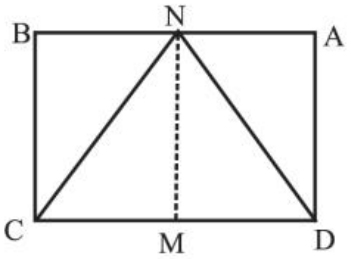
    M is the mid point of CD then find the area of ∆AMC.



22. ABCD is a parallelogram. Through point A, a line AEF is drawn to meet BC at E. DC produced at F. Show that ar (∆BEF) = ar (∆DCE).



23. In the given figure, the area of parallelogram ABCD is 40 cm². If MN is a median of ∆CDN then find the area of ∆NDM.

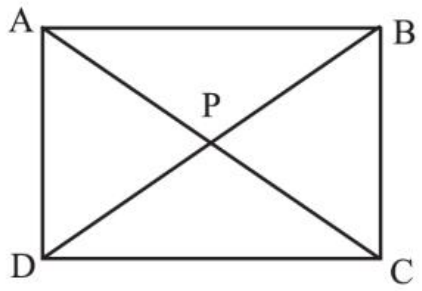


Part-C

24. In the figure, P is the point in the interior of parallelogram ABCD then show that

    (i) ar (APB) + ar (PCD) = 1/2 ar (ABCD)

    (ii) ar (APD) + ar (PBC) = ar (APB) + ar (PCD)



25. ABCD is a trapezium in which the AB || DC. If diagonal AC and BD intersect at O. Prove that ar (AOD) = ar (BOC).

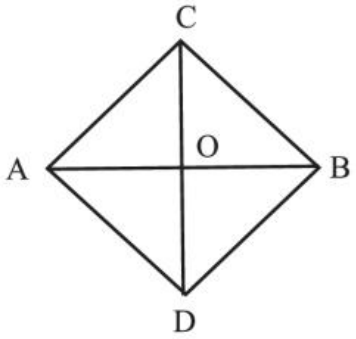
26. ABCD is a parallelogram whose diagonals AC and BD intersect at O. A line through O intersects AB at P and DC at Q. Prove that ar (ΔPOA) = ar (ΔQOC).

27. Diagonal PR and QS of quadrilateral PQRS intersects at T such that

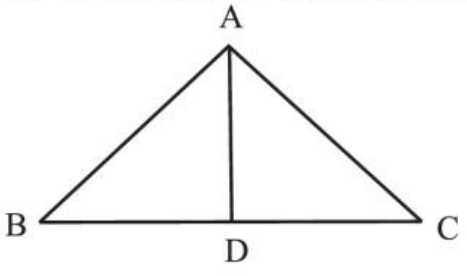
    PT = TR and PS = QR, show that

    ar (ΔPTS) = ar (ΔRTQ).

28. In the figure, ABC and ABD are two triangles on the same base AB. If line segment CD bisects AB at O show that ar (ΔABC) = ar (ΔABD).



29. In given figure AD is median of ΔABC. Prove that ar (ΔABD) = ar (ΔACD).

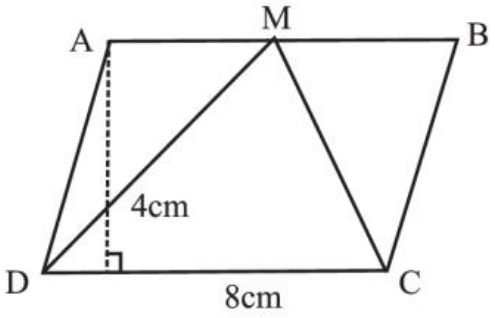


Part – D

30. Prove that parallelogram on the same base and between same parallels are equal in area.

31. Prove that the two triangles on the same base and between the same parallels are equal in area.

32. If a triangle and parallelogram are on the same base and between the same parallels then prove that the area of triangle is equal to the half the area of parallelogram using this find ar (ΔCMD).



33. 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 show that ar (ABE) = ar (ACF).

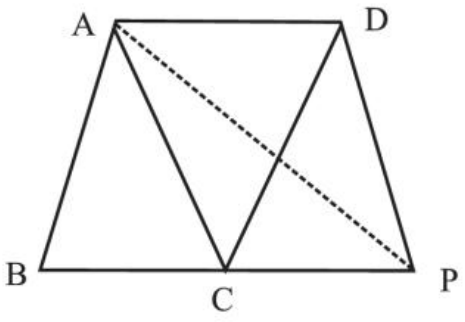
34. If E, F, G and H are respectively the mid points of the sides of a parallelograms ABCD. Show that ar (EFGH) = 1/2 ar (ABCD).

35. There is a plot in a village in the shape of a quadrilateral ABCD. Head of the village wants to get floor cemented so as to use it for panchayat meetings.

    Later he decided to construct playground of shape ΔABP for children. If AC || DP then

    (a) Prove than ar (ABCD) = ar (ABP)

    (b) area ($\square$ ABCD) = 2x _____

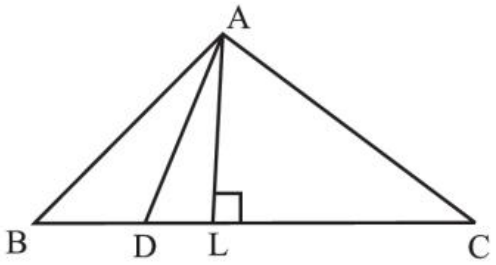


36. A farmer has a square plot of land where he wants to grow five different crops at a time. On half of the area in the middle he want to grow different crops.

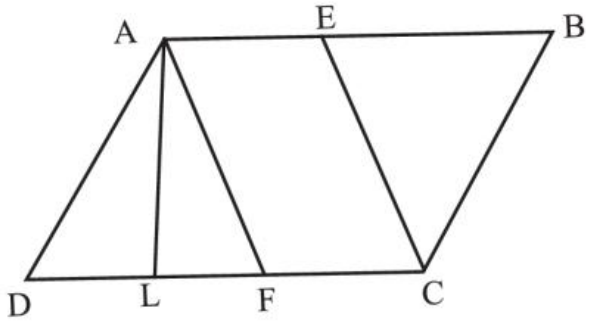
a) Explain by diagram how he can divide the area to fulfill his purpose.

b) For same base and between the same parallels write the relation between area of triangle and parallelogram formed.

37. In the adjoining figure, the point D divides the side BC of ΔABC in the ratio m:n. Prove that ar (ΔABD) : ar (ΔADC) = m : n.

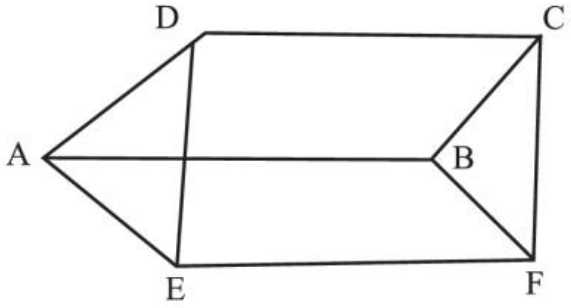


38. ABCD is a parallelogram. E is a point on BA such that BE= 2EA and F is a point on DC such that DF = 2 FC. Prove that AECF is a parallelogram whose area is one third of the area of parallelogram ABCD.

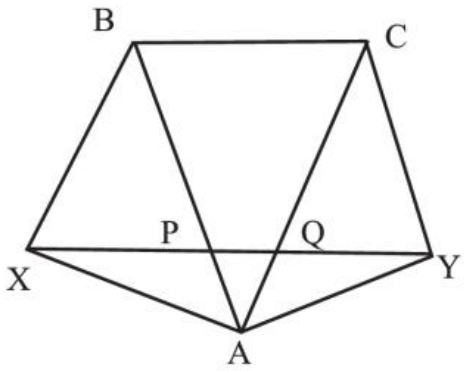


39. In the adjoining figure, two parallelogram ABCD and AEFB are drawn on opposite sides of AB. Prove that

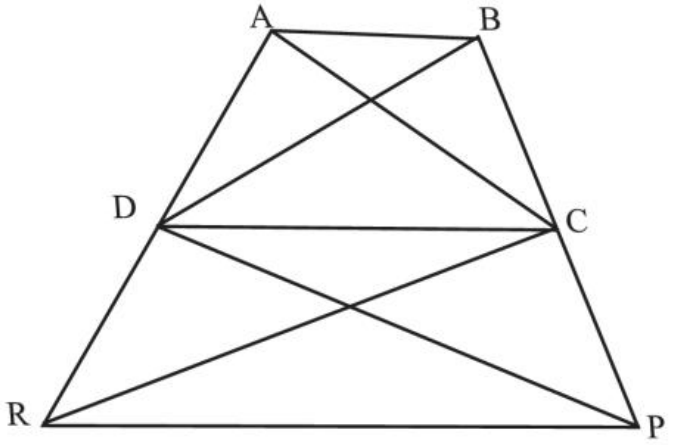
ar(□ABCD) + ar(□ AEFB) = ar (□ EFCD)



40. In the given figure BC || XY, BX || CA and AB || YC. Prove that ar (ΔABX) = ar (ΔACY)



41. In the given figure, ar (DRC) = ar (DPC) and ar (BDP) = ar (ARC). Show that both the quadrilateral ABCD and DCPR are trapeziums.



CHAPTER-9

AREAS OF PARALLELOGRAMS TRIANGLES

ANSWERS

1. $40\ cm^2$

2. $11\ cm$

3. $36\ cm^2$

4. $50\ cm^2$

5. $7\ cm$

6. $7\ cm^2$

7. $1:1$

8. $1:2$

9. $1:4$

10. $40\ cm^2$

11. $1:1$

12. $15\ cm^2$

15. $\frac{11}{2}$ units

16. $18\ cm$

17. $\sqrt{8}\ cm$

21. $\frac{1}{6}\ \Delta ABC$

23. $10\ cm^2$

32. $16\ cm^2$

35. area ($\square$ ADPC) = 2 ar (ΔACD)

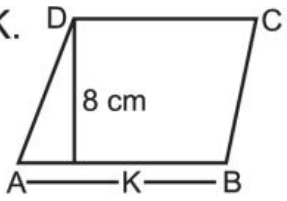
36. area of triangle = $\frac{1}{2}$ area of parallelogram.

PRACTICE TEST

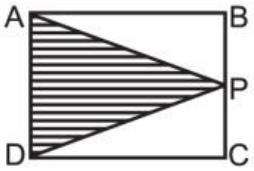
AREAS OF PARALLELOGRAMS & TRIANGLES

Time : 50 Min. M.M. 20

1. If area of parallelogram ABCD is 96 cm^2, find K.

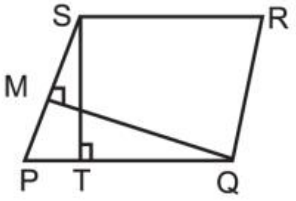


2. If area of parallelogram ABCD is 60 cm^2. Find area of ΔAPD.

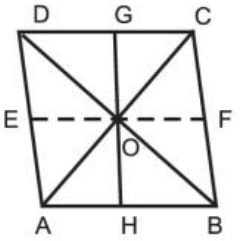


3. Show that the median of a triangle divides it into two triangles of equal area.

4. In figure if PQRS is a parallelogram in which PQ = 12 cm, ST = 9 cm QM = 6 cm, ST $\perp$ PQ, QM $\perp$ SP, then find length of SP.



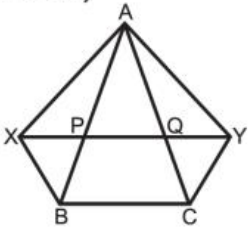
5. The base BC of ΔABC is divided at D. Such that $BD = \frac{1}{2} DC$. Prove that $ar(\Delta ABD) = \frac{1}{3} ar(\Delta ABC)$



6. ABCD is a parallelogram and O is a point in the interior, Prove that

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

7. In the adjoining figure, PQ is a line parallel to the side BC to ΔABC. If BX || CA and Cy || BA meet the line PQ produced in X and Y respectively. Show that $ar(\Delta ABX) = ar(\Delta ACY)$



8. Prove that parallelogram on the same base and between same parallels are equal in area.