MATHS

BOOKS - PSEB

AREAS OF PARALLELOGRAMS AND TRIANGLES

Exercise

1. Which of the following figures

 lie on the same base and between the same parallels. In such a case, write the common base and the two parallels.

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6. Which of the following figures

 lie on the same base and between the same parallels. In such a case, write the common base and the two parallels.

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7. ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$. If AB = 16 cm, AE = 8 cm and CF = 10 cm, find AD.

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8. 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).

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

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10. In Fig.  , P is a point in the interior of a parallelogram ABCD. Show that $ar(APB) + ar(PCD) = \frac{1}{2}ar(ABCD)$.

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11. In fig.  PQRS and ABRS are parallelograms and X is

any point on side BR. Show that $ar(PQRS) = ar(ABRS)$.

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12. A farmer was having a field in the form of a parallelogram PQRS. She took any point A on RS and joined it to points P and Q.In how many parts the field is divided ? What are the shapes of these parts ? The farmer wants to sow wheat and pulses in equal portions of the field separately. How should she do it ?

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13. E is any point on median AD of a $\triangle ABC$. Show that ar (ABE) = ar (ACE).

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14. ABC and BDE are two equilateral triangles such that D is the mid-point of BC. Then ar (BDE)=$\frac{1}{4}$ ar(ABC).

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15. A diagonal of parallelogram divides it into four triangles of equal area.

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16. In Fig. 9.24, ABC and ABD are two triangles on the same base AB. If line- segment CD is bisected by AB at O, show that ar(ABC) = ar

(ABD).

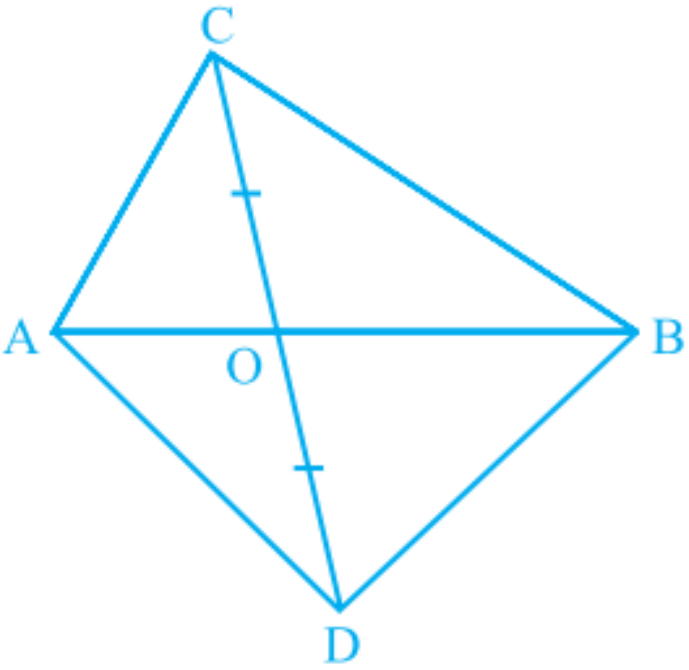

Fig. 9.24

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17. D, E and F are respectively the mid-points of the sides BC, CA and AB of a $\triangle ABC$. Show that:- BDEF is a parallelogram.

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18. D, E and F are respectively the mid points of the sides BC, CA and AB of $\triangle ABC$. Determine the ratio of the areas of triangles DEF and ABC.

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19. D, E and F are respectively the mid points of the sides BC, CA and AB of $\triangle ABC$. Determine the ratio of the areas of triangles DEF and ABC.

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20. In Fig.

 diagonals AC and BD of quadrilateral ABCD intersect at O such that OB = OD. If AB = CD, then show that : ar (DOC)=ar (AOB).

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21. In Fig.

 diagonals AC and BD of quadrilateral ABCD intersect at O such that OB = OD. If AB = CD, then show that : ar (DCB)=ar (ACB).

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22. In Fig.

 diagonals AC and BD of quadrilateral ABCD

intersect at O such that OB = OD. If AB = CD, then show that : $DA \mid\mid CB$ or ABCD is a parallelogram.

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23. D and E are points on sides AB and AC respectively of ΔABC such that ar (DBC) = ar (EBC). Prove that $DEIIBC$.

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24. XY is a line parallel to side BC of triangle ABC. If $BEIIAC$ and $CFIIAB$ meet XY at E and F respectively,show that ar (ABE) = ar (ACF).

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25. 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 . Show

that ar (ABCD) = ar (PBQR). [Hint : Join AC and PQ. Now compare ar (ACQ) and ar (APQ).]

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

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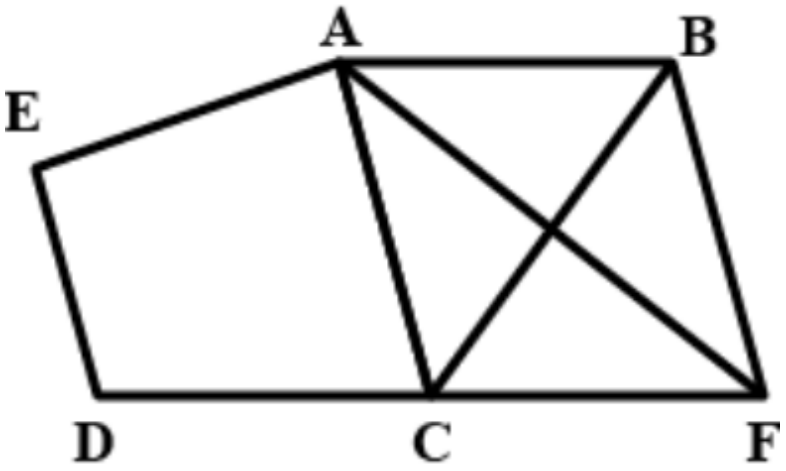
27. In Fig. 9.27, ABCDE is a pentagon. A line through B parallel to AC meets DC produced at F. Show that:- (i) ar (ACB) = ar (ACF) (ii) ar (AEDF) = ar (ABCDE)



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28. ABCD is a trapezium with AB || DC. A line parallel to AC intersects AB at X and BC at Y. Prove that ar (ADX) = ar (ACY). [Hint : Join CX.]

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29. In Fig

 , $APIIBQIICR$. Prove that ar (AQC) = ar (PBR).

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

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31. In Fig.

 , ar (ABQ) = ar (PBQ) and ar (BQC) = ar (BQR). Show that both the quadrilaterals ABQP and BCRQ are trapeziums.

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

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33. In fig.

 , D and E are two points on BC such that $BD = DE = EC$. Show that ar (ABD) = ar

(ADE) = ar (AEC). Can you now answer the question that you have left in the 'introduction' of this chapter, whether the field of Budhia has been actually divided into three parts of equal area ?

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34. In Fig.

 ABCD, DCFE and ABFE are parallelograms. Show that ar (ADE) = ar (BCF).

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35. In Fig.

 ABCD is a parallelogram and BC is produced to a point Q such that AD = CQ. If AQ intersect DC at P, show that ar (BPC) = ar (DPQ).

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36. In Fig.

 , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE

intersects BC at F, show that : ar (BDE)=$\frac{1}{4}$ ar(ABC).

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37. In Fig.

 , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE intersects BC at F, show that : ar (BDE)=$\frac{1}{2}$ ar(BAE).

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38. In Fig.  , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE intersects BC at F, show that : ar(ABC)=2 ar(BEC).

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39. In Fig.  , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE intersects BC at F, show that : ar(BFE)=ar(AFD).

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40. In Fig.

 , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE intersects BC at F, show that : ar(BFE)=2ar(FED).

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41. In Fig.

 , ABC and BDE are two equilateral triangles such that D is the midpoint of BC. If AE intersects BC at F, show that : ar(FED)=$\frac{1}{8}$ ar(AFC).

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42. Diagonals AC and BD of quadrilateral ABCD intersect each other at P. Show that ar

$(APB) \times ar(CPD)$ = ar $(APD) \times ar(BPC)$.

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43. P and Q are respectively the midpoints of sides AB and BC or a triangle ABC and R is the mid-point of AP, show ar(PRQ)=$\frac{1}{2}$ ar(ARC).

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44. P and Q are respectively the midpoints of sides AB and BC or a triangle ABC and R is the mid-point of AP, show ar(RQC) = $\frac{3}{8}$ ar(ABC).

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45. P and Q are respectively the midpoints of sides AB and BC or a triangle ABC and R is the mid-point of AP, show ar(PBQ)=ar(ARC).

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46. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : $\Delta MBC \cong \Delta ABD$.

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47. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the

sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : ar (BYXD)=2ar(MBC).

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48. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : ar(BYXD)=ar(ABMN).

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49. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : $\Delta FCB \cong \Delta ACE$.

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50. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : ar(CYXE)=2ar(FCB).

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51. In Fig.

 ABC is a right triangle right angled at A.

BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment $AX \perp DE$ meets BC at Y. Show that : ar(CYXE)=ar(ACFG).

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52. In Fig.

 ABC is a right triangle right angled at A. BCED, ACFG and ABMN are squares on the sides BC, CA and AB respectively. Line segment

$AX \perp DE$ meets BC at Y. Show that : ar(BCED)=ar(ABMN)+ar(ACFG).

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Example

1. In Fig. 9.13, ABCD is a parallelogram and EFCD is a rectangle. Also, $AL \perp DC$. Prove that (i)

ar (ABCD) = ar (EFCD) (ii) ar (ABCD) = DC × AL

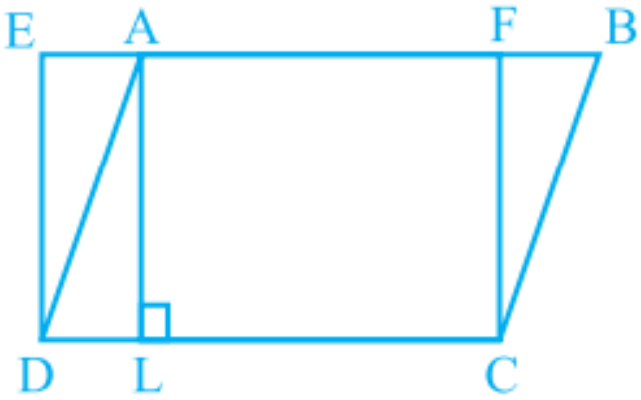

Fig. 9.13

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2. If a triangle and a parallelogram are on the same base and between same parallels, then

the ratio of the area of the triangle to the area of parallelogram is

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

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4. In Fig. 9.22, ABCD is a quadrilateral and BE || AC and also BE meets DC produced at E. Show

that area of ΔADE is equal to the area of the quadrilateral ABCD.

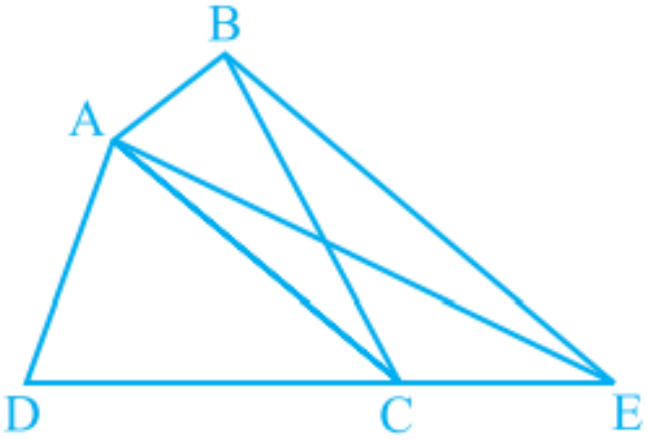

Fig. 9.22

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