Assignments in Mathematics Class IX (Term 2)
9. AREAS OF PARALLELOGRAMS AND TRIANGLES

IMPORTANT TERMS, DEFINITIONS AND RESULTS

- If two figures A and B are congruent, they must have equal areas.

  Or, if A and B are congruent figures, then ar(A) = ar(B)
- If a planar region formed by a figure T is made up of two non-overlapping planar regions formed by figures P and Q, then ar (T) = ar (P) + ar (Q).
- Two figures are said to be on the same base and between the same parallels, if they have a common base (side) and the vertices (or the vertex) opposite to the common base of each figure lie on a line parallel to the base.
- Parallelograms on the same base and between the same parallels are equal in area.
- Area of a parallelogram is the product of its any side and the corresponding altitude.
- Parallelograms on the same base and having equal areas lie between the same parallels.
- If a parallelogram and a triangle are on the same base and between the same parallels, then area of the triangle, is half the area of the parallelogram.
- Two triangles on the same base and between the same parallels are equal in area.
- Two triangles having the same base and equal areas lie between the same parallels.
- Area of a triangle is half the product of its base and the corresponding altitude (or height).
- A median of a triangle divides it into two triangles of equal areas.

SUMMATIVE ASSESSMENT

MULTIPLE CHOICE QUESTIONS [1 Mark]

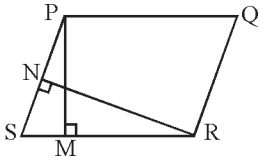
A. Important Questions

1. If sum of two parallel sides of a trapezium is 15 cm and its area is 30 cm^2, then the height of the trapezium is :
(*a*) 2 cm (*b*) 4 cm (*c*) 6 cm (*d*) 8 cm

2. The area of a triangle is 36 cm^2 and one of its sides is 9 cm. Then, the length of the corresponding altitude to the given side is :
(*a*) 8 cm (*b*) 4 cm (*c*) 6 cm (*d*) 9 cm

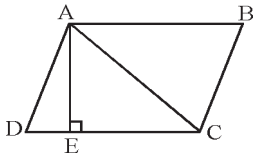
3. The altitude of a parallelogram is twice the length of the base and its area is 1250 cm^2. The lengths of the base and the altitude respectively are :
(*a*) 20 cm, 40 cm (*b*) 35 cm, 70 cm
(*c*) 25 cm, 50 cm (*d*) 15 cm, 30 cm

4. In the figure, PQRS is a parallelogram, PM ⊥ RS and RN ⊥ PS. If PQ = 12 cm, PM = 6 cm and RN = 8 cm, then the length of PS is equal to :



(*a*) 18 cm (*b*) 9 cm (*c*) 4 cm (*d*) 12 cm

5. ABCD is a parallelogram one of whose diagonals is AC. Then, which of the following is true ?



(*a*) ar (ΔADC) > ar (ΔCBA)
(*b*) ar (ΔADC) = ar (ΔCBA)
(*c*) ar (ΔABC) < ar (ΔADC)
(*d*) none of these

6. The area of a rhombus is 20 cm^2. If one of its diagonals is 5 cm, then the other diagonal is :
(*a*) 8 cm (*b*) 5 cm
(*c*) 4 cm (*d*) 10 cm

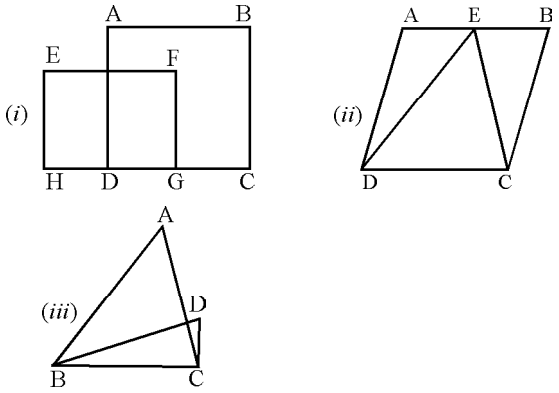
7. Which of the following is true ?
(*a*) Area of a triangle = Base × Altitude
(*b*) Altitude of a triangle = $\frac{\text{Area}}{\text{Base}}$
(*c*) Base of triangle = 2 × $\frac{\text{Area}}{\text{Altitude}}$
(*d*) none of these

8. The sum of the lengths of bases of a trapezium is 13.5 cm and its area is 54 cm^2. The altitude of the trapezium is :
(*a*) 9 cm (*b*) 6 cm (*c*) 8 cm (*d*) 12 cm

9. Two adjacent sides of a parallelogram are 24 cm and 18 cm. If the distance between the longer sides is 12 cm, then the distance between the shorter sides is :

(*a*) 18 cm (*b*) 16 cm (*c*) 9 cm (*d*) none of these

10. Which of the following figures lies on the same base and between the same parallels ?



(*a*) only (i) (*b*) both (i) and (ii)
(*c*) only (iii) (*d*) only (ii)

11. Area of a rhombus is 24 cm^2 , the product of its diagonals is :

(*a*) 48 cm^2 (*b*) 24 cm^2
(*c*) 12 cm^2 (*d*) none of these

12. Sum of the parallel sides of a trapezium is 10 cm and its area is 20 cm^2. The distance between the parallel sides is :

(*a*) 10 cm (*b*) 8 cm (*c*) 4 cm (*d*) 2 cm

13. The area of an isosceles triangle, if its base and corresponding altitude are 6 cm and 4 cm respectively, is :

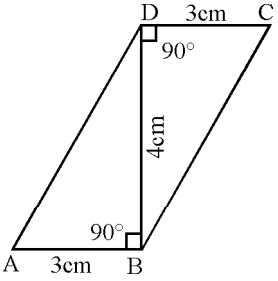
(*a*) 10 cm^2 (*b*) 24 cm^2 (*c*) 12 cm^2 (*d*) 20 cm^2

14. The side of an equilateral triangle is 4 cm. Its area is :

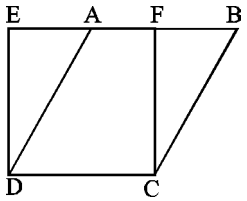
(*a*) $\frac{\sqrt{3}}{4}$ cm^2 (*b*) $4\sqrt{3}$ cm^2
(*c*) $16\sqrt{3}$ cm^2 (*d*) $12\sqrt{3}$ cm^2

15. The area of the parallelogram ABCD is :

(*a*) 10 cm^2
(*b*) 9 cm^2
(*c*) 12 cm^2
(*d*) 15 cm^2



16. In the figure, ABCD is a parallelogram and EFCD is a rectangle. Now which of the following is correct option ?



(*a*) ar (|| gm ADCF) = ar (rect. EFCD)
(*b*) ar (|| gm ABCD) = ar (rect. EFCD)
(*c*) ar (|| gm ADCF) = ar (rect. ABCD)
(*d*) none of these

17. If the sum of the parallel sides of a trapezium is 7 cm and distance between them is 4 cm, then area of the trapezium is :

(*a*) 28 cm^2 (*b*) 7 cm^2
(*c*) 21 cm^2 (*d*) 14 cm^2

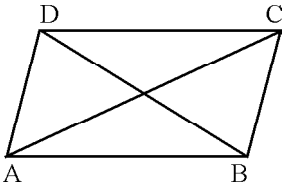
18. ABCD is a quadrilateral whose diagonal AC divides it into two parts, equal in area, then ABCD :

(*a*) is a rectangle
(*b*) is always a rhombus
(*c*) is a parallelogram
(*d*) need not be any of (a), (b) or (c)

19. The median of a triangle divides it into two :

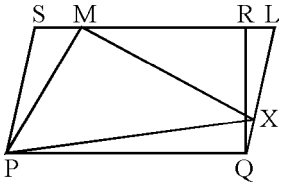
(*a*) triangles of equal area
(*b*) congruent triangles
(*c*) right triangles
(*d*) isosceles triangles

20. If ABCD is a parallelogram, then which of the following is true ?



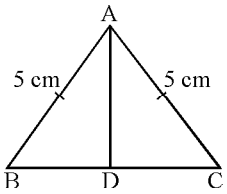
(*a*) ar (ΔABD) = ar (ΔBCD)
(*b*) ar (ΔABD) = ar (ΔABC)
(*c*) ar (ΔABC) = ar (ΔACD)
(*d*) all are true

21. In the figure, PQRS and PQLM are parallelogram and X is any point on side QL. The area of ΔPMX is equal to :



(*a*) area of ΔRQL (*b*) area of || gm PQRS
(*c*) area of ΔSPM (*d*) $\frac{1}{2}$ area of || gm PQLM

22. ABC is an isosceles triangle with each equal side 5 cm, perimeter 18 cm and height AD = 7 cm. Then, the area of the triangle ABC is :

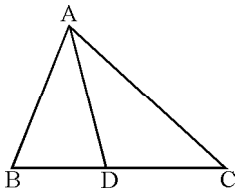


(*a*) 30 cm^2 (*b*) 28 cm^2 (*c*) 14 cm^2 (*d*) 36 cm^2

23. The area of a triangle is equal to the area of a rectangle whose length and breadth are 18 cm and 12 cm respectively. If the base of the triangle is 24 cm, then its altitude is :

(*a*) 18 cm (*b*) 24 cm (*c*) 36 cm (*d*) 48 cm

24. In the given figure, ABC is a triangle and AD is one of its medians. The ratio of areas of triangles ABD and ACD respectively is :

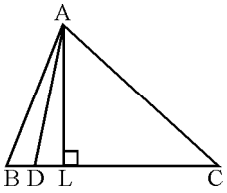


(*a*) 2 : 1 (*b*) 1 : 2 (*c*) 1 : 1 (*d*) 3 : 1

25. If the base of an isosceles triangle is 8 cm and one of the equal sides measures 5 cm, then the area of the isosceles triangle is :

(*a*) 24 cm^2 (*b*) 18 cm^2 (*c*) 12 cm^2 (*d*) 30 cm^2

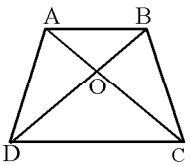
26. In the figure, point D divides the side BC of ΔABC in the ratio $p : q$. The ratio between the ar (ΔABD) and ar (ΔADC) is :



(*a*) $\frac{p}{p+q} : \frac{q}{p+q}$ (*b*) $p : q$

(*c*) $q : p$ (*d*) none of these

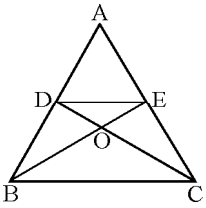
27. In the figure, ABCD is a trapezium in which AB ∥ CD and its diagonals AC and BD intersect at O. Now ar (ΔAOD) is equal to :



(*a*) ar (ΔAOB) (*b*) ar (ΔCOD)

(*c*) ar (ΔBOC) (*d*) none of these

28. In the figure, DE ∥ BC. Then, which of the following relations is true ?



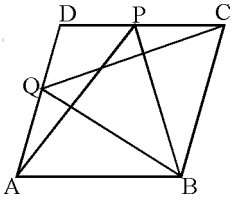
(*a*) ar (ΔACD) = ar (ΔBOC)

(*b*) ar (ΔACD) = ar (ΔABE)

(*c*) ar (ΔACD) = ar (ΔBDE)

(*d*) ar (ΔACD) = ar (ΔCDE)

29. P and Q are any two points lying on the sides CD and AD respectively of a parallelogram ABCD. Now which of the two triangles have equal area ?



(*a*) ΔAPD and ΔBPC (*b*) ΔABQ and ΔCDQ

(*c*) ΔAPB and ΔBQC (*d*) none of these

30. The figure obtained by joining the mid-points of the adjacent sides of a reactangle of sides 8 cm and 6 cm is :

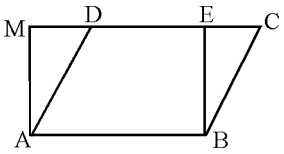
(*a*) a rectangle of area 24 cm^2

(*b*) a square of area 25 cm^2

(*c*) a trapezium of area 24 cm^2

(*d*) a rhombus of area 24 cm^2

31. In the figure, the area of paralleogram ABCD is :



(*a*) AB × BM (*b*) BC × BN

(*c*) DC × DL (*d*) AD × DL

32. The area of the figure formed by joining the mid-points of the adjacent sides of a rhombus with diagonals 12 cm and 16 cm is :

(*a*) 48 cm^2 (*b*) 64 cm^2

(*c*) 96 cm^2 (*d*) 192 cm^2

B. Questions From CBSE Examination Papers

1. If a triangle and a parallelogram are on the same base and between the same parallels, then the ratio of the area of the triangle to the area of parallelogram is : **[T-II (2011)]**

(*a*) 1 : 4 (*b*) 1 : 3 (*c*) 1 : 2 (*d*) 1 : 1

2. The mid point of the sides of a triangle ABC along with any one of the vertices as the fourth point makes a parallelogram whose are is equal to : **[T-II (2011)]**

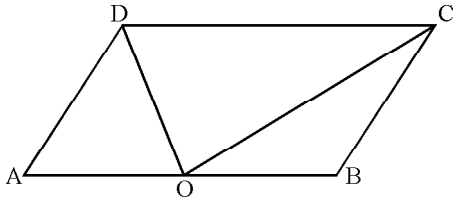
(*a*) $\frac{2}{3}$ ar (ABC) (*b*) $\frac{1}{4}$ ar (ABC)

(*c*) $\frac{1}{3}$ ar (ABC) (*d*) $\frac{1}{2}$ ar (ABC)

3. In ΔABC, D, E, F are respectively the mid points of the sides AB, BC and AC. Area of ΔDEF : area of ΔABC is : **[T-II (2011)]**

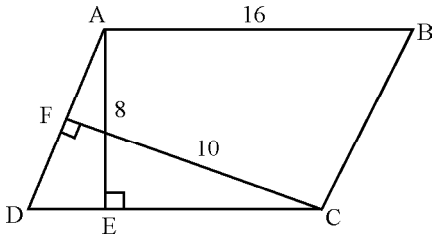
(*a*) 2 : 1 (*b*) 3 : 4 (*c*) 2 : 3 (*d*) 1 : 4

4. ABCD is parallelogram and O is mid point of AB. If area of the parallelogram is 74 sq cm, then area of ΔDOC is : **[T-II (2011)]**



(*a*) 158 sq cm (*b*) 37 sq cm
(*c*) 18.5 sq cm (*d*) 222 sq cm

5. In the figure, ABCD is a parallelogram. AE ⊥ DC, CF ⊥ AD. If AB = 16 cm, AE = 8 cm and CF = 10 cm, then AD equals : **[T-II (2011)]**



(*a*) 12 cm (*b*) 15 cm
(*c*) 12.8 cm (*d*) 15.5 cm

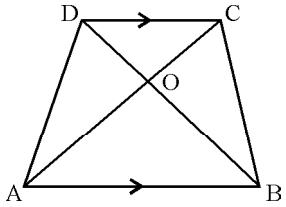
6. AD is the median of a triangle ABC. Area of triangle ADC = 15 cm^2, then ar (ΔABC) is : **[T-II (2011)]**

(*a*) 15 cm^2 (*b*) 22.5 cm^2
(*c*) 30 cm^2 (*d*) 37.5 cm^2

7. ABCD is a parallelogram. O is an interior point. If ar (AOB) + ar (DOC) = 43 sq units, then ar (||gm ABCD) is : **[T-II (2011)]**

(*a*) 172 sq units (*b*) 176 sq units
(*c*) 43 sq units (*d*) 86 sq units

8. In the figure, AB || DC. Which of the following is true about the figure? **[T-II (2011)]**

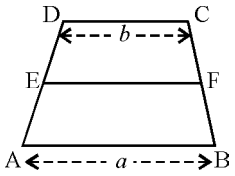


(*a*) ar (AOD) = ar (BOC)
(*b*) ar (AOB) = ar (COD)
(*c*) ar (ADC) = ar (ABC)
(*d*) ar (AOB) = $\frac{1}{4}$ ar (ABCD)

9. A rectangle and a rhombus are on the same base and between the same parallels. Then the ratio of their areas is : **[T-II (2011)]**

(*a*) 1 : 1 (*b*) 1 : 2 (*c*) 1 : 3 (*d*) 1 : 4

10. ABCD is a trapezium with parallel sides AB = *a* cm, CD = *b* cm. E and F are the mid-points of non-parallel sides. The ratio of ar (ABFE) and ar (EFCD) is : **[T-II (2011)]**



(*a*) *a* : *b* (*b*) (3*a* + *b*) : (*a* + 3*b*)
(*c*) (*a* + 3*b*) : (3*a* + *b*) (*d*) (2*a* + *b* : (3*a* + *b*)

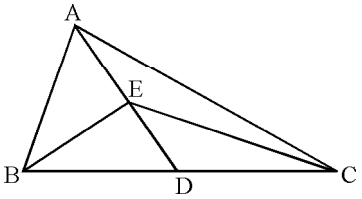
11. If E, F, G, H are respectively the mid points of the sides of a parallelogram ABCD, and ar (EFGH) = 40 cm^2, then ar (parallelogram ABCD) is : **[T-II (2011)]**

(*a*) 40 cm^2 (*b*) 20 cm^2 (*c*) 80 cm^2 (*d*) 60 cm^2

12. AD is the median of a ΔABC. Area of ΔADC = 15 cm^2, then ar (ΔABC) is : **[T-II (2011)]**

(*a*) 15 cm^2 (*b*) 22.5 cm^2
(*c*) 30 cm^2 (*d*) 37.5 cm^2

13. In the figure, D is the midpoint of side BC of ΔABC. and E is the midpoint of AD. Then the area of ΔABE is : **[T-II (2011)]**



(*a*) $\frac{1}{3}$ area (ΔABC) (*b*) $\frac{1}{2}$ area (ΔAEC)

(*c*) $\frac{1}{2}$ area (ΔBEC) (*d*) $\frac{1}{4}$ area of (ΔABC)

14. Two parallelograms are on the same base and between the same parallels. The ratio of their areas is : **[T-II (2011)]**

(*a*) 1 : 1 (*b*) 1 : 2

(*c*) 2 : 1 (*d*) 1 : 4

15. In a parallelogram ABCD, P is a point in its interior. If ar (||gm ABCD) = 18 cm^2, then [ar (ΔAPD) + ar (ΔCPB)] is : **[T-II (2011)]**

(*a*) 9 cm^2 (*b*) 12 cm^2

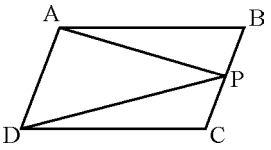
(*c*) 18 cm^2 (*d*) 15 cm^2

16. ABCD is a parallelogram. If E and F are mid points of sides AB and CD and diagonal AC is joined, then ar (FCBE) : ar (CAB) is : **[T-II (2011)]**

(*a*) 1 : 2 (*b*) 2 : 1

(*c*) 1 : 1 (*d*) 1 : 4

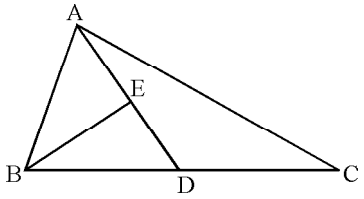
17. If area of ||^{gm} ABCD is 80 cm^2, then ar (ΔADP) is : **[T-II (2011)]**



(*a*) 80 cm^2 (*b*) 60 cm^2

(*c*) 50 cm^2 (*d*) 40 cm^2

18. In ΔABC, AD is median of ΔABC and BE is median of ΔABD. If ar (ΔABE) = 15 cm^2, then ar (ΔABC) is : **[T-II (2011)]**



(*a*) 60 cm^2 (*b*) 50 cm^2

(*c*) 40 cm^2 (*d*) 30 cm^2

19. In ΔABC, E is the mid-point of median AD. ar (ΔBED) is : **[T-II (2011)]**

(*a*) $\frac{1}{2}$ ar (ΔABC) (*b*) $\frac{1}{3}$ ar (ΔABC)

(*c*) $\frac{1}{4}$ ar (ΔABC) (*d*) none of the above

20. If a triangle and a square are on the same base and between the same parallels, then the ratio of area of triangle to the area of square is : **[T-II (2011)]**

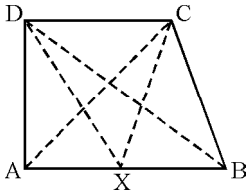
(*a*) 1 : 3 (*b*) 1 : 2

(*c*) 3 : 1 (*d*) 1 : 4

21. In the figure, AB || DC, then the triangles that have equal area are : **[T-II (2011)]**

(*a*) ΔADX, ΔACX (*b*) ΔADX, ΔXCB

(*c*) ΔACX, ΔXCB (*d*) all of the above

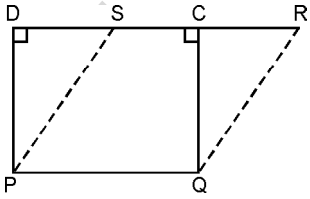


22. D and E are the points on the sides AB and AC respectively of triangle ABC such that DE || BC. If area of ΔDBC = 15 cm^2, then area ΔEBC is : **[T-II (2011)]**

(*a*) 30 cm^2 (*b*) 7.5 cm^2

(*c*) 15 cm^2 (*d*) 20 cm^2

23. In the given figure, PQRS is a parallelogram and PQCD is a rectangle, then : **[T-II (2011)]**



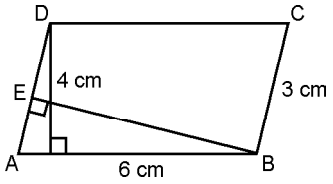
(*a*) ar (PQRS) < ar (PQCD)

(*b*) ar(PQRS) = ar(PQCD)

(*c*) ar(PQRS) > ar(PQCD)

(*d*) none of the above

24. In the given figure, if ABCD is a parallelogram, then length of BE is : **[T-II (2011)]**



(*a*) 24 cm (*b*) 26 cm (*c*) 6 cm (*d*) 8 cm

25. If area of parallelogram ABCD is 25 cm^2 and on the same base CD, a triangle BCD is given such that area of BCD = x cm^2, then the value of x is : **[T-II (2011)]**

(*a*) 25 cm^2 (*b*) 12.5 cm^2

(*c*) 15 cm^2 (*d*) 20 cm^2

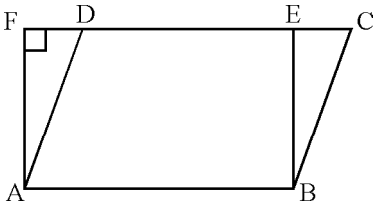
26. A triangle and a rhombus are on the same base and between the same parallels. Then the ratio of area of triangle to that of rhombus is : **[T-II (2011)]**

(*a*) 1 : 1 (*b*) 1 : 2 (*c*) 1 : 3 (*d*) 1 : 4

27. If the base of a parallelogram is 8 cm and its altitude is 5 cm, then its area is equal to : **[T-II (2011)]**

(*a*) 15 cm^2 (*b*) 20 cm^2 (*c*) 40 cm^2 (*d*) 10 cm^2

28. In the figure, if parallelogram ABCD and rectangle ABEF are of equal area, then : **[T-II (2011)]**



(*a*) perimeter of ABCD = perimeter of ABEF

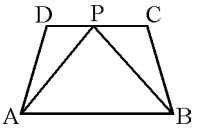
(*b*) perimeter of ABCD < perimeter of ABEF

(*c*) perimeter of ABCD > perimeter of ABEF

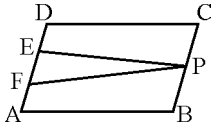
(*d*) perimeter of ABCD = $\frac{1}{2}$ (perimeter of ABEF)

29. In which of the following figures, one quadrilateral and one triangle, lie on the same base and between the same parallels? **[T-II (2011)]**

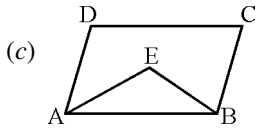
(*a*)



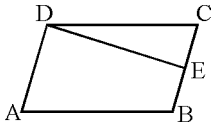
(*b*)



(*c*)



(*d*)



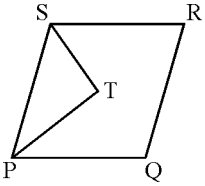
30. The diagonal of a square is 10 cm. Its area is :

(*a*) 20 cm^2 (*b*) 25 cm^2

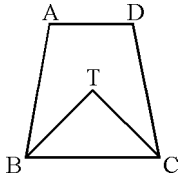
(*c*) 50 cm^2 (*d*) 100 cm^2 **[T-II (2011)]**

31. Two polygons have the same area in figure :

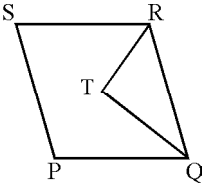
(*a*)



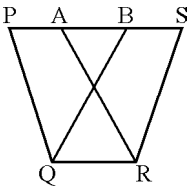
(*b*)



(*c*)



(*d*)



[T-II (2011)]

32. The length of the diagonal of the square is 10 cm. The area of the square is : **[T-II (2011)]**

(*a*) 20 cm^2 (*b*) 100 cm^2

(*c*) 50 cm^2 (*d*) 70 cm^2

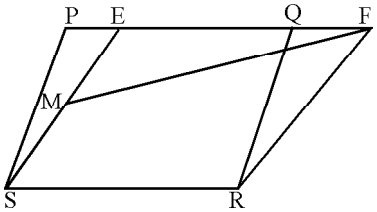
SHORT ANSWERS TYPE QUESTIONS **[2 Marks]**

A. Important Questions

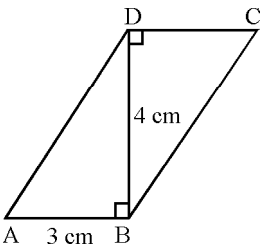
1. PQRS is a parallelogram whose area is 180 cm^2 and A is any point on the diagonal QS. The area of ΔASR is 90 cm^2. Is it true?

2. P is any point on the median AD of ΔABC. Show that ar(APB) = ar(ACP).

3. In the figure, PQRS and EFRS are two paralleograms. Is area of ΔMFR equal to $\frac{1}{2}$ area of || gm PQRS ?



4. In the figure, ABCD is a quadrilateral and BD is one of its diagonals. Show that ABCD is a parallelogram and find its area.



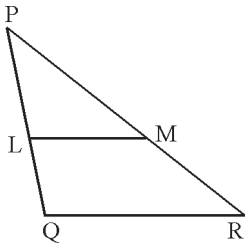
5. BD is one of the diagonals of a quadrilateral ABCD. AM and CN are the perpendiculars from A and C respectively on BD. Show that ar (ABCD) = $\frac{1}{2}$ BD (AM + CN).

6. Check whether the following statement is true. PQRS is a rectangle inscribed in a quadrant of a circle of radius 13 cm. A is any point on PQ. If PS = 5 cm, then ar (PAS) = 30 cm^2.

7. In ΔABC, O is any point on its median AD. Show that ar(ΔABO) = ar(ΔACO).

8. ABCD is a parallelogram and X is the mid-point of AB. If ar (AXCD) = 24 cm^2, then ar(ABC) = 24 cm^2. It is true ?

9. In the figure, LM = $\frac{3}{4}$ QR , LM || QR and distance between LM and QR is 3 cm. If length of QR = 6 cm, find the area of LQRM.

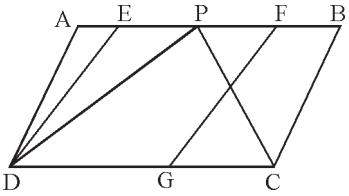


10. ABC and BDE are two equilateral triangles such that D is mid-point of BC. Show that ar (BDE) = $\frac{1}{4}$ ar (ABC).

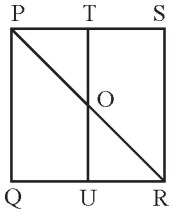
11. In parallelogram ABCD, AB = 10 cm. The altitude corresponding to the sides AB and AD are respectively 7 cm and 8 cm. Find AD.

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

13. In the figure, ABCD and EFGD are two parallegorams and G is the mid-point of CD. Check whether area of ΔPDC is equal to half of area EFGD.



14. In the figure, PQRS is square and T and U are respectively the mid-points of PS and QR. Find the area of ΔOTS, if PQ = 8 cm.



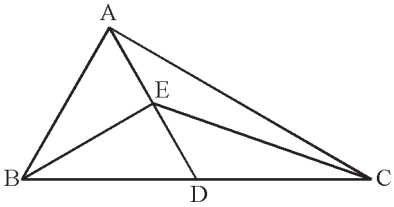
15. Each side of a rhombus is 8 cm and its area is 36 cm^2. Find its altitude.

B. Questions From CBSE Examination Papers

1. D, E, F are respectively the mid point of the sides BC, CA and AB of triangle ABC. Show that.

$ar(\Delta DEF) = \frac{1}{4} ar\ (\Delta ABC)$. **[T-II (2011)]**

2. In the figure, AD is a median of ΔABC. E is any point on AD. Show that ar (ΔBED) = ar (ΔCED).

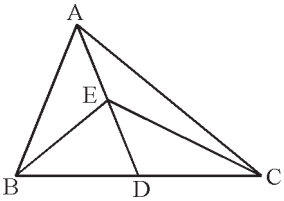


[T-II (2011)]

3. PQRS is a trapezium with PQ||SR. A line parallel to PR intersects PQ at L and QR at M. Prove that ar (ΔPSL) = ar (ΔPRM). **[T-II (2011)]**

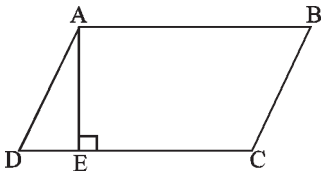
4. In the figure, E is any point on median AD of a ΔABC. Show that ar (ABE) = ar (ACE).

[T-II (2011)]

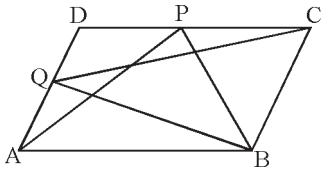


5. Show that the median of a triangle divides it into two triangles of equal areas. **[T-II (2011)]**

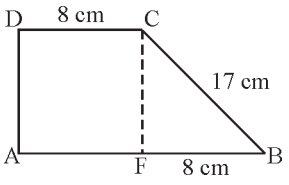
6. In the given figure, ABCD is a parallelogram and AE ⊥ DC. If AB is 20 cm and the area of parallelogram ABCD is 80 cm^2, find AE. **[T-II (2011)]**



7. 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) **[T-II (2011)]**



8. In the figure, ABCD is a trapezium. BC = 17 cm, AB = 16 cm and DC = 8 cm. Find the area of ABCD. **[T-II (2011)]**



9. The area of a parallelogram ABCD is 40 sq. cm. If X be the mid point of AD, find area of ΔAXB. **[T-II (2011)]**

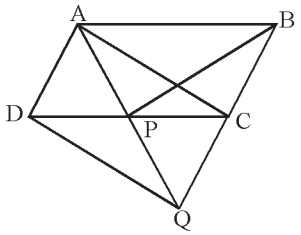
10. Diagonals AC and BD of a trapezium ABCD with AD || CD intersect each other at O. Prove that ar (ΔAOD) = ar (ΔBOC). **[T-II (2011)]**

SHORT ANSWERS TYPE QUESTIONS [3 Marks]

A. Important Questions

1. If the mid-points of the sides of a quadrilateral are joined in order, prove that the area of the parallelogram so formed will be half of that of the given quadrilateral.

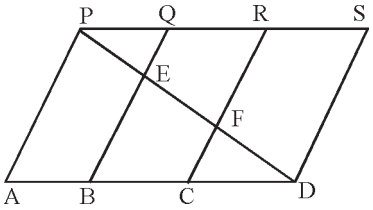
2. In the figure, ABCD is a parallelogram and BC is produced to a point Q such that AD = CQ. If AQ intersects DC at P, show that ar (BPC) = ar (DPQ).



3. O is any point on the diagonal BD of a parallelogram ABCD. Show that ar (ΔOAB) = ar (ΔOBC).

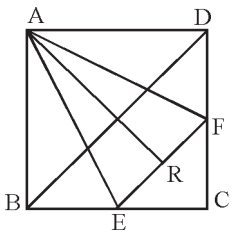
4. D is the mid-point of side BC of a ΔABC and E is the mid point of BD. If O is the mid-point of AE, then show that ar (BOE) = $\frac{1}{8}$ ar (ABC).

5. In the figure, PSDA is a parallelogram. Points Q and R are taken on PS such that PQ = QR = RS and PA || QB || RC. Prove that ar (PQE) = ar (CFD).

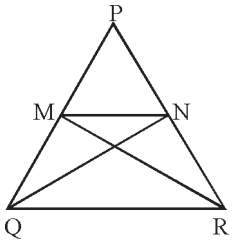


6. Show that the diagonals of a parallelogram divide it into four triangles of equal area.

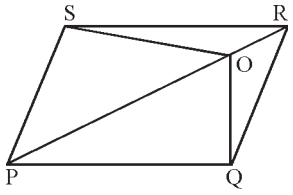
7. In the figure, ABCD is a square. E and F are respectively the mid-points of BC and CD. If R is the mid point of EF, show that ar (AER) = ar (AFR).



8. In the figure, M, N are points on sides PQ and PR respectively of ΔPQR, such that ar (ΔQRN) = ar (ΔQRM). Show that MN || QR.



9. In the figure, O is any point on the diagonal PR of a parallelogram PQRS. Show that ar (PSO) = ar (PQO).

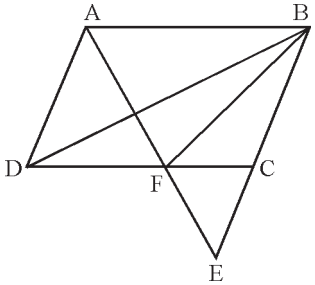


10. Show that the area of a rhombus is half the product of the lengths of its diagonals.

11. Triangles ABC and DBC are on the same base BC with vertices A and D on opposite sides of BC such that ar (ABC) = ar (DBC). Show that BC bisects AD.

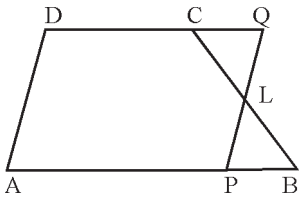
12. In the figure, ABCD is a parallelogram in which BC is produced to E such that CE = BC. AE intersects CD at F.

If ar (ΔDFB) = 3 cm^2, find the area of the parallelogram ABCD.



13. ABCD is a trapezium with parallel sides AB = *a* cm and DC = *b* cm. E and F are the mid-points of non-parallel sides. Show that ar (ABFE) : ar (EFCD) = (3*a* + *b*) : (*a* + 3*b*).

14. In the figure, ABCD is a trapezium in which AB || DC and L is the mid-point of BC. Through L, a line PQ || AD has been drawn which meets AB in P and DC produced to Q. Show that ar (ABCD) = ar (APQD).

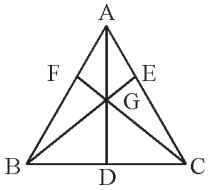


B. Questions From CBSE Examination Papers

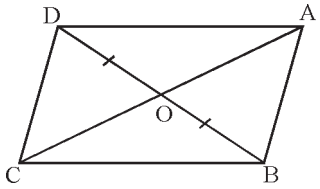
1. XY is a line parallel to side BC of a ΔABC. If BE || AC and CF || AB meet XY at E and F respectively, show that ar (ΔABE) = ar (ΔACF). **[T-II (2011)]**

2. Prove that a rectangle and a parallelogram on the same base and between the same parallels, the perimeter of the parallelogram is greater than the perimeter of the rectangle. **[T-II (2011)]**

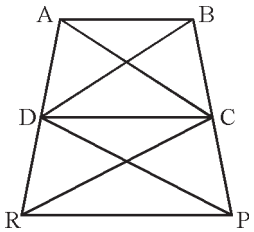
3. If medians of a triangle ABC intersects at G, show that ar (ΔAGB) = ar (ΔAGC) = ar (ΔBGC) = $\frac{1}{3}$ ar (ΔABC). **[T-II (2011)]**



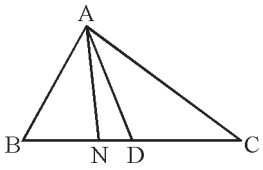
4. In the figure, diagonals AC and BD of quadrilateral ABCD intersect at O such that OB = CD. If AB = CD, then show that ar (ΔDOC) = ar (ΔAOB). **[T-II (2011)]**



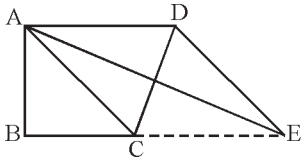
5. In the figure, ar (DRC) = ar (DPC) and ar (BDP) = ar (ARC). Show that both the quadrilaterals ABCD and DCPR are trapeziums. **[T-II (2011)]**



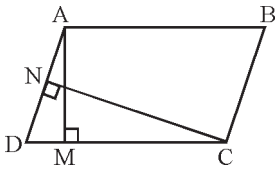
6. In the figure, AD is median. Prove that ar (ΔABD) = ar (ΔACD). **[T-II (2011)]**



7. In the figure, ABCD is a quadrilateral. A line through D parallel to AC meets BC produced at E. Prove that ar (ΔABE) = ar quad. (ABCD). **[T-II (2011)]**



8. ABCD is a parallelogram in which CD = 15 cm, its corresponding altitude AM is 8 cm and CN ⊥ AD. If CN = 10 cm, then find the length of AD. **[T-II (2011)]**



9. A point D is taken on the base BC of a ΔABC and AD is produced to E, such that DE = AD. Show that ar (ΔBCE) = ar (ΔABC). **[T-II (2011)]**

10. ABCD is a parallelogram whose diagonals AC and BD intersect at O. A line through O intersect AB at P and DC at Q. Prove that :

ar (ΔPOA) = ar (ΔQOC) **[T-II (2011)]**

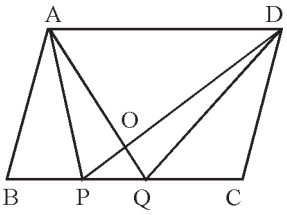
LONG ANSWERS TYPE QUESTIONS **[4 Marks]**

A. Important Questions

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

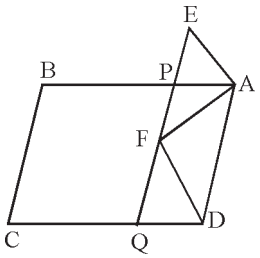
2. D, E, F are the mid-points of the sides BC, CA and AB respectively of ΔABC. Prove that BDEF is a parallelogram whose area is half that of ABC.

3. In the figure, ABCD is a parallelogram. Points P and Q on BC trisect BC. Show that ar (APQ) = ar (DPQ) = $\frac{1}{6}$ ar (ABCD).



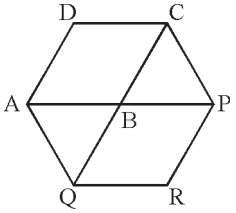
4. In ΔABC, if L and M are the points on AB and AC respectively, such that LM || BC, prove that ar (LOB) = ar (MOC).

5. In the figure, ABCD and AEFD are two parallelograms. Prove that ar (PEA) = ar (QFD).



B. Questions From CBSE Examination Papers

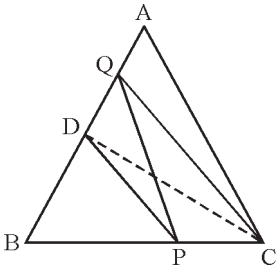
1. The side AB of a parallelogram ABCD is produced to any point P. A line through A and parallel to CP meets CB produced at Q and then parallelogram PBQR is completed. Show that ar (ABCD) = ar (PBQR).



[T-II (2011)]

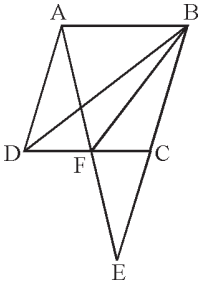
2. In the figure, ABC is a triangle, D is the mid-point of AB, P is any point on BC. Line CQ is drawn parallel to PD to intersect AB at Q. PQ is joined. Show that ar (ΔBPQ) = $\frac{1}{2}$ ar (ΔABC).

[T-II (2011)]



3. Prove that parallelograms on the same base and between the same parallels are equal in area. **[T-II (2011)]**

4. In the figure, ABCD is a parallelogram in which BC is produced to E such that CE = BC. AE intersects CD at F. Show that ar (ΔBDF) = $\frac{1}{4}$ ar (ABCD).

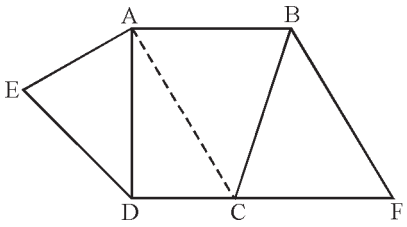


[T-II (2011)]

5. The figure, ABCDE is a pentagon and a line through B parallel to AC meets DC produced at F. Show that

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

(ii) ar (ABCDE) = ar (AEDF). **[T-II (2011)]**



6. 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). **[T-II (2011)]**

7. Diagonals of a parallelogram ABCD intersect at point O. Thourgh 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. **[T-II (2011)]**

8. Diagonals PR and QS of quadrilateral PQRS intersect at T such that PT = TR. If PS = QR, show that ar (ΔPTS) = ar (ΔRTQ). **[T-II (2011)]**

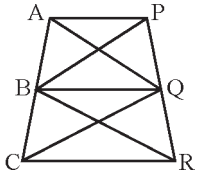
9. Diagonal AC and BD of a quadrilateral ABCD intersect at O in such a way that ar (AOD) = ar (BOC). Prove that ABCD is a trapezium. **[T-II (2011)]**

10. PQRS and ABRS are parallelograms and X is any point on side BR. Show that : **[T-II (2011)]**

(i) area PQRS = area ABRS

(ii) area AXS = $\frac{1}{2}$ area PQRS.

11. In the given figure, AP||BQ||CR. Prove that ar (ΔAQC) = ar (ΔPBR). **[T-II (2011)]**

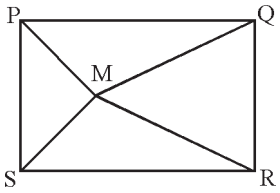


12. A point E is taken as the midpoint of the side BC of a parallelogram ABCD. AE and DC are produced to meet at F. Prove that ar (ΔADF) = ar (ABFC). **[T-II (2011)]**

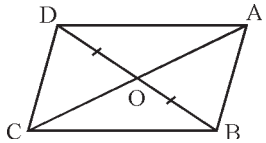
13. In the figure, M is a point in the interior of a parallelogram PQRS. Show that **[T-II (2011)]**

(i) $ar(\Delta PMQ) + ar(\Delta MRS) = \frac{1}{2} ar(\|gm\ PQRS)$

(ii) $ar(\Delta PMS) + ar(\Delta MQR) = ar(\Delta PMQ) + ar(\Delta MRS)$.



14. In the figure, diagonals AC and BD of quadrilateral ABCD intersect at O, such that OB = OD. If AB = CD, show that **[T-II (2011)]**



(i) ar (DOC) = ar (AOB)

(ii) ar (DCB) = ar (ACB)

(iii) ABCD is a parallelogram.