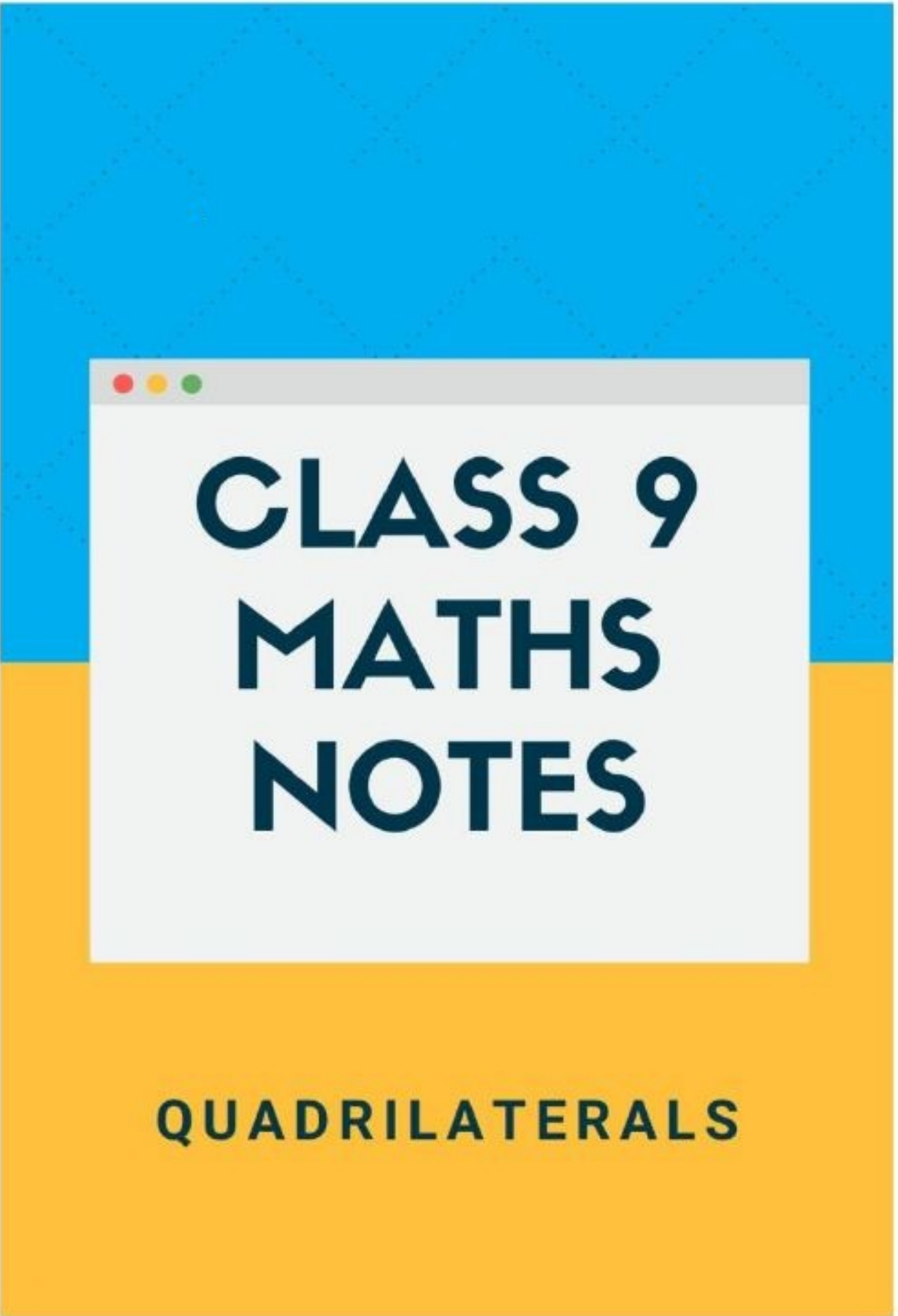


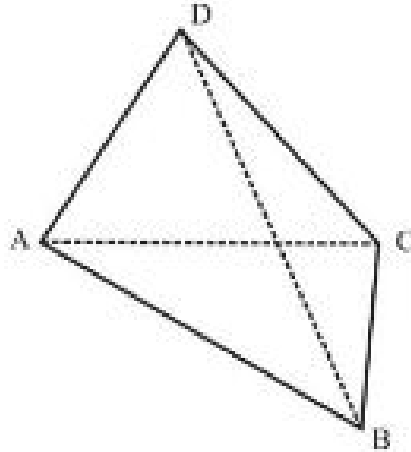


CLASS 9 MATHS NOTES

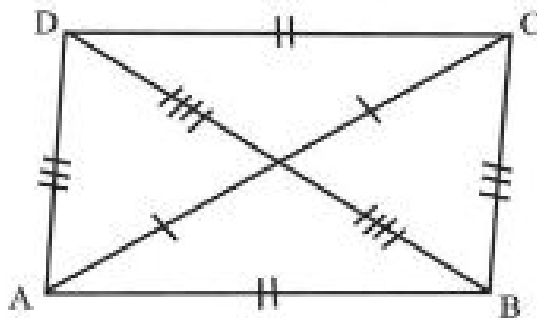
QUADRILATERALS

CHAPTER-8
QUADRILATERALS
KEY POINTS

1. Quadrilateral : - A closed figure bounded by four line segments. In a quadrilateral are

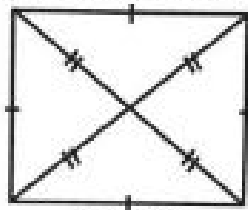


- i) Two pairs of opposite side (no common point)
e.g. AB & CD, BC & AD
 - ii) Two pairs of opposite angles $\angle A$ & $\angle C$ and $\angle B$ & $\angle D$.
 - (iii) Four pairs of adjacent sides AB & BC, BC & CD, CD & AD and AD & AB (one common point)
 - (iv) Four pairs of adjacent angles $\angle A$ & $\angle B$, $\angle B$ & $\angle C$, $\angle C$ & $\angle D$, $\angle D$ & $\angle A$.
 - (v) Line segment joining opposite vertices called diagonal of quadrilateral. e.g., AC & BD.
 - (vi) Sum of the angles of a quadrilateral is 360° , $\angle A + \angle B + \angle C + \angle D = 360^\circ$.
2. Parallelogram : A quadrilateral is a parallelogram if.

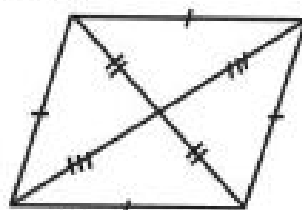


- Opposite sides are equal or
- Opposite angles are equal or
- Diagonals bisect each other or
- One pair of opposite sides is equal and parallel

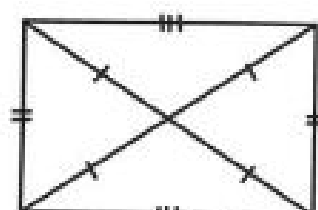
3. A diagonal of a parallelogram divides it into two congruent triangles.
examples of parallelogram:



Square

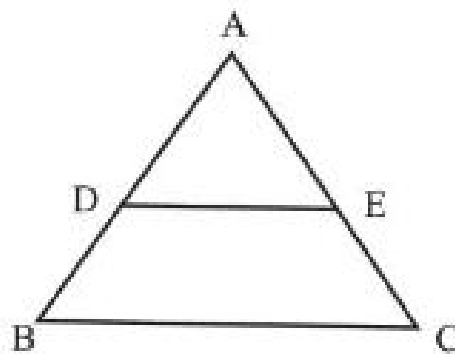


Rhombus



Rectangle

4. Theorem :- A line segment joining the mid points of the two sides of a triangle is parallel to the third side and is half of it. If D & E are mid points then $DE \parallel BC$ and $DE = \frac{1}{2} BC$.



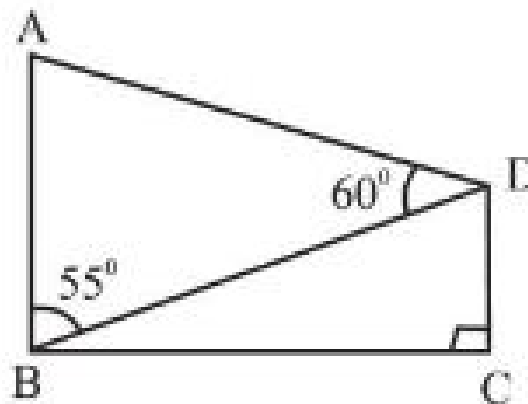
5. Converse of mid point theorem.

The line drawn through the mid point of one side of a triangle, parallel to another side bisects the third side.

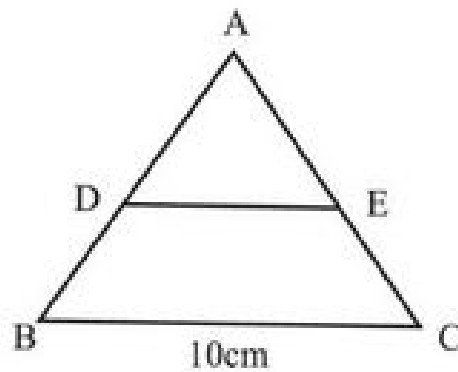
Important Questions with Solutions

Part – A

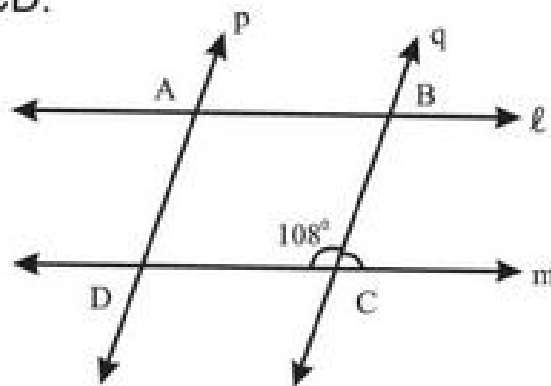
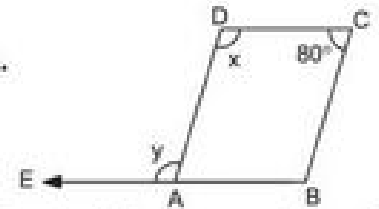
1. In a rhombus ABCD, if $\angle A = 60^\circ$ find $\angle B$, $\angle C$ & $\angle D$.
2. The angles of a quadrilateral are in the ratio 1:2:4:5. Find the measure of each angle.
3. If in a rhombus LMNP, $\angle LNM = 40^\circ$ then what is the measure of $\angle LPM$?
4. In a parallelogram if all the four angles are in the ratio 1:1:1:1 then, what type of parallelogram is this?
5. In the figure, $AB \parallel CD$, what will be the measure of $\angle ADC$?



6. In the figure, if D & E are respectively the mid points of AB & AC, what will be the length of ED?



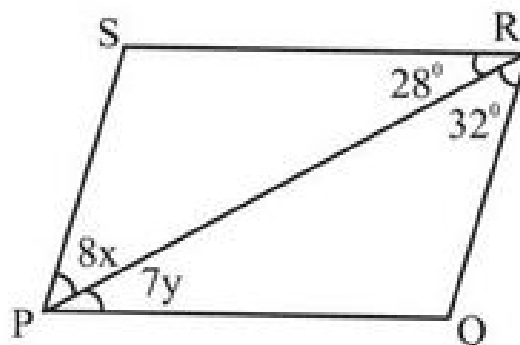
7. PQRS is a rhombus with $\angle QPS = 50^\circ$. Find $\angle RQS$.
8. In the figure, ABCD is a parallelogram find value of $(x + y)$.
9. In the figure line $\ell \parallel m$ and $p \parallel q$, $\angle BCD = 108^\circ$ find all four angles of quadrilateral ABCD.



10. If two adjacent angles of a parallelogram ABCD are in the ratio 5:4, find all the angles of the parallelogram.

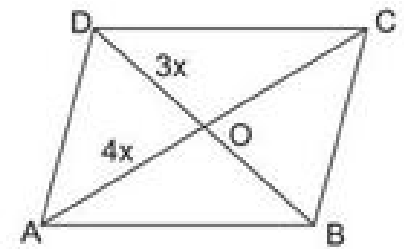
Part – B

11. Prove that the sum of all the four angles of a quadrilateral is 360:
12. Show that opposite angles of a parallelogram are equal.
13. In a parallelogram ABCD $\angle B = 110^\circ$ determine the measure of $\angle A$ and $\angle D$.
14. In the figure if PQRS is a parallelogram, then find the value of x & y .



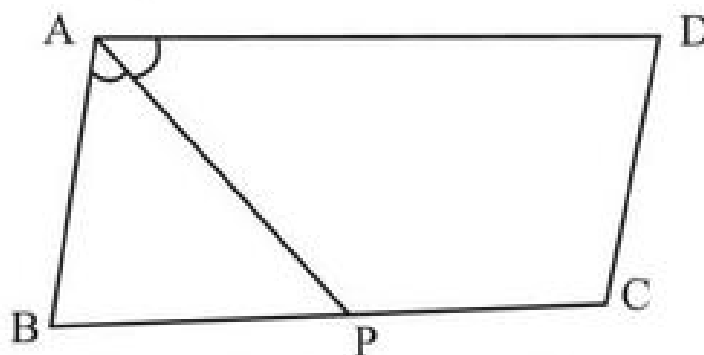
15. The diagonals of a parallelogram ABCD intersect at O. A line through O intersects AB at X & DC at Y. Prove that $OX = OY$.

16. In a parallelogram ABCD diagonals AC and BD intersect at O and $AC = 7.4$ cm. and $BD = 6.2$ cm. Find the length of AO and BO.
17. Two opposite angles of a parallelogram are $(5x-3)$ and $(4x+12)$. Find the measure of each angle of the parallelogram.
18. Diagonals of a quadrilateral ABCD bisect each other if $\angle A = 35^\circ$ determine $\angle B$.
19. The perimeter of a parallelogram is 30cm. If longer side is 9.5 cm then find the length of shorter side.
20. In a parallelogram ABCD diagonals AC and BD intersect at O and $AC = 12.6$ cm and $BD = 9.4$ cm. Find the measures of OC and OD.
21. ABCD is a rhombus in which $DO = 3x$ & $AO = 4x$, find perimeter of quadrilateral ABCD.
22. The angles of a quadrilateral are $(x+20)$, $(x-20)$, $(2x+5)$, $(2x-5)$. Find the value of x .

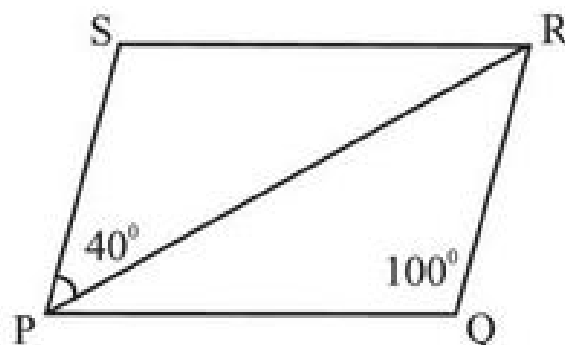


Part – C

23. In the figure P is the mid point of side BC of a parallelogram ABCD such that $\angle BAP = \angle DAP$ prove that $AD = 2CD$.

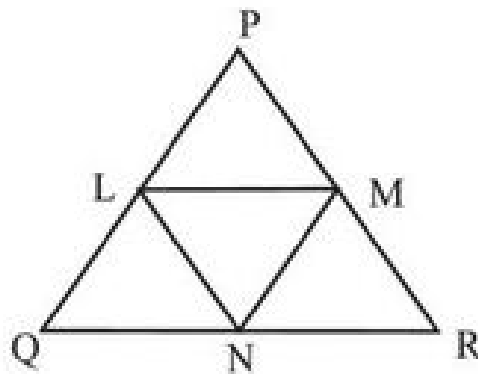


24. In the adjoining figure if PQRS is a parallelogram where $\angle PQR = 100$ and $\angle SPR = 40$. Find $\angle PRQ$ and $\angle SRQ$.

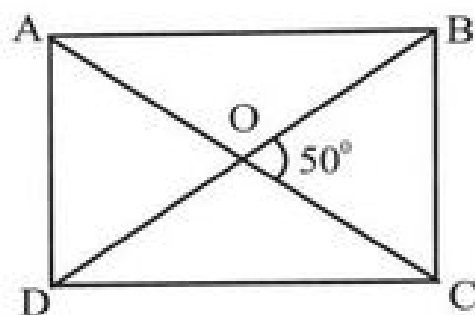


25. Prove that the line segment joining the mid points of two sides of a triangle is parallel to the third side.

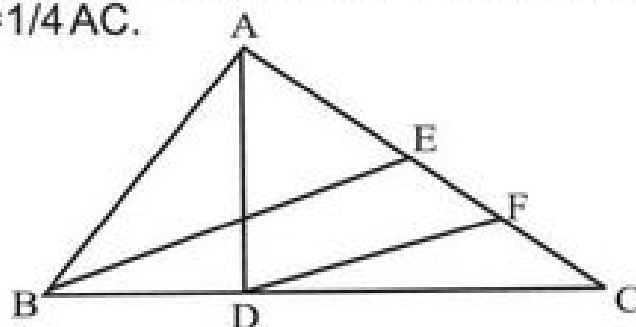
26. In the given figure L, M, and N are mid point of the sides PQ, PR and QR respectively of $\triangle PQR$. If $PQ = 4.4\text{cm}$, $QR = 5.6\text{ cm}$ and $PR = 4.8\text{cm}$ then find the perimeter of $\triangle LMN$.



27. A quadrilateral is a parallelogram if one pair of opposite sides are equal and parallel. Prove it.
28. If the diagonals of a quadrilateral bisect each other then quadrilateral is a parallelogram. Prove it.
29. In a parallelogram PQRS, M and N are points on PQ and RS such that $PM = RN$. Prove that $MS \parallel NQ$.
30. In a parallelogram ABCD, AP and CQ are drawn perpendiculars from vertices A and C on diagonal BD. Prove that $\triangle APB \cong \triangle CQD$.
31. The diagonals of a rectangle ABCD meet at O. If $\angle BOC = 50^\circ$ then find $\angle ODA$.

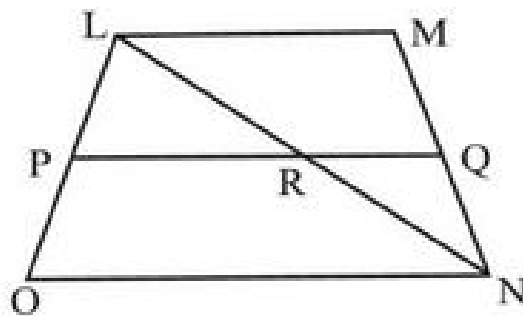


32. In the given figure AD and BE are the medians of $\triangle ABC$ and $BE \parallel DF$ prove that $CF = \frac{1}{4} AC$.

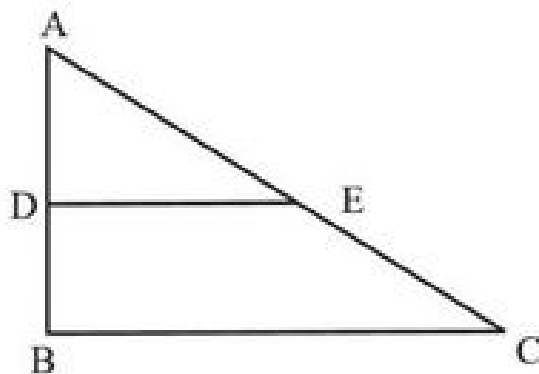


Part – D

33. In the figure LMNO, is a trapezium in which LM is parallel to side ON and P is the mid point of side LO. If Q is a point on the side MN such that segment PQ is parallel to side ON Prove that Q is the mid point of MN and $PQ = \frac{1}{2} (LM + ON)$.



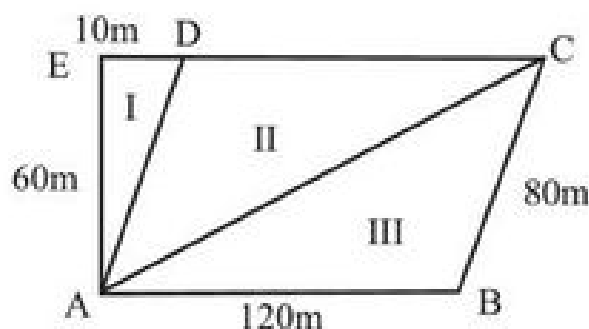
34. In the figure, $\triangle ABC$ is right angled at B. If $AB = 9$ cm $AC = 15$ cm. and D and E are the mid points of AB & AC respectively calculate.
- The length of BC
 - The area of trapezium BCED



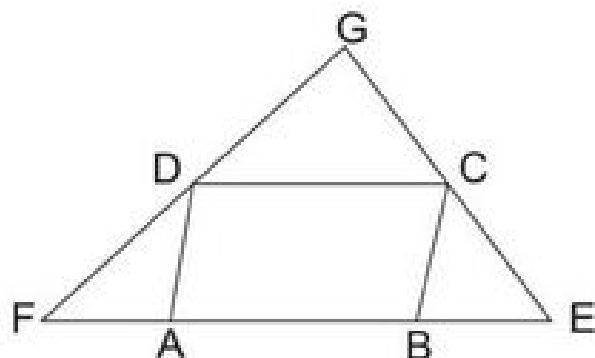
35. A farmer has divided his field into three parts as in the figure. Ist part is used to take care of his cattles. While II and III are used to grow two different crops.

Answer the following :–

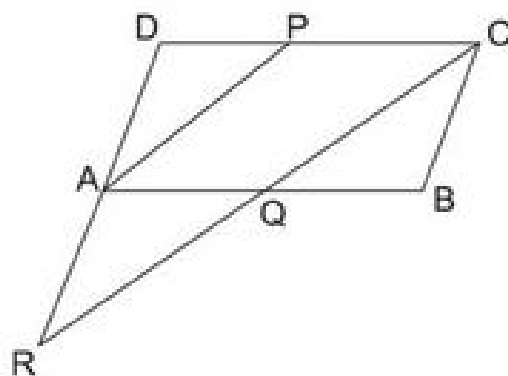
- How much area has been used to take care for cattles ?
- Are the two areas part II and part III equal? Justify.
- What is the total area of the field ?



36. ABCD is a parallelogram. Side AB is produced on both sides to E & F as in figure such that $BE = BC$ & $AF = AD$. Show that EC & FD when produced meets at right angle.



37. P is mid point of side CD of a parallelogram ABCD. A line through C parallel to PA intersects AB at Q & DA produced at R. Prove that $DA = AR$ & $CQ = QR$.



CHAPTER-8
QUADRILATERALS

ANSWERS

- | | |
|--|--|
| 1. $120^\circ, 60^\circ, 120^\circ$ | 20. 6.3 cm, 4.7 cm |
| 2. $30^\circ, 60^\circ, 120^\circ, 150^\circ$ | 21. 20x units |
| 3. 100° | 22. $x = 60^\circ$ |
| 4. Rectangle | 24. $40^\circ, 80^\circ$ |
| 5. 115° | 26. 7.4 cm |
| 6. 5 cm | 27. 65° |
| 7. 65° | 34. 12 cm, 40.5 cm^2 |
| 8. 200° | 35. (i) 300 m^2 , (ii) Yes, (iii) 7500 m^2 |
| 9. $108^\circ, 72^\circ, 108^\circ, 72^\circ$ | |
| 10. $100^\circ, 80^\circ, 100^\circ, 80^\circ$ | |
| 13. $70^\circ, 110^\circ$ | |
| 14. $x = y = 4$ | |
| 16. 3.7 cm, 3.1 cm | |
| 17. $72^\circ, 108^\circ, 72^\circ, 108^\circ$ | |
| 18. 145° | |
| 19. 5.5 cm | |

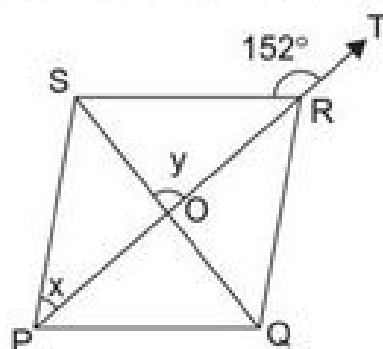
PRACTICE TEST

Quadrilaterals

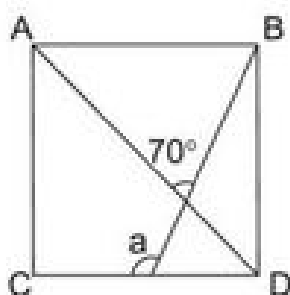
Time : 50 Min.

M.M. 20

1. If the diagonals of a quadrilateral ABCD bisect each other & $\angle A = 45^\circ$, what is $m\angle B$? (1)
2. The angles of a Quadrilateral ABCD are in the ratio 2 : 3 : 5 : 8. Find the measure of smallest angle. (1)
3. In a $\triangle PQR$, median PS is produced to a point T such that $PS = ST$. Prove that PQTR is a parallelogram. (2)
4. In the Fig. PQRS is a rhombus in which the diagonal PR is produced to T. If $\angle SRT = 152^\circ$, find x & y . (2)



5. ABCD is a square. A line BM intersects CD at M and the diagonal AC at O such that $\angle AOB = 70^\circ$, find a (3)



6. AD is median of $\triangle ABC$ & E is the mid point of AD. BE is produced to meet AC in F. Prove that $AF = \frac{1}{3}AC$. (3)
7. Show that the bisectors of angles of a parallelogram forms a rectangle. (4)
8. Show that the quadrilateral formed by joining the mid point of the sides of a square is also a square. (4)