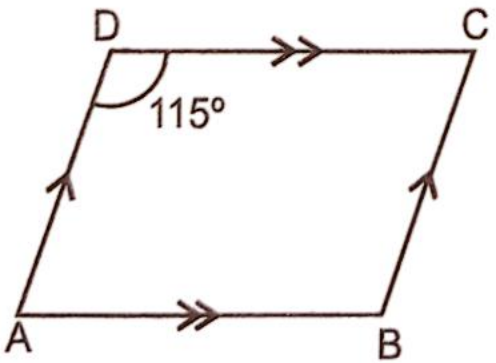
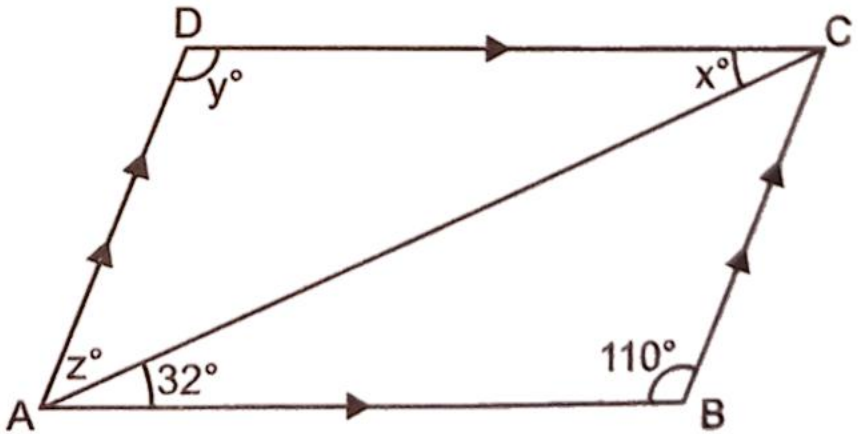
Exercise 2.1

1. Prove that:
   (*i*) Opposite sides of a parallelogram are equal.
   (*ii*) Opposite angles of a parallelogram are equal.
   (*iii*) The two diagonals of a parallelogram bisect each other.

2. (*i*) A parallelogram ABCD is given in the figure (*a*), in which, $\angle D = 115°$. Find the measures of $\angle A$ and $\angle B$.
   (*ii*) In the given figure (*b*), ABCD is a parallelogram. If $\angle CAB = 32°$ and $\angle ABC = 110°$, calculate $\angle x$, $\angle y$ and $\angle z$.



(*a*)



(*b*)

(*iii*) The perimeter of a parallelogram is 22 cm. If the longer side measures 6.5 cm, what is the measure of shorter side?

(*i*) ABCD is a rhombus with $\angle ABC = 56°$. Find the measure of $\angle ACD$.

(*ii*) In a parallelogram ABCD, diagonals AC and BD intersect at O and AC = 6.8 cm and BD = 5.6 cm. Find the measures of OC and OD.

(*i*) In a quadrilateral ABCD, $\angle A : \angle B : \angle C : \angle D = 2 : 4 : 5 : 7$. Find the angles of the quadrilateral.

(*ii*) The angles of a quadrilateral are in the ratio 3 : 5 : 9 : 13. Find all the angles of the quadrilateral. [*CBSE* 2011]

5. Two opposite angles of a parallelogram are $(3x - 2)°$ and $(50 - x)°$. Number of degrees in each angle are.....

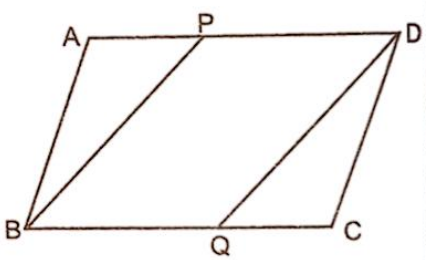
6. The adjacent interior angles of a parallelogram are $(2x - 15)°$ and $(7x - 75)°$. Find all the angles of parallelogram.

7. If an angle of a parallelogram is two-third its adjacent angle, find the angles of the parallelogram.

8. Calculate the side of a rhombus if its diagonals are 18 cm and 24 cm.

9. In a parallelogram ABCD, diagonals AC and BD intersect at O and AC = 6.8 cm and BD = 5.6 cm. Find the measures of OC and OD.

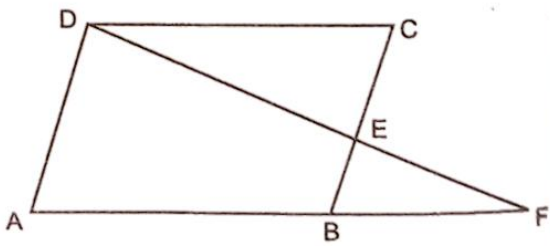
10. In the given figure, ABCD is a parallelogram and P and Q are the points on the sides AD and BC respectively such that $AP = \frac{1}{4}AD$ and $CQ = \frac{1}{4}BC$. Prove that BPDQ is a parallelogram.



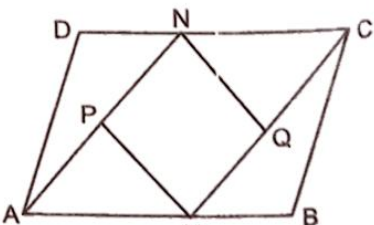
11. In a triangle ABC, median AD is produced to X such that AD = DX. Prove that ABXC is a parallelogram.

12. In a parallelogram ABCD, points P and Q are points of trisection of diagonal BD. Prove that CQ is parallel to AP. [*CBSE* 2010]

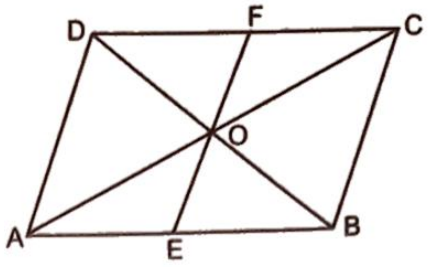
13. ABCD is a parallelogram and E is the mid-point of side BC. If DE and AB when produced meet at F, prove that AF = 2AB.



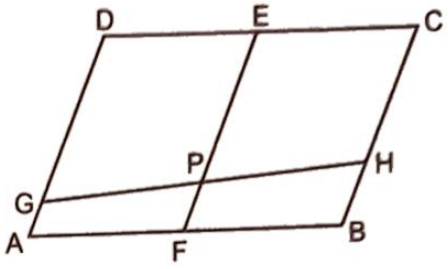
14. M and N are the mid-points of opposite sides AB and CD of a parallelogram ABCD respectively. AN and CM are joined and if P and Q are the mid-points of AN and CM respectively, prove that PMQN is a parallelogram.



15. ABCD is a parallelogram whose diagonals intersect each other at a point O. A line segment EF is drawn through O and is terminated by AB and CD. Prove that OE = OF.



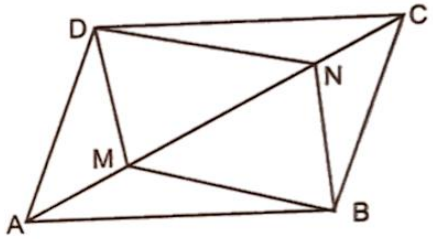
16. In the given figure, ABCD is a parallelogram, E is the mid-point of AB and F is the mid-point of CD. GH is any line that intersects AD, EF and BC in G, P and H respectively. Prove that GP = PH.



17. ABCD is a square. A is joined to a point P on BC and D is joined to a point Q on AB. If AP = DQ, prove that AP and DQ are perpendicular to each other.

18. ABCD is a rhombus and P, Q, R and S are the mid-points of the sides AB, BC, CD and DA respectively. Show that the quadrilateral PQRS is a rectangle. [*CBSE* 2010]

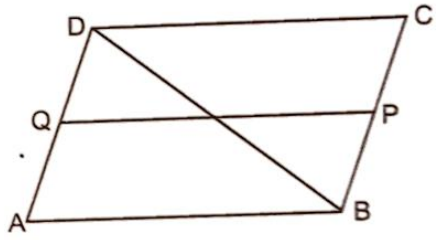
19. In the given figure, ABCD is a parallelogram, AM = CN. Prove that BNDM is a parallelogram.



20. In the given figure, ABCD is a parallelogram. P and Q are the mid-points of BC and AD respectively. Prove that

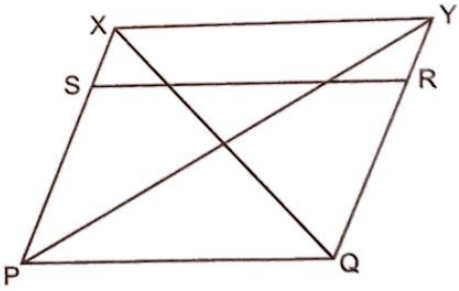
(*i*) APCQ is a ||gm.

(*ii*) QP bisects BD.

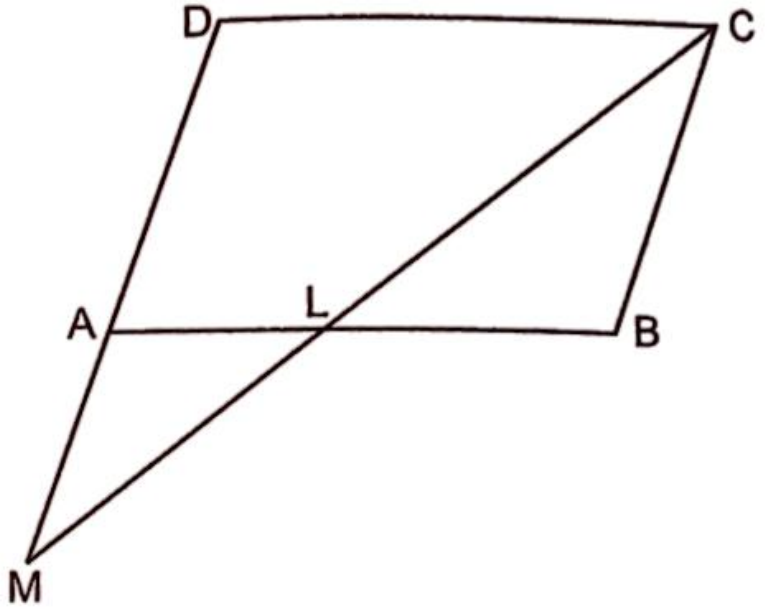


21. ABCD is a parallelogram. AB is produced to E so that BE = AB. EF meets CB produced at F and is parallel to CA. Prove that AF is equal to EC.

22. In the given figure, PQRS is a parallelogram. The bisectors of ∠PQR and ∠QPS meet PS produced and QR produced at X, Y respectively. Show that PQ = XY.

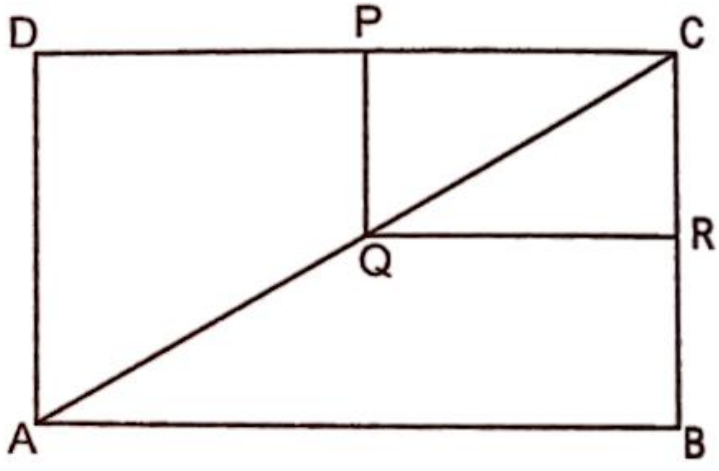


23. In the given figure, ABCD is a parallelogram. L is the mid-point of AB. Prove that ACBM is a parallelogram.



24. In the given figure, ABCD and PQRC are rectangles and Q is the mid-point of AC, then prove that (*i*) DP = PC (*ii*) $PR = \frac{1}{2}$ AC.

[*CBSE* 2010]



Answers

2. (*i*) $\angle A = 65°$ and $\angle B = 115°$ (*ii*) $\angle x = 32°$, $\angle y = 110°$, $\angle z = 38°$ (*iii*) 4.5 cm

3. (*i*) 62° (*ii*) OC = 3.4 cm and OD = 2.8 cm

4. (*i*) $\angle A = 40°$, $\angle B = 80°$, $\angle C = 100°$, $\angle D = 140°$,
(*ii*) 36°, 60°, 108° and 156°.

5. 37°, 143°, 37°, 143°

6. 45°, 135°, 45°, 135°

7. 72°, 108°, 72°, 108°

8. Each side = 15 cm

9. 3.4 cm, 2.8 cm