MATHS

NCERT - NCERT MATHEMATICS(GUJRATI ENGLISH)

QUADRILATERALS

Illustrative Examples

1. ABCD is a parallelogram and $\angle A = 60°$. Find the remaining angles.

2. In parallelogram ABCD, $\angle B - \angle A = 40°$.

Find all the angles of parallelogram ABCD.

3. Two adjacent sides of a parallelogram are 4.5

cm and 3 cm. Find its perimeter.

4. In a parallelogram ABCD, the bisectors of the consecutive angles angleA and angleB intersect at P. Show that $\angle APB = 90°$.

5. $\overleftrightarrow{AB}$ and $\overleftrightarrow{DC}$ are two parallel lines and a transversal l, intersects $\overleftrightarrow{AB}$ at P and $\overleftrightarrow{DC}$ at R. Prove that the bisectors of the interior angles form a rectangle.

6. In a triangle ABC, AD is the median drawn on the side BC is produced to E such that $AD = ED$ prove that ABEC is a parallelogram.

7. In $\triangle ABC$, D, E and F are the midpoints of sides AB, BC and CA respectively. Show that $\triangle ABC$ is divided into four congruent triangles, when the three midpoints are joined to each other. (ΔDEF is called medial triangle)

8. l, m and n are three parallel lines intersected by the transversals p and q at A, B, C and D,E, F such that they make equal intercepts AB and BC on the transversal p. Show that the intercepts DE and EF on q are also equal.

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9. ABC is a triangle and through A, B, C lines are drawn parallel to BC, CA and AB respectively intersecting at P, Q and R. Prove

that the perimeter of $\triangle PQR$ is double the perimeter of $\triangle ABC$.

Think Discuss And Write

1. Show that the diagonals of a square are equal and right bisectors of each other.

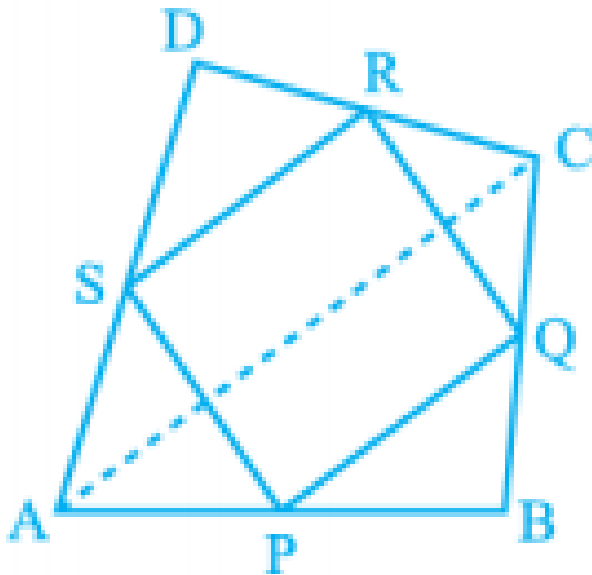**2.** Show that the diagonals of a rhombus divide it into four congruent triangles.

Try This

1. Extend AB to E . Find $\angle CBE$. What do you notice. What kind of angles are

$\angle ABC$ and $\angle CBE$?

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Exercise 8 1

1. State whether the statements are True or False.

(i) Every parallelogram is a trapezium ( )

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2. State whether the statements are True or False.

(ii) All parallelograms are quadrilaterals

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3. State whether the statements are True or False.

(iii) All trapeziums are parallelograms ( )

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4. State whether the statements are True or False.

(iv) A square is a rhombus ( )

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5. State whether the statements are True or False.

(v) Every rhombus is a square ( )

6. State whether the statements are True or False.

(vi) All parallelograms are rectangles

7. Complete the following table by writing (YES) if the property holds for the particular Quadrilateral and (NO) if property does not holds.

Properties	Trapezium	Parallelogram	Rhombus	Rectangle	square
a. Only one pair of opposite sides are parallel	YES				
b. Two pairs of opposite sides are parallel					
c. Opposite sides are equal					
d. Opposite angles are equal					
e. Consecutive angles are supplementary					
f. Diagonals bisect each other					
g. Diagonals are equal					
h. All sides are equal					
i. Each angle is a right angle					
j. Diagonals are perpendicular to each other.					

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8. ABCD is trapezium in which $AB||CD$. If $AD = BC$, show that $\angle A = \angle B$ and $\angle C = \angle D$.

9. The four angles of a quadrilateral are in the ratio 1: 2:3:4. Find the measure of each angle of the quadrilateral.

10. ABCD is a rectangle AC is diagonal. Find the nature of $\triangle ACD$. Give reasons.

Exercise 8 2

1. In the adjacent figure ABCD is a parallelogram ABEF is a rectangle show that

$\Delta AFD \cong \Delta BEC.$

2. Show that the diagonals of a rhombus divide it into four congruent triangles.

3. If a quadrilateral ABCD, the bisector of $\angle C$ & $\angle D$ intersect at O.

Prove that $\angle COD = \dfrac{1}{2}(\angle A + \angle B)$

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Exercise 8 3

1. The opposite angles of a parallelogram are $(3x - 2)^\circ$ and $(x + 48)^\circ$.

Find the measure of each angle of the parallelogram.

2. Find the measure of all the angles of a parallelogram, if one angle is $24°$ less than the twice of the smallest angle.

3. In the adjacent figure ABCD is a parallelogram and E is the midpoint of the side BC. If DE and AB are produced to meet at F, show that

$AF = 2AB.$
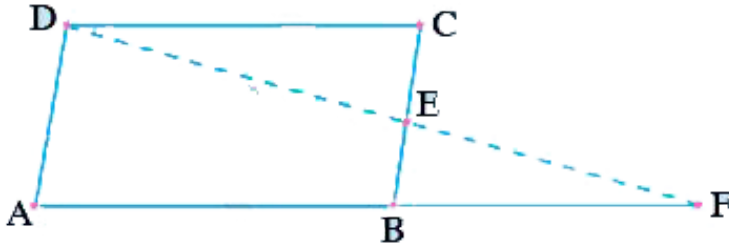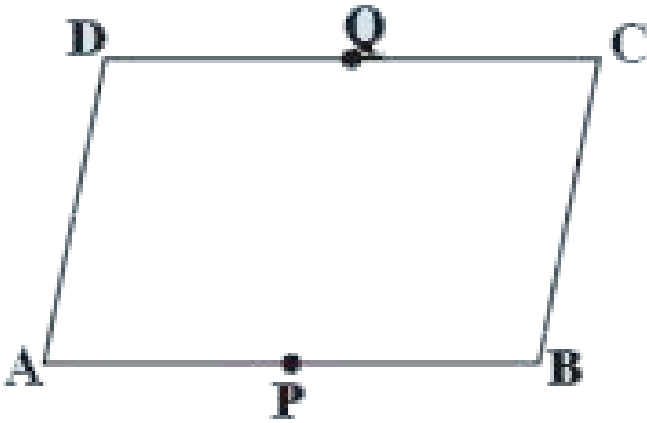
4. In the adjacent figure ABCD is a parallelogram

P and Q are the midpoints of sides AB and DC
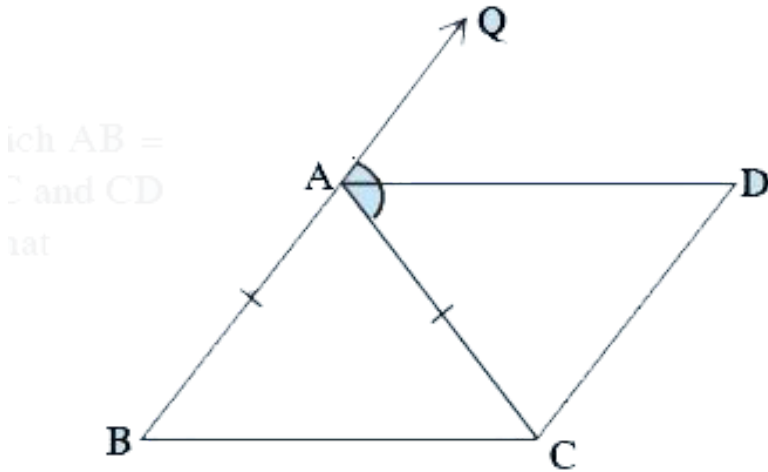
respectively. Show that PBCQ is also a

parallelogram.

5. ABC is an isosceles triangle in which

$AB = AC$. AD bisects exterior angle

QAC and $CD||BA$ as shown in the figure.

Show that

(i) $\angle DAC = \angle BCA$

(ii) ABCD is a parallelogram

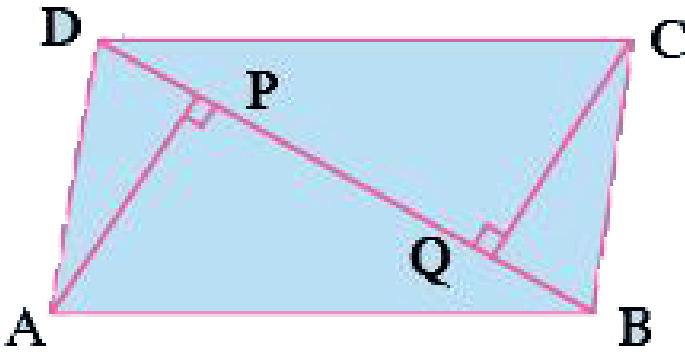▶ **Watch Video Solution**

6. ABCD is a parallelogram AP and CQ are perpendiculars drawn from vertices A and C on diagonal BD (see figure) show that

(i) $\triangle APB \cong \triangle CQD$

(ii) $AP = CQ$

7. In

$\triangle^s ABC$ and , $AB||DE, BC = EF$ and $BC||EF$
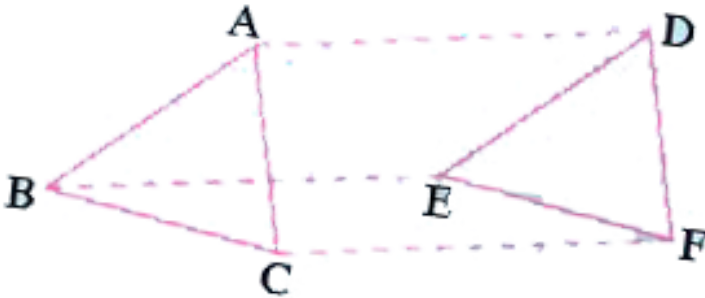
. Vertices A, B and C are joined to vertices D, E

and F respectively (see figure). Show that

(i) ABED is a parallelogram

(ii) BCFE is a parallelogram

(iii) AC = DF
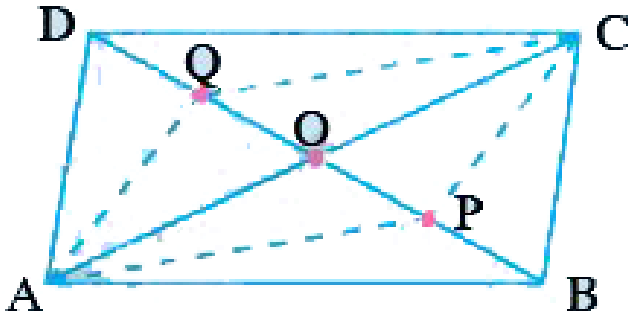
(iv) $\triangle ABC \cong \triangle DEF$

8. ABCD is a parallelogram. AC and BD are the diagonals intersect at O. P and Q are the points of tri section of the diagonal BD. Prove that

$CQ \parallel AP$ and also AC bisects PQ (see figure).

9. ABCD is a square. E, F, G and H are the mid points of AB, BC, CD and DA respectively. Such that $AE = BF = CG = DH$. Prove that EFGH is a square.

1. ABC is a triangle . D is a point of AB such that $AD = \dfrac{1}{4}AB$ and E is a point on AC such that $AE = \dfrac{1}{4}AC$. If $DE = 2cm$ find BC.

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2. ABCD is quadrilateral E, F, G and H are the midpoints of AB, BC, CD and DA respectively. Prove that EFGH is a parallelogram.
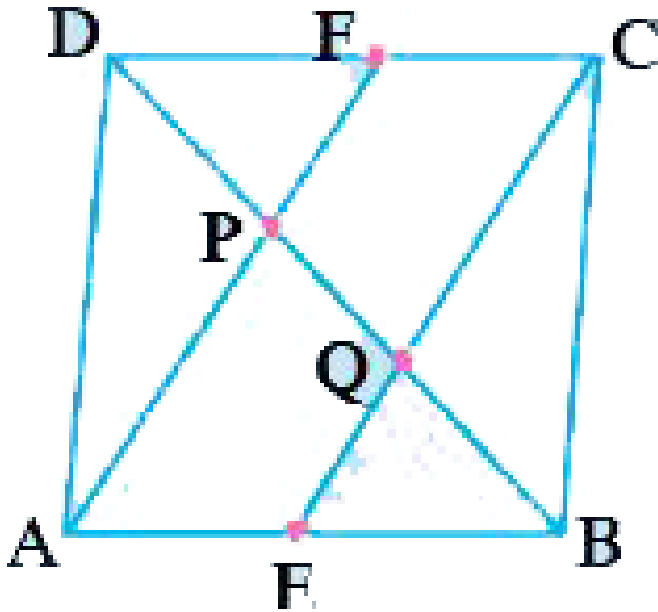
3. Show that the figure formed by joining the midpoints of sides of a rhombus successively is a rectangle.

4. In a parallelogram ABCD, E and F are the midpoints of the sides AB and DC respectively. Show that the line segments AF and EC trisect

the diagonal BD.

5. Show that the line segments joining the midpoints of the opposite sides of a quadrilateral and bisect each other.
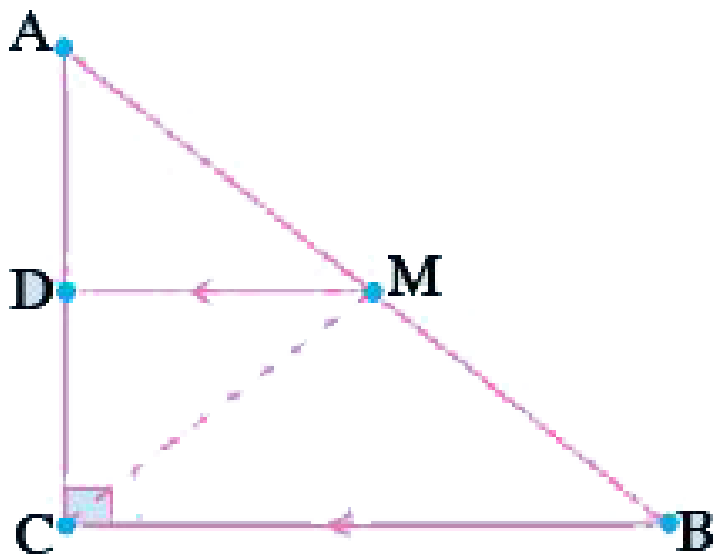
6. ABC is a triangle right angled at C. A line through the midpoint M of hypotenuse AB and Parallel to BC intersects AC at D. Show that

(i) D is the midpoint of AC

(ii) $MD \perp AC$

(iii) $CM = MA = \dfrac{1}{2}AB.$