

## *FlexiPrep*

### NCERT Class 8 Mathematics Solutions: Chapter 3 – Understanding Quadrilaterals Exercise 3.3 Part 3 (For CBSE, ICSE, IAS, NET, NRA 2022)

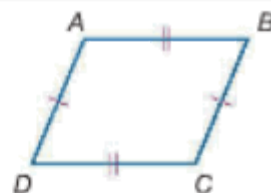
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### Theorems Conditions for Parallelograms

If both pairs of opposite sides of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

**Abbreviation** If both pairs of opp. sides are  $\cong$ , then quad. is a  $\square$ .

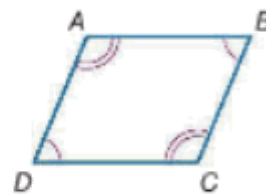
**Example** If  $\overline{AB} \cong \overline{DC}$  and  $\overline{AD} \cong \overline{BC}$ , then  $ABCD$  is a parallelogram.



If both pairs of opposite angles of a quadrilateral are congruent, then the quadrilateral is a parallelogram.

**Abbreviation** If both pairs of opp.  $\angle$ s are  $\cong$ , then quad. is a  $\square$ .

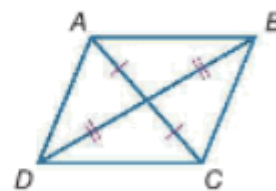
**Example** If  $\angle A \cong \angle C$  and  $\angle B \cong \angle D$ , then  $ABCD$  is a parallelogram.



If the diagonals of a quadrilateral bisect each other, then the quadrilateral is a parallelogram.

**Abbreviation** If diag. bisect each other, then quad. is a  $\square$ .

**Example** If  $\overline{AC}$  and  $\overline{DB}$  bisect each other, then  $ABCD$  is a parallelogram.



If one pair of opposite sides of a quadrilateral is both parallel and congruent, then the quadrilateral is a parallelogram.

**Abbreviation** If one pair of opp. sides is  $\cong$  and  $\parallel$ , then the quad. is a  $\square$ .



**Example** If  $\overline{AB} \parallel \overline{DC}$  and  $\overline{AB} \cong \overline{DC}$ , then  $ABCD$  is a parallelogram.



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**Question: 3** Can a quadrilateral  $ABCD$  be a parallelogram, if:

- (i)  $\angle D + \angle B = 180^\circ$ ?
- (ii)  $AB = DC = 8$  cm,  $AD = 4$  cm and  $BC = 4.4$  cm ?
- (iii)  $\angle A = 70^\circ$  and  $\angle C = 65^\circ$ ?

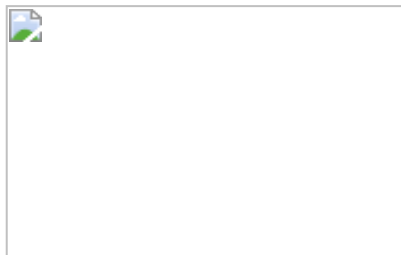
**Answer:**

(i) Yes,

Quadrilateral  $ABCD$  be a parallelogram if  $\angle D + \angle B = 180^\circ$  but it should also fulfill some conditions such as:

- Sum of the adjacent angles should be  $180^\circ$ .
- Opposite angles must be equal.

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(ii) No

In this case because one pair of opposite sides is equal and another pair of opposite sides are unequal. So, it is not a parallelogram.

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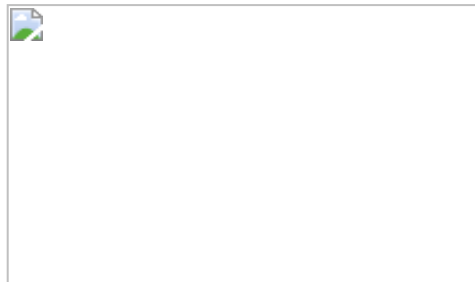


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(iv) No

$\angle A \neq \angle C$  because, opposite angles are equal in parallelogram and here opposite angles are not equal in quadrilateral ABCD. Therefore it is not a parallelogram.

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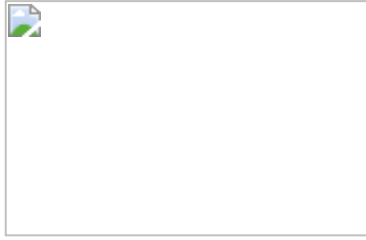
**Question: 4** Draw a rough figure of a quadrilateral that is not a parallelogram but has exactly two opposite angles of equal measures.

**Answer:**

ABCD is a quadrilateral in which angles  $\angle A = \angle C = 110^\circ$ .

Therefore, it could be a kite.

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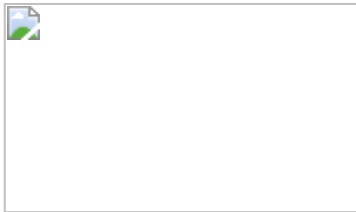
**Question: 5** The measure of two adjacent angles of a parallelogram are in the ratio 3: 2. Find the measure of each of the angles of the parallelogram.

**Answer:**

Let two adjacent angles be  $3x$  and  $2x$  .

Since the adjacent angles in a parallelogram are supplementary.

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$$\therefore 3x + 2x = 180^\circ$$

$$\therefore 5x = 180^\circ$$

$$\therefore x = \frac{180^\circ}{5}$$

$$\therefore x = 36^\circ$$

$$\text{One angle} = 3x = 3(36^\circ) = 108^\circ$$

$$\text{And another angle} = 2x = 2(36^\circ) = 72^\circ$$