

Exercise 11.1

Q.1 One angle of a parallelogram is 130° . Find the measures of its remaining angles.

In parallelogram

$$m\angle B = 130^\circ$$

$$\angle D = \angle B$$

(Opposite angles of a parallelogram)

$$m\angle D = m\angle B = 130^\circ$$

We know that

$$\angle A + \angle B = 180$$

$$\angle A + 130 = 180$$

(sum of int. $\angle$ s on same side of a parallelogram is 180°)

$$\angle A = 180 - 130$$

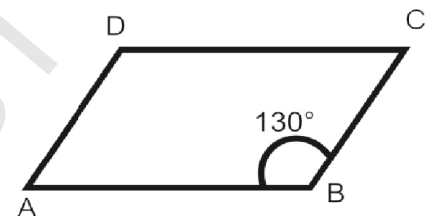
$$\angle A = 50^\circ$$

$$\text{If } \angle D = \angle B$$

Then

$$\angle C = \angle A$$

$$\angle C = 50^\circ$$



Q.2 One exterior angle formed on producing one side of a parallelogram is 40° . Find the measures of its interior angles.

$ABCD$ is a parallelogram. $\overline{BA}$ is produced towards A .

$$m\angle DAM = 40^\circ$$

$$m\angle DAB = ?$$

$$m\angle D = ?$$

$$m\angle B = ?$$

$$m\angle C = ?$$

$$\angle DAM + \angle DAB = 180^\circ$$

$$40^\circ + \angle DAB = 180^\circ$$

$$\angle DAB = 180^\circ - 40^\circ$$

$$\angle DAB = 140^\circ$$

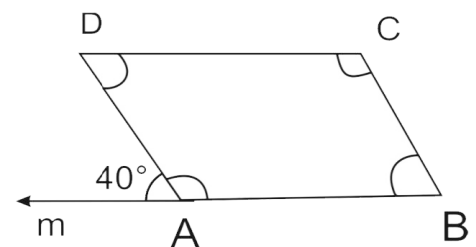
$$\angle DAB + \angle B = 180^\circ$$

$$140^\circ + \angle B = 180^\circ$$

$$\angle B = 180^\circ - 140^\circ$$

$$\angle B = 40^\circ$$

$$\angle D = \angle B = 40^\circ$$



$$\angle D = 40^\circ$$

$$\angle C = \angle DAB$$

$$\angle C = 140^\circ$$

Theorem 11.1.2

Statement: If two opposite sides of quadrilateral are congruent and parallel, it is a parallelogram

Given

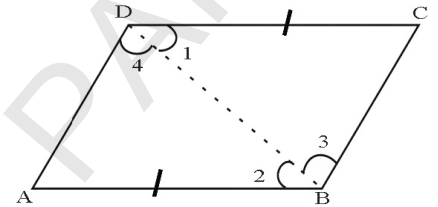
In quadrilateral $ABCD$,
 $\overline{AB} \cong \overline{DC}$ and $\overline{AB} \parallel \overline{DC}$

To prove

$ABCD$ is a parallelogram

Construction

Join the point B to D and in the figure name the angles as



Proof

Statements	Reasons
In $\triangle ABD \leftrightarrow \triangle CDB$	
$\overline{AB} \cong \overline{DC}$	Given
$\angle 2 \cong \angle 1$	Alternate angles
$\overline{BD} \cong \overline{BD}$	Common
$\therefore \triangle ABD \cong \triangle CDB$	SAS postulate
Now $\angle 4 \cong \angle 3$(i)	(Corresponding angles of congruent triangles)
$\therefore \overline{AD} \parallel \overline{BC}$(ii)	from (i)
and $\overline{AD} = \overline{BC}$(iii)	corresponding of sides of congruent triangles
Also $\overline{AB} \parallel \overline{DC}$(iv)	Given
Hence $ABCD$ is a parallelogram	From (ii)-(iv)