Exercise 11.1

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

In parallelogram

m∠B = 130°

∠D = ∠B (Opposite angles of a parallelogram)

m∠D = m∠B = 130°

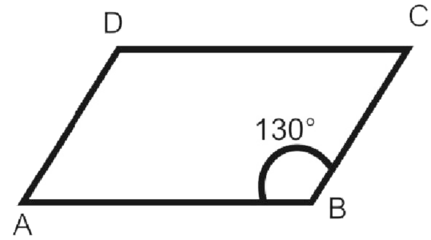
We know that

∠A+∠B =180

∠A+130 =180 (sum of int. ∠s on same side of a parallelogram is 180°)

∠A = 180–130

∠A = 50°



If ∠D = ∠B

Then

∠C = ∠A

∠C = 50°

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*.

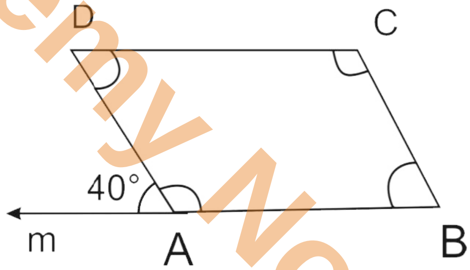
m∠DAM = 40°

m∠DAB = ?

m∠D = ?

m∠B = ?

m∠C = ?



∠DAM + ∠DAB = 180°

40° + ∠DAB = 180°

∠DAB = 180° – 40°

∠DAB = 140°

∠DAB + ∠B = 180°

140° + ∠B = 180°

∠B = 180° –140°

∠B = 40°

∠D = ∠B = 40°

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$\angle D = 40°$

$\angle C = \angle DAB$

$\angle C = 140°$

Theorem 11.1.2

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

Given

In quadrilateral $ABCD$,

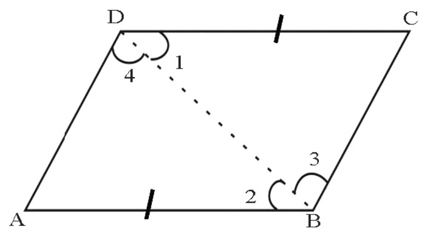
$\overline{AB} \cong \overline{DC}$ and $\overline{AB} \parallel \overline{DC}$

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 $\Delta ABD \leftrightarrow \Delta CDB$	
$\overline{AB} \cong \overline{DC}$	Given
$\angle 2 \cong \angle 1$	Alternate angles
$\overline{BD} \cong \overline{BD}$	Common
$\therefore \Delta ABD \cong \Delta CDB$	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)

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