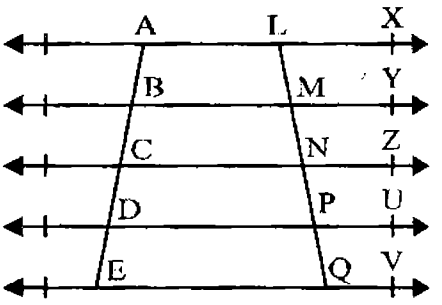
Exercise 11.5

1. In the given figure. $\overleftrightarrow{AX} \| \overleftrightarrow{BY} \| \overleftrightarrow{CZ} \| \overleftrightarrow{DU} \| \overleftrightarrow{EV}$ and $\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DE}$ if $m\overline{MN} = 1cm$ then find the length of $\overline{LN}$ and $\overline{LQ}$



Given

In given figure $\overleftrightarrow{AX} \| \overleftrightarrow{BY} \| \overleftrightarrow{CZ} \| \overleftrightarrow{DU} \| \overleftrightarrow{EV}$,

$\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DE}$, $m\overline{MN} = 1cm$

Required:

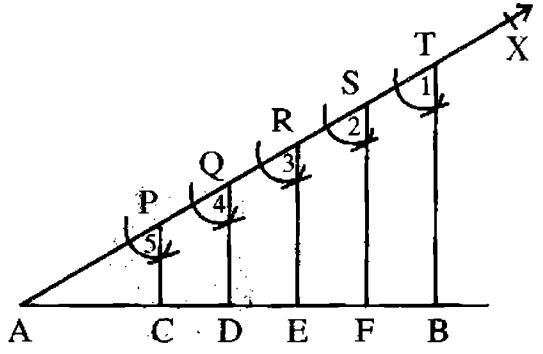
To find $m\overline{LN}$ and $m\overline{LQ}$

Statement	Reasons
$\overleftrightarrow{AX} \| \overleftrightarrow{BY} \| \overleftrightarrow{CZ} \| \overleftrightarrow{DU} \| \overleftrightarrow{EV}$	Given
$\overline{AB} \cong \overline{BC} \cong \overline{CD} \cong \overline{DE}$	Given
$\overline{BC} \cong \overline{MN}$ $\overline{NP} \cong \overline{PQ}$	$\because$ | | lines through A, B, C, D, E cut $\overline{LQ}$ in points L, M, N, P, Q.
$m\overline{MN} = 1cm$	Given
$\overline{LN} = 2\overline{MN}$ $= 2(1)$ $= 2cm$	$\because$ $\overline{MN} = 1cm$
$\overline{LQ} = 4\overline{MN}$ $= 4 \times 1$ $= 4cm$	

2. Take a line segment of length 5cm and divide it into five congruent parts.

[Hint: Draw an acute angle $\angle BAX$. On $\overline{AX}$ take $\overline{AP} \cong \overline{PQ} \cong \overline{QR} \cong \overline{RS} \cong \overline{ST}$.

Joint T to B. Draw line parallel to $\overline{TB}$ from the points P, Q, R and S.]



Construction:

(i) Take a line segment AB of 5cm long.

(ii) Draw an acute angle $\angle BAX$.

(iii) Mark 5 points on $\overline{AX}$ at equal distance starting from point A.

(iv) Join the last point (mark)T to B.

(v) Draw $\overline{SF}, \overline{RE}, \overline{QD}, \overline{PC}$ parallel to TB these line segments meet AB at F,E,D,C points.

Result: AB has been divided into five equal points

$\overline{AC} \cong \overline{CD} \cong \overline{DE} \cong \overline{FB}$

3. Fill in the blanks.

(i) In a parallelogram opposite sides are..... (Parallel / Congruent)

(ii) In a parallelogram opposite angles are ..... (Equal / Congruent)

(iii) Diagonals of a parallelogram ..... each other at a point. (Intersect)

(iv) Medians of a triangle are ..... (Concurrent)

(v) Diagonal of a parallelogram divides the parallelogram into two ..... triangles. (Congruent)

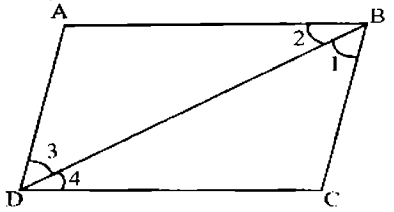
4. In parallelogram ABCD

(i) $m\overline{AB}$ ... $\cong$ ..... $m\overline{DC}$

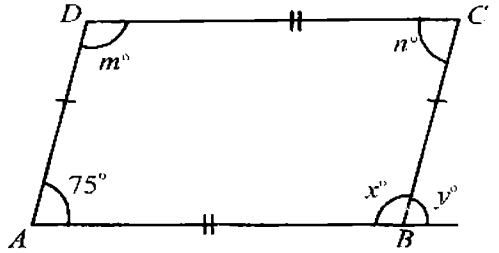
(ii) $m\overline{BC}$ ... $\cong$ ... $m\overline{AD}$

(iii) $m\angle 1 \cong$ ...$m\angle 3$.....

(iv) $m\angle 2 \cong$ ...$m\angle 4$.....



5. Find the unknowns in the given figure.



Given: Let ABCD be the given figure with

$\overline{AB} \cong \overline{CD}$

$\overline{BC} \cong \overline{AD}$

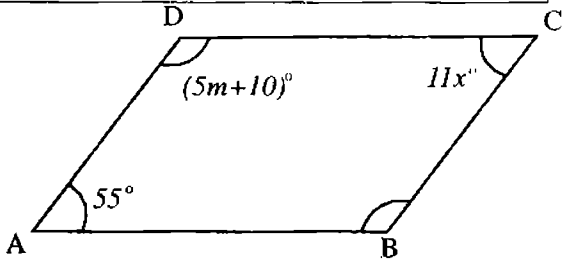
To Find: m°, n°, x°, y°

Proof:

Statement	Reasons
ABCD is a Parallelogram	$\overline{AB} \cong \overline{CD}$ $\overline{AD} \cong \overline{BC}$
$\angle n = 75^\circ$	Opposite interior angles
$m^\circ + 75^\circ = 180^\circ$ $m^\circ = 180^\circ - 75^\circ = 105^\circ$	supplementary angles
$x^\circ = m^\circ$ $x^\circ = 105^\circ$	
$x^\circ + y^\circ = 180^\circ$	supplementary angles
$y^\circ = 180^\circ - x^\circ$ $y^\circ = 180^\circ - 105^\circ$ $y^\circ = 75^\circ$	

6. If the given figure ABCD is a parallelogram, then find x, m.

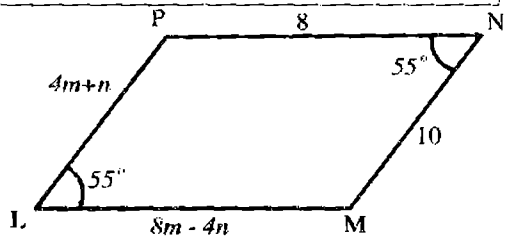
Given: ABCD is a parallelogram with angles as shown To Find x° and m°



Proof:

Statement	Reasons
$11\ x^\circ = 55^\circ$	Opposite angles of parallelogram
$x^\circ = \frac{55^\circ}{11} = 5^\circ$	
$x^\circ = 5^\circ$	
$(5m + 10)^\circ + 55^\circ = 180^\circ$	Int. supplementary angles
$(5m + 10)^\circ = 180^\circ - 55^\circ$	
$5m^\circ + 10^\circ = 125^\circ$	
$5m^\circ = 125^\circ - 10^\circ$	
$5m^\circ = 115^\circ$	
$m^\circ = 23^\circ$	

7. The given figure LMNP is a parallelogram. Find the value of *m, n.*



Given: The parallelogram LMNP with lengths and angles as shown to find: m° and n°

Proof:

Statement	Reasons
$4m + n = 10$.....(i)	Opposite sides of ||gm
$8m - 4n = 8$ ....(ii)	Opposite side of ||gm
Multiplying (i) by 4	
$16m + 4n = 40$ (iii)	
Adding (i) and (iii)	

$$8m - \cancel{4n} = 8$$
$$16m + \cancel{4n} = 40$$
$$24m = 48$$

$$m = \frac{48}{24} = 2$$

Put in (i)

$4(2) + n = 10$

$8 + n = 10$

$n = 10 - 8 \Rightarrow n = 2$

8. In the question 7, sum of the opposite angles of the parallelogram is 110°, find the remaining angles.

Given: LMNP is a parallelogram with angles 55°, 55° as shown

To Find: All angles

Proof:

Statement	Reasons
$\angle LPN + 55^\circ = 180^\circ$	Interior angles
$\angle LPN = 125^\circ$	
Also	
$\angle m = \angle P$	Opposite angles
$\angle m = 125^\circ$	$\because \angle P = 125^\circ$