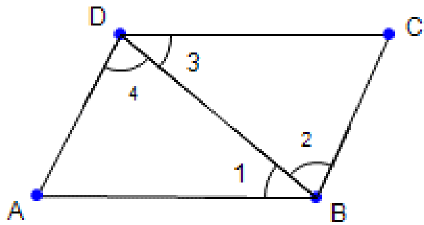
MathCity.org Merging man and maths	**Exercise 10.3 (Solutions)** Mathematics 9th (Science) Punjab Textbook Board

Q.1 In the figure, $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$.
Prove that $\angle A \cong \angle C$, $\angle ABC \cong \angle ADC$.



Solution: ***Given:*** In quadrilateral $ABCD$, $\overline{AB} \cong \overline{DC}$, $\overline{AD} \cong \overline{BC}$.

To prove:
$\angle A \cong \angle C$ and $\angle ABC \cong \angle ADC$.

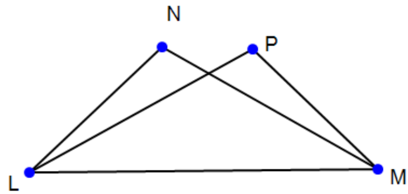
Proof:

Statement	Reasons
In $\Delta ABD \leftrightarrow \Delta\ CDB$	
$\overline{AB} \cong \overline{DC}$	Given
$\overline{AD} \cong \overline{BC}$	Given
$\overline{BD} \cong \overline{BD}$	Common
$\Delta ABD \cong \Delta CDB$	$S.S.S \cong S.S.S$
Hence $\angle A \cong \angle C$	Corresponding angles of congruent triangles
$m\angle 1 = m\angle 3$	Corresponding angles of congruent triangles
$m\angle 2 = m\angle 4$	Corresponding angles of congruent triangles
$m\angle 1 + m\angle 2 = m\angle 3 + m\angle 4$	
or $m\angle ABC = m\angle ADC$	
$\angle ABC \cong \angle ADC$	

Q.2 In the figure,

$\overline{LN} \cong \overline{MP}$, $\overline{MN} \cong \overline{LP}$.

Prove that $\angle N \cong \angle P$, $\angle NML \cong \angle PLM$,



Solution: Given: $\overline{LN} \cong \overline{PM}$ and

$\overline{LP} \cong \overline{MN}$

To prove: $\angle N \cong \angle P$ and $\angle NML \cong \angle PLM$

Proof:

Statement	Reasons
In $\Delta LMN \leftrightarrow \Delta MLP$	
$\overline{LN} \cong \overline{MP}$	Given
$\overline{LP} \cong \overline{MN}$	Given
$\overline{LM} \cong \overline{ML}$	common
$\Delta LMN \cong \Delta MLP$	S.S.S $\cong$ S.S.S
$\angle N \cong \angle P$	Corresponding angles of congruent triangles
$\angle NML \cong \angle PLM$	Corresponding angles of congruent triangles

Q.3 Prove that the median bisecting the base of an isosceles triangle bisects the vertex angle and it is perpendicular to the base.

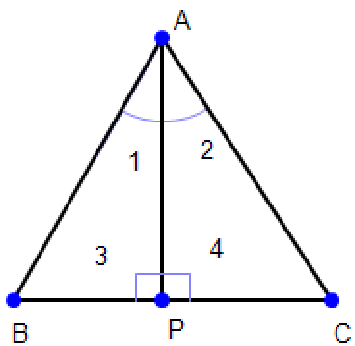
Solution: ***Given:*** In ΔABC,

(i) $\overline{AB} \cong \overline{AC}$

(ii) P is the mid-point of $\overline{BC}$ i.e $\overline{BP} = \overline{CP}$

P is joining A i.e $\overline{AP}$ is median

To prove: $\angle 1 \cong \angle 2$ and $\overline{AP} \perp \overline{BC}$



Proof:

Statement	Reasons
In $\Delta ABP \leftrightarrow \Delta\ ACP$	
$\overline{AB} \cong \overline{AC}$	Given
$\overline{BP} \cong \overline{CP}$	Given
$\overline{AP} \cong \overline{AP}$	Common
$\Delta ABP \cong \Delta ACP$	S.S.S ≅ S.S.S
$\angle 1 \cong \angle 2$	Corresponding angles of congruent triangles
$\angle 3 \cong \angle 4$	Corresponding angles of congruent triangles
$m\angle 3 = m\angle 4$ …… (i)	
$m\angle 3 + m\angle 4 = 180^\circ$	Sum of supplementary angles
$2(m\angle 4) = 180^\circ$	From equation (i) and (ii)
$m\angle 4 = 90^\circ$	
Thus $m\angle 3 = m\angle 4 = 90^\circ$	
So $\overline{AP} \perp \overline{BC}$	

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