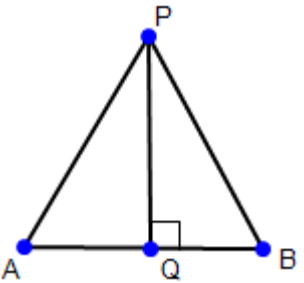
MathCity.org Merging man and maths	Exercise 10.4 (Solutions) Mathematics 9th (Science) Punjab Textbook Board

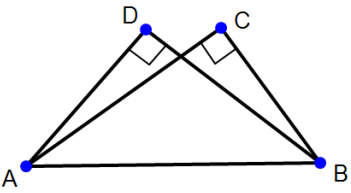
Q.1 In ΔPAB of figure,
$\overline{PQ} \perp \overline{AB}$ and $\overline{PA} \cong \overline{PB}$.
Prove that $AQ \cong BQ$, $\angle APQ \cong \angle BPQ$.



Solution: ***Given:*** In ΔPAB,
$\overline{PQ} \perp \overline{AB}$ and $\overline{PA} \cong \overline{PB}$.
To prove: $AQ \cong BQ$, $\angle APQ \cong \angle BPQ$.
Proof:

Statement	Reasons
In $\Delta APQ \leftrightarrow \Delta BPQ$	
$\overline{PA} \cong \overline{PB}$	Given
$\angle AQP \cong \angle BQP$	Given $\overline{PQ} \perp \overline{AB}$
$\overline{PQ} \cong \overline{PQ}$	Commo
$\therefore \Delta APQ \cong \Delta BPQ$	H.S $\cong$ H.S
So $\overline{AQ} \cong \overline{BQ}$	Corresponding sides of congruent triangles.
and $\angle APQ \cong \angle BPQ$	Corresponding angle of congruent triangles.

Q.2 In the figure,
$m\angle C = m\angle D = 90^\circ$ and $\overline{BC} \cong \overline{AD}$.
Prove that $\overline{AC} \cong \overline{BD}$, and
$\angle BAC \cong \angle ABD$.



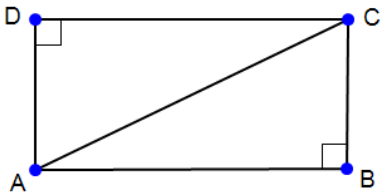
Solution: ***Given:*** $m\angle C = m\angle D = 90^\circ$ and $\overline{BC} \cong \overline{AD}$.

To prove: $\overline{AC} \cong \overline{BD}$ and $\angle BAC \cong \angle ABD$.

Proof:

Statement	Reasons
In $\Delta ABD \leftrightarrow \Delta BAC$	
$\overline{AD} \cong \overline{BC}$	Given
$\angle C \cong \angle D$	Each 90°
$\overline{BA} \cong \overline{AB}$	Common
Thus $\Delta ABD \cong \Delta BAC$	H.S $\cong$ H.S
So $\overline{AC} \cong \overline{BD}$	Corresponding sides of congruent triangles.
and $\angle BAC \cong \angle ABD$	Corresponding angles of congruent triangles.

Q.3 In the figure, $m\angle B = m\angle D = 90^\circ$ and $\overline{AD} \cong \overline{BC}$. Prove that $ABCD$ is a rectangle.



Solution: ***Given:*** In rectangle $ABCD$, $m\angle B = m\angle D = 90^\circ$ and $\overline{AD} \cong \overline{BC}$.

To prove: $ABCD$ is a rectangle.

Construction: Join A *to* C.

Proof:

Statement	Reasons
In $\Delta ABC \leftrightarrow \Delta CDA$	
$\angle B = \angle D = 90^\circ$	Given
$\overline{AC} \cong \overline{CA}$	Common
$\overline{BC} \cong \overline{AD}$.	Given
$\therefore$ $\Delta ABC \cong \Delta CDA$	H.S $\cong$ H.S
$\overline{AB} \cong \overline{CD}$	Corresponding sides of congruent triangles.

$\overline{AD} \cong \overline{BC}$ $m\angle DCA = m\angle BAC$ ….(i) and $m\angle BCA = m\angle DAC$ …. (ii) $m\angle DCA + m\angle DAC = 90^\circ$ $m\angle BAC + m\angle DAC = 90^\circ$ $m\angle A = m\angle BAD = 90^\circ$ Similarly $m\angle C = m\angle BCD = 90^\circ$ Thus $m\angle A = m\angle B = m\angle C = m\angle D = 90^\circ$ $\overline{AB} \cong \overline{CD}$ and $\overline{AD} \cong \overline{BC}$ Hence, $ABCD$ is a rectangle.	Given Corresponding angle of congruent triangles. Corresponding angle of congruent triangles. Sum of other two angles of right triangle Using (i)

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