

## Exercise 10.4 (Solutions) Mathematics 9th (Science) Punjab Textbook Board



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برائے مہربانی نوٹس کاپی اور استعمال کرتے وقت اس لائیسنس کا خیال رکھیں۔

<b>Q.1</b> In $\triangle PAB$ of figure,		
$\overline{PQ} \perp \overline{AB}$ and $\overline{PA} \cong \overline{PB}$ .		
Prove that A	$Q \cong BQ, \ \angle APQ \cong \angle BPQ.$	
Solution:	<b>Given:</b> In $\triangle PAB$ ,	
	$\overline{PQ} \perp \overline{AB}$ and $\overline{PA} \cong \overline{PB}$ .	



**To prove:**  $AQ \cong BQ$ ,  $\angle APQ \cong \angle BPQ$ . **Proof:** 

Statement	Reasons
In $\triangle APQ \leftrightarrow \triangle BPQ$	
$\overline{PA} \cong \overline{PB}$	Given
$\angle AQP \cong \angle BQP$	Given $\overline{PQ} \perp \overline{AB}$
$\overline{PQ} \cong \overline{PQ}$	Commo
$\therefore  \Delta APQ \cong \Delta BPQ$	$H.S \cong H.S$
$S_0 \qquad \overline{AO} \simeq \overline{BO}$	Corresponding sides of congruent
	triangles.
and $\angle APQ \equiv \angle BPQ$	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 $\triangle ABD \leftrightarrow \triangle BAC$	
$\overline{AD} \cong \overline{BC}$	Given
$\angle C \cong \angle D$	Each 90°
$\overline{BA} \cong \overline{AB}$	Common
Thus $\triangle ABD \cong \triangle BAC$	$H.S \cong H.S$
So $\overline{AC} \cong \overline{BD}$	Corresponding sides of congruent
and	triangles.
$\angle BAC \cong \angle ABD$	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
	$\Delta ABC \cong \Delta CDA$	$H.S \cong H.S$
	$\overline{AB} \cong \overline{CD}$	Corresponding sides of congruent triangles.



$\overline{AD} \cong \overline{BC}$	Given
$m \angle DCA = m \angle BAC \dots$ (i)	Corresponding angle of
	congruent triangles.
and	
$m \angle BCA = m \angle DAC \dots$ (ii)	Corresponding angle of
	congruent triangles.
$m \angle DCA + m \angle DAC = 90^{\circ}$	Sum of other two angles of
	right triangle
$m \angle BAC + m \angle DAC = 90^{\circ}$	Using (i)
$m \angle A = m \angle BAD = 90^{\circ}$	
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.	

# Mathematics 9

by Dr. Karamat H. Dar and Prof. Irfan-ul-Haq. Published by Carvan Book House, Lahore, Pakistan. Edition: 2022