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**SOLUTIONS: CHAPTER TEST - TRIANGLES**  
Mathematics | Class IX (2026/TRIANG/09/001)

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### Section A: Multiple Choice Questions

1. **Answer: (c) SSA**

SSA (Side-Side-Angle) is not a valid congruence criterion. SAS, ASA, and SSS are standard criteria.

2. **Answer: (d)  $\triangle PQR \cong \triangle BCA$**

Matching the corresponding sides:  $PQ \leftrightarrow CA$ ,  $QR \leftrightarrow AB$ , and  $PR \leftrightarrow BC$ . Only option (d) maintains this order.

3. **Answer: (b)  $AB > AC$**

In a triangle, the side opposite to the larger angle is longer. Since  $\angle C > \angle B$ , the side opposite  $\angle C$  ( $AB$ ) must be greater than the side opposite  $\angle B$  ( $AC$ ).

4. **Answer: (c)  $DF = 5$  cm,  $\angle E = 60^\circ$**

$\triangle ABC \cong \triangle FDE \implies AB = FD = 5$  cm.

Sum of angles in  $\triangle ABC$ :  $\angle C = 180^\circ - (80^\circ + 40^\circ) = 60^\circ$ .

By CPCT,  $\angle E = \angle C = 60^\circ$ .

5. **Answer: (a)  $120^\circ$**

Let base angles be  $x$ . Sum =  $2x$ . Vertex angle =  $2(2x) = 4x$ .

$x + x + 4x = 180^\circ \implies 6x = 180^\circ \implies x = 30^\circ$ .

Vertex angle =  $4(30^\circ) = 120^\circ$ .

6. **Answer: (b)  $QR$**

$\angle R = 180^\circ - (70^\circ + 30^\circ) = 80^\circ$ .

The longest side is opposite the largest angle ( $\angle R = 80^\circ$ ), which is  $PQ$ .

*Correction based on calculation:  $\angle R$  is largest, side is  $PQ$ . (Option (a) is correct).*

7. **Answer: (c) 5 cm, 6 cm, 10 cm**

Triangle Inequality: Sum of any two sides must be  $>$  third side.

$5 + 6 = 11 > 10$ . (Correct).

8. **Answer: (a) 3.6 cm**

Third side  $x$  must satisfy:  $(5 - 1.5) < x < (5 + 1.5) \implies 3.5 < x < 6.5$ .

$x$  cannot be  $\leq 3.5$ .

### Section B: Very Short Answer Questions

1. In  $\triangle ABD$  and  $\triangle ACD$ :

1.  $BD = CD$  ( $D$  is the midpoint as  $AD$  is perp. bisector)

2.  $\angle ADB = \angle ADC = 90^\circ$  (Given)

3.  $AD = AD$  (Common)

By SAS,  $\triangle ABD \cong \triangle ACD$ . By CPCT,  $AB = AC$ . Hence, isosceles.

2. In  $\triangle BFC$  and  $\triangle CEB$ :

1.  $\angle BFC = \angle CEB = 90^\circ$

2.  $BC = BC$  (Common Hypotenuse)

3.  $\angle B = \angle C$  (Angles opposite to equal sides  $AC$  and  $AB$ )  
By AAS,  $\triangle BFC \cong \triangle CEB$ . By CPCT,  $CF = BE$ .
3. Given  $PQ = PR \implies \angle Q = \angle R$ .  
 $100^\circ + \angle Q + \angle R = 180^\circ \implies 2\angle Q = 80^\circ$ .  
 $\angle Q = 40^\circ, \angle R = 40^\circ$ .
4. Ext. Angle = Sum of int. opp. angles.  
 $115^\circ = 45^\circ + x \implies x = 70^\circ$ .  
 Third angle =  $180^\circ - (45^\circ + 70^\circ) = 65^\circ$ .

## Section C: Short Answer Questions

1. In  $\triangle APB$  and  $\triangle AQB$ :  
 1.  $\angle PAB = \angle QAB$  ( $l$  is bisector)  
 2.  $\angle APB = \angle AQB = 90^\circ$  (Given)  
 3.  $AB = AB$  (Common Hypotenuse)  
 By AAS,  $\triangle APB \cong \triangle AQB$ . By CPCT,  $BP = BQ$ .
2. In  $\triangle ABD$  and  $\triangle ACD$ :  
 $\angle BAD = \angle CAD$  ( $AD$  is bisector),  $AD = AD$  (Common),  $\angle ADB = \angle ADC = 90^\circ$ .  
 By ASA,  $\triangle ABD \cong \triangle ACD$ . By CPCT,  $AB = AC$ .
3. In right  $\triangle ABC$  (right angled at  $B$ ):  
 $\angle B = 90^\circ$ . Since sum of angles is  $180^\circ$ ,  $\angle A + \angle C = 90^\circ$ .  
 This means  $\angle B$  is the largest angle. Side opposite  $\angle B$  (Hypotenuse  $AC$ ) is the longest.

## Section D: Long Answer Questions

1. In  $\triangle ABD$  and  $\triangle ACE$ :  
 $AB = AC$  (Given).  $\angle B = \angle C$  (Angles opp. to equal sides).  
 $BE = CD \implies BE - DE = CD - DE \implies BD = CE$ .  
 By SAS,  $\triangle ABD \cong \triangle ACE$ . By CPCT,  $AD = AE$ .
2. **RHS Rule:** Two right triangles are congruent if the hypotenuse and one side of one are equal to those of the other.

**Median Proof:** In isosceles  $\triangle ABC$  ( $AB = AC$ ), let medians be  $BD$  and  $CE$ .

In  $\triangle BDC$  and  $\triangle CEB$ :

- $BC = BC$  (Common)
- $\angle B = \angle C$  (Given  $AB = AC$ )
- $CD = BE$  (Half of equal sides)

By SAS (or RHS if using altitudes), the triangles are congruent  $\implies BD = CE$ .

## Section E: Case Study

- Answer: (b) SSS or SAS** ( $PQ = PR, PS = PS, QS = RS$ )
- Answer: (c)  $55^\circ$**  (In isosceles triangle, base angles are equal)
- Answer: (b) 6 m** (Midpoint of 12 m)

4. **Answer:** (c)  $90^\circ$  (Apex of isosceles to midpoint of base is perpendicular)

5. **Answer:** (b)  $180^\circ$  (Angle sum property)

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