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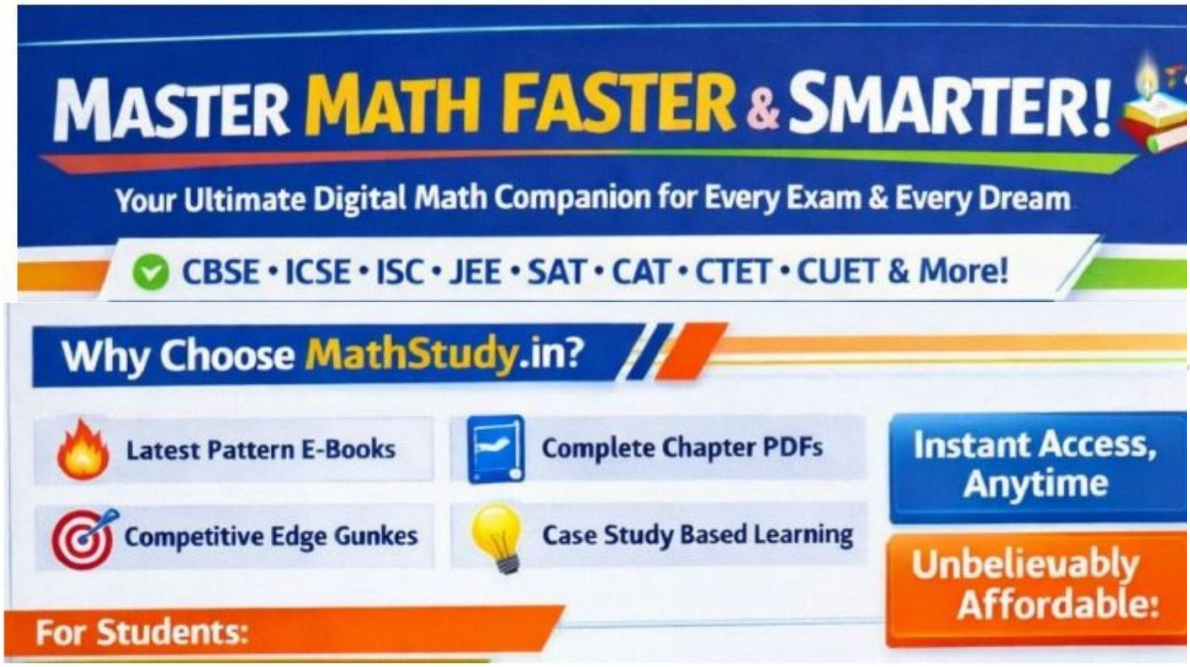

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SOLUTIONS: CHAPTER TEST - TRIANGLES

Mathematics | Class IX (2026/TRIANG/09/003)

Section A: Multiple Choice Questions

1. **Answer: (c) Equilateral**
   A triangle with all three sides equal is defined as an equilateral triangle.

2. **Answer: (d) AAA**
   AAA (Angle-Angle-Angle) is a criterion for similarity, not congruence. Congruence requires at least one side to be specified to fix the size.

3. **Answer: (b) SAS**
   SAS stands for Side-Angle-Side, where the angle must be the included angle between the two sides.

4. **Answer: (c) Larger**
   By the theorem of inequalities in a triangle, the angle opposite to the longer side is always larger.

5. **Answer: (c) Equilateral**
   If two angles are 60° each, the third angle is $180^\circ - (60^\circ + 60^\circ) = 60^\circ$. Since all angles are equal, the triangle is equilateral.

6. **Answer: (a) Two opposite interior angles**
   The exterior angle theorem states that an exterior angle of a triangle is equal to the sum of its two interior opposite angles.

7. **Answer: (c)** $BC = EF$
   In $\triangle ABC \cong \triangle DEF$, the corresponding parts are $AB = DE$, $BC = EF$, and $AC = DF$.

8. **Answer: (a)** 50°
   $\angle R = 180^\circ - (\angle P + \angle Q) = 180^\circ - (70^\circ + 60^\circ) = 50^\circ$.

Section B: Very Short Answer Questions

1. **Definition:** Two triangles are congruent if they are identical in shape and size. Their corresponding sides and angles are equal.
   Example: Two equilateral triangles both having sides of 5 cm.

2. **SSS Criterion:** If three sides of one triangle are equal to the three sides of another triangle, the triangles are congruent.

3. Given $AB = AC \implies \angle B = \angle C$ (Angles opposite to equal sides).
   Since $\angle B = 70^\circ$, then $\angle \mathbf{C} = \mathbf{70}^\circ$.
   $\angle A = 180^\circ - (70^\circ + 70^\circ) = \mathbf{40}^\circ$.

4. Corresponding parts for $\triangle PQR \cong \triangle ABC$:
   Sides: $PQ \leftrightarrow AB$, $QR \leftrightarrow BC$, $PR \leftrightarrow AC$.
   Angles: $\angle P \leftrightarrow \angle A$, $\angle Q \leftrightarrow \angle B$, $\angle R \leftrightarrow \angle C$.

Section C: Short Answer Questions

1. In $\triangle ABD$ and $\triangle ACD$:
   1. $AB = AC$ (Given)
   2. $\angle BAD = \angle CAD$ (AD is bisector of $\angle BAC$)
   3. $AD = AD$ (Common)
   By **SAS criterion**, $\triangle ABD \cong \triangle ACD$.

2. In right triangles $\triangle ABD$ and $\triangle ACD$:
   1. $AB = AC$ (Hypotenuse - Given)
   2. $AD = AD$ (Side - Common)
   3. $\angle ADB = \angle ADC = 90°$ (Given $AD \perp BC$)
   By **RHS criterion**, $\triangle ABD \cong \triangle ACD$. Therefore, $BD = DC$ (CPCT).

3. In $\triangle AOB$ and $\triangle DOC$:
   1. $OA = OD$ (O is midpoint of AD)
   2. $\angle OAB = \angle ODC$ (Alternate interior angles as $AB \parallel CD$)
   3. $\angle AOB = \angle DOC$ (Vertically opposite angles)
   By **ASA criterion**, $\triangle AOB \cong \triangle DOC$.

Section D: Long Answer Questions

1. **Part 1:** In $\triangle ABD$ and $\triangle ACD$, if $AB = AC$ and $AB = AD$, then $AC = AD$. In $\triangle ACD$, since $AC = AD$, $\angle ACD = \angle ADC$.
   Part 2: In $\triangle ABC$, $AB = AC \implies \angle ABC = \angle ACB$.
   Let $\angle BAC = \theta$. Then $\angle ABC = \angle ACB = \frac{180-\theta}{2}$.
   In $\triangle ACD$, $\angle CAD = 180 - \theta$ (Linear pair). Since $AC = AD$, $\angle ACD = \frac{180-(180-\theta)}{2} = \frac{\theta}{2}$.
   $\angle BCD = \angle ACB + \angle ACD = 90 - \frac{\theta}{2} + \frac{\theta}{2} = \mathbf{90}°$.

2. Given $BA \perp AC$ and $DE \perp DF \implies \angle A = \angle D = 90°$.
   Given $BF = EC$. Adding FC to both sides: $BF + FC = EC + FC \implies BC = EF$.
   In $\triangle ABC$ and $\triangle DEF$:
   1. $\angle A = \angle D = 90°$
   2. $BC = EF$ (Hypotenuse)
   3. $AB = DE$ (Side)
   By **RHS criterion**, $\triangle ABC \cong \triangle DEF$.

Section E: Case Study

1. **Answer: (b) SAS** (Pathway to midpoint creates two sides and included angle)
2. **Answer: (a) SSS** (Three sides: $AC = BC, AD = BD, CD = CD$)
3. **Answer: (c) ASA** (Or AAS depending on the specific angle placement)
4. **Answer: (c) 4 cm** (Assuming a 45° or specific geometry provided in design)
5. **Answer: (a) 5 cm** (Using properties of isosceles triangles if CD were specific)