GRADE: 7

LESSON: Congruence of Triangles

Instructions:

1. The time given at the head of this Paper is the time allowed for writing the answers.
2. You will not be allowed to write during the first 10 minutes. Use this time to read the question paper carefully.
3. Attempt **all questions from Section A** and **any four questions from Section B**.
4. All working, including rough work, must be clearly shown.
5. Omission of essential working will result in loss of marks.

SECTION A (4 × 10 = 40 marks)

(Answer all questions)

1. Choose the correct option:

a) Two triangles are congruent if their:
- (i) Corresponding angles are equal
- (ii) Corresponding sides are equal
- (iii) Both corresponding sides and angles are equal
- (iv) None of the above

b) The congruence rule **SAS** states that two triangles are congruent if:
- (i) Two sides and the non-included angle are equal
- (ii) Two sides and the included angle are equal
- (iii) All three sides are equal
- (iv) All three angles are equal

c) If $\triangle ABC \cong \triangle PQR$, which of the following statements is true?
- (i) AB = PQ , BC = QR , CA = RP
- (ii) A = P , B = Q , C = R
- (iii) Both (i) and (ii)
- (iv) None of the above

d) The **ASA** congruence rule states that:
- (i) Two angles and the included side must be equal
- (ii) Two angles and any side must be equal
- (iii) Three angles must be equal
- (iv) Three sides must be equal

2. Solve the following:

a) Define congruence of triangles and give two real-life examples.

b) Check if two triangles with sides 5 cm, 6 cm, 7 cm and 5 cm, 6 cm, 7 cm are congruent. Justify your answer.

c) Find the missing angle in a triangle if two angles measure **65°** and **45°**.

3. Solve the following equations:

a) Two triangles are congruent under the **SSS** rule if their corresponding sides are equal. Prove that **ΔABC ≅ ΔDEF**, given:

- AB = DE = 5 cm,
- BC = EF = 7 cm,
- CA = FD = 6 cm

b) If **ΔXYZ ≅ ΔPQR**, find the missing values:

- XY = 8 cm, PQ = ?
- YZ = 10 cm, QR = ?
- XZ = 6 cm, PR = ?

c) Two triangles are congruent under **ASA** rule. The measures of two angles are **50° and 60°**. Find the third angle.

4. State whether the following statements are TRUE or FALSE:

a) Two congruent triangles have equal perimeters.
b) If two triangles have equal areas, they are always congruent.
c) If two right triangles have equal hypotenuses and one pair of equal legs, then they are

congruent.
d) The **AAA** (Angle-Angle-Angle) rule is a valid congruence criterion for triangles.

5. Solve the following problems:

a) **Prove that two right-angled triangles are congruent if their hypotenuses and one leg are equal.**

b) In **ΔABC, AB = 5 cm, AC = 7 cm, and BC = 6 cm**. In **ΔXYZ, XY = 5 cm, XZ = 7 cm, and YZ = 6 cm**. Show that **ΔABC ≅ ΔXYZ** using the **SSS** criterion.

c) A triangle has sides in the ratio **3:4:5**. If its perimeter is **36 cm**, find the length of each side and prove that it is a right triangle.

SECTION B (4 × 10 = 40 marks)

(Answer any four questions)

6. Congruence of Triangles – Practical Applications:

a) A surveyor needs to prove that two triangular plots of land are congruent using the **SAS** criterion. What information does he need?

b) Two bridges have triangular supports with equal bases and equal heights. Show that these supports are congruent using the **ASA** criterion.

c) If two roads form a triangular intersection with equal angles and a common side, prove that they form congruent triangles.

7. Properties of Congruent Triangles:

a) Two triangles are congruent by the **RHS** (Right-angle Hypotenuse Side) rule. Prove that their third sides must also be equal.

b) Prove that an **isosceles triangle** is always congruent to itself.

c) If two congruent triangles are placed on top of each other with their sides aligned, prove that their angles remain unchanged.

8. Real-Life Application Problems:

a) The sides of a triangular metal sheet are **6 cm, 8 cm, and 10 cm**. Another triangular metal sheet has the same measurements. Show that they are congruent and determine if they are right-angled.

b) A park has two triangular garden beds with sides **12 m, 16 m, and 20 m** each. Prove that the beds are congruent and find the area of each bed.

c) An architect designs two triangular windows with sides **3 ft, 4 ft, and 5 ft**. Prove that the two windows are congruent and state if they are right triangles.

9. HOTS (Higher Order Thinking Skills):

a) A triangular banner is cut into two congruent triangles. Explain how to check if both halves are congruent.

b) Two equilateral triangles are placed on top of each other. Prove that they remain congruent.

c) If a right-angled triangle is flipped and rotated, does it remain congruent to its original shape? Justify your answer.

10. Bonus Challenge Questions:

a) A flagpole casts a triangular shadow with its base as **10 m** and height as **15 m**. Another pole casts a similar triangular shadow with a base of **10 m** and a height of **15 m**. Are the two triangular shadows congruent? Prove it.

b) Two mountain peaks form a **triangular shape** when viewed from a distance. If the slopes on either side of the peaks are the same, prove that the two triangles are congruent.

c) A carpenter needs to cut two identical triangular boards from a single wooden piece. How can he ensure that both pieces are congruent?

END OF THE QUESTION PAPER