

GRADE: 7

LESSON: Triangles and Its Properties

DURATION: 2½ hrs

MAX MARKS: 80

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 constructions must be done accurately and neatly.
5. Omission of essential working will result in loss of marks.

SECTION A ($4 \times 10 = 40$ marks)

(Answer all questions)

1. Choose the correct option:

a) The sum of all three angles of a triangle is always:

- (i) 90°
- (ii) 120°
- (iii) 180°
- (iv) 360°

b) An equilateral triangle has:

- (i) All angles different
- (ii) All angles equal to 60°
- (iii) Only two equal angles
- (iv) One angle equal to 90°

c) The longest side in a right-angled triangle is called:

- (i) Base
- (ii) Perpendicular
- (iii) Hypotenuse
- (iv) Median

d) If the sides of a triangle are 5 cm, 12 cm, and 13 cm, then it is a:

- (i) Acute-angled triangle
- (ii) Right-angled triangle
- (iii) Equilateral triangle
- (iv) Obtuse-angled triangle

2. Solve the following:

a) Define a triangle and list its six elements.

b) Find the measure of the third angle in a triangle if two angles are 65° and 75° .

c) Classify the following triangles based on their angles:

- (i) $45^\circ, 45^\circ, 90^\circ$
- (ii) $30^\circ, 60^\circ, 90^\circ$
- (iii) $110^\circ, 40^\circ, 30^\circ$

3. Solve the following equations:

a) Find the missing angle in a triangle if two angles measure 50° and 40° .

b) Two sides of a triangle are 7 cm and 9 cm. What is the possible range for the third side?

c) Use the **Pythagoras theorem** to check whether a triangle with sides 6 cm, 8 cm, and 10 cm is a right-angled triangle.

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

a) The sum of two sides of a triangle is always greater than the third side.

b) The exterior angle of a triangle is equal to the sum of two interior opposite angles.

- c) A right-angled triangle can never be an isosceles triangle.
- d) The altitudes of a triangle always lie inside the triangle.

5. Solve the following problems:

- a) The angles of a triangle are in the ratio **2:3:4**. Find the measure of each angle.
- b) Find the length of the hypotenuse in a **right-angled triangle** where the base is **9 cm** and the perpendicular is **12 cm**.
- c) Prove that in an **isosceles triangle**, the angles opposite the equal sides are always equal.

SECTION B ($4 \times 10 = 40$ marks)

(Answer any four questions)

6. Properties of Triangles:

- a) State and explain the **angle sum property** of a triangle with an example.
- b) Prove that the sum of any two sides of a triangle is always greater than the third side.
- c) Explain the **Pythagoras theorem** with a real-life example.

7. Types of Triangles:

- a) Construct a **scalene triangle** with sides **5 cm, 6 cm, and 7 cm**.
- b) Construct an **isosceles triangle** where the base is **6 cm** and equal sides are **7 cm**.
- c) Construct a **right-angled triangle** where the base is **8 cm** and perpendicular is **6 cm**.

8. Real-Life Applications:

- a) A ladder **15 m long** is leaning against a wall. The base of the ladder is **9 m** from the wall. Find the height at which the ladder touches the wall.

b) A triangular plot has sides **40 m, 30 m, and 50 m**. Check if it is a right-angled triangle using **Pythagoras theorem**.

c) A farmer wants to fence a triangular field with sides **100 m, 120 m, and 150 m**. Find the total fencing required.

9. Higher Order Thinking Skills (HOTS):

a) The exterior angle of a triangle is **110°** , and one of its opposite interior angles is **40°** . Find the other opposite interior angle.

b) In an isosceles triangle, one of the angles is **40°** . Find the other two angles.

c) The angles of a triangle are in the ratio **5:7:8**. Find the angles.

10. Bonus Challenge Questions:

a) A pole is broken at a height of **5 m** from the ground and falls **12 m** away from the base. Find the original height of the pole.

b) A rectangle has a **length of 30 cm** and a **diagonal of 34 cm**. Find its width using the **Pythagoras theorem**.

c) A road signboard is in the shape of an **equilateral triangle** with side **20 cm**. Find the height of the signboard.

END OF THE QUESTION PAPER