# Triangle inequality property

### **Understanding: Triangle Inequality Property**

- The Triangle Inequality Property states that the sum of the lengths of any two sides of a triangle is always greater than the third side.
- This must be true for all three combinations of the sides for a triangle to be valid.

#### **Important Rule**

- For any triangle with sides a, b, and c:
  - a + b > c
  - a + c > b
  - b + c > a

#### Why It's Important

• This property helps in checking whether the given side lengths can form a triangle or not

#### Let us understand with see examples:

**Example:** If 5cm, 7cm and 2cm are the measures of three lines segment. Can it be used to draw a Triangle?

**Solution:** The triangle is formed by three-line segments 5cm, 7and 2cm, then it should satisfy the inequality theorem.



Hence, let us check if the sum of two sides is greater than the third side.

 $5 + 7 > 2 \Rightarrow 12 > 2 \Rightarrow True$ 

 $7 + 2 > 5 \Rightarrow 9 > 4 \Rightarrow True$ 

 $5 + 2 > 7 \Rightarrow 7 > 7 \Rightarrow False$ 

Therefore, the sides of the triangle do not satisfy the inequality theorem. So, we cannot construct a triangle with these three line-segments.

#### Example:

Can sides 7 cm, 9 cm, and 5 cm form a triangle?

7 + 9 = 16 > 5

7 + 5 = 12 > 9

9 + 5 = 14 > 7

Yes, the sides satisfy the triangle inequality property

# Example:

Check whether 2 cm, 2 cm, and 5 cm can form a triangle

2 + 2 = 4 which is not greater than 5

No, the triangle cannot be formed

# Example:

Can a triangle be formed with sides 6 cm, 8 cm, and 10 cm?

6 + 8 = 14 > 10 6 + 10 = 16 > 8

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8 + 10 = 18 > 6
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Yes, all conditions are satisfied

# **Summary Points**

- In a triangle, the sum of any two sides must be greater than the third side.
- This rule must be true for all three combinations.
- If the condition fails even once, a triangle is not possible.
- This property helps in checking validity of triangle side lengths.
- Always compare two sides' sum with the third before forming a triangle.