Triangle inequality property

A. Choose the correct answer:

1. According to the triangle inequality property, the sum of the lengths of any two sides of a triangle must be

a) less than the third side b) equal to the third side

c) greater than the third side d) less than or equal to the third side

2. Which of the following can be the sides of a triangle?

a) 3 cm, 4 cm, 8 cm b) 2 cm, 5 cm, 7 cm

c) 5 cm, 6 cm, 12 cm d) 7 cm, 8 cm, 15 cm

3. If two sides of a triangle are 5 cm and 7 cm, the third side must be

a) more than 12 cm b) less than 2 cm

c) less than 12 cm and more than 2 cm d) equal to 12 cm

4. Which of the following cannot form a triangle?

a) 6 cm, 8 cm, 13 cm b) 2 cm, 2 cm, 5 cm

c) 4 cm, 4 cm, 5 cm d) 5 cm, 6 cm, 10 cm

5. In a triangle, the difference of the lengths of any two sides is always

a) less than the third side b) more than the third side

c) equal to the third side d) greater than the sum of the third side

B. Write the Missing Terms to Complete the Sentences:

1. The sum of any two sides of a triangle must be _____ than the third side.

2. A triangle cannot be formed if the sum of two sides is _____ than or equal to the third side.

3. The sides 3 cm, 4 cm, and 5 cm can form a _____.

4. If two sides of a triangle are 6 cm and 9 cm, the third side must be less than _____.

5. According to the triangle inequality property, the third side must lie between the _____ and the _____ of the other two sides.

C. Mark each sentence with a True (✔) or False (✗):

1. A triangle can have sides 2 cm, 3 cm, and 6 cm. _____
2. The triangle inequality applies to all triangles. _____
3. The difference of any two sides of a triangle is always greater than the third side. _____
4. The sides 4 cm, 4 cm, and 9 cm cannot form a triangle. _____
5. A triangle with sides 5 cm, 5 cm, and 10 cm satisfies the triangle inequality property. _____

D. Figure out the answers to these questions:

1. Can a triangle be formed with sides 5 cm, 10 cm, and 15 cm? Check using the triangle inequality property.
2. If two sides of a triangle are 7 cm and 11 cm, find the range of the possible lengths of the third side.
3. A triangle has one side 8 cm and another side 3 cm. What is the maximum and minimum value the third side can take.
4. Use the triangle inequality property to check whether 6 cm, 7 cm, and 14 cm can form a triangle.
5. If two sides of a triangle are equal to a and b, write the condition for the third side using triangle inequality.

E. Challenge yourself with these questions:

1. Can a triangle be formed with sides $\frac{7}{2}$ cm, $\frac{3}{2}$ cm, and 5 cm.
2. Find three different sets of side lengths that satisfy the triangle inequality property.
3. Explain why a triangle cannot have sides 2 cm, 2 cm, and 5 cm.
4. Test whether a triangle with sides 4.5 cm, 5.5 cm, and 10 cm is possible.
5. If a triangle has sides a, b, and c, write all three triangle inequality conditions using a, b, and c.

F. In the given figure P and Q are the points on the side BC of ΔABC. Find AP = AQ. Prove that AC + AB + BC > 2AP + PQ.