

Triangle Inequality Theorem Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

Which of the following is a correct statement of the Triangle Inequality Theorem?

Hint: Think about the relationship between the sides of a triangle.

- A) The sum of the lengths of any two sides of a triangle is equal to the length of the third side.
- B) The sum of the lengths of any two sides of a triangle is less than the length of the third side.
- C) The sum of the lengths of any two sides of a triangle is greater than the length of the third side. ✓
- D) The difference of the lengths of any two sides of a triangle is greater than the length of the third side.

The correct statement is that the sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Which of the following is a correct statement of the Triangle Inequality Theorem?

Hint: Consider the definitions of the theorem.

- A) The sum of the lengths of any two sides of a triangle is equal to the length of the third side.
- B) The sum of the lengths of any two sides of a triangle is less than the length of the third side.
- C) The sum of the lengths of any two sides of a triangle is greater than the length of the third side. ✓
- D) The difference of the lengths of any two sides of a triangle is greater than the length of the third side.

The correct statement is C) The sum of the lengths of any two sides of a triangle is greater than the length of the third side.

Which of the following inequalities must be true for a triangle with sides a, b, and c?

Hint: Consider the relationships between all three sides.

- A) $a + b > c$ ✓
- B) $a + c > b$ ✓

C) $b + c > a$ ✓

D) $a + b = c$

■ All three inequalities must be true for the sides to form a triangle.

Which of the following inequalities must be true for a triangle with sides a , b , and c ?

Hint: Think about the relationships between the sides.

A) $a + b > c$ ✓

B) $a + c > b$ ✓

C) $b + c > a$ ✓

D) $a + b = c$

■ All of the inequalities A), B), and C) must be true.

Explain in your own words why the Triangle Inequality Theorem is important in determining whether three lengths can form a triangle.

Hint: Think about the implications of the theorem in geometry.

■ **The theorem is crucial because it establishes the necessary conditions for three lengths to create a closed shape, ensuring that the lengths can connect to form a triangle.**

Explain in your own words why the Triangle Inequality Theorem is important in determining whether three lengths can form a triangle.

Hint: Consider the implications of the theorem in geometry.

The Triangle Inequality Theorem is crucial because it provides a necessary condition for the existence of a triangle.

List the three inequalities that must be satisfied for a triangle with sides x , y , and z .

Hint: Consider the relationships between each pair of sides.

1. First inequality

$$x + y > z$$

2. Second inequality

$$x + z > y$$

3. Third inequality

$$y + z > x$$

The inequalities are: $x + y > z$, $x + z > y$, and $y + z > x$.

Part 2: Comprehension and Application

Given the side lengths 3, 4, and 8, which statements are true regarding the possibility of forming a triangle?

Hint: Evaluate each inequality carefully.

- A) $3 + 4 > 8$
- B) $3 + 8 > 4$ ✓
- C) $4 + 8 > 3$ ✓
- D) A triangle cannot be formed with these side lengths. ✓

The correct statement is D) A triangle cannot be formed with these side lengths because one inequality is not satisfied.

Given the side lengths 3, 4, and 8, which statements are true regarding the possibility of forming a triangle?

Hint: Apply the Triangle Inequality Theorem to these lengths.

- A) $3 + 4 > 8$
- B) $3 + 8 > 4$ ✓
- C) $4 + 8 > 3$ ✓
- D) A triangle cannot be formed with these side lengths. ✓

The correct statement is D) A triangle cannot be formed with these side lengths.

Given the side lengths 9, 12, and x , find the range of possible values for x that would allow these lengths to form a triangle.

Hint: Use the Triangle Inequality Theorem to establish the inequalities.

The range for x is $3 < x < 21$, derived from the inequalities $9 + 12 > x$, $9 + x > 12$, and $12 + x > 9$.

Part 3: Analysis, Evaluation, and Creation

Analyze the following set of side lengths: 10, 24, and 15. Which statement is true?

Hint: Consider the implications of the Triangle Inequality Theorem.

- A) They can form a triangle because all inequalities are satisfied. ✓
- B) They cannot form a triangle because one inequality is not satisfied.
- C) They can form a triangle because they satisfy the Pythagorean theorem.
- D) They cannot form a triangle because they are not integers.

The correct answer is A) They can form a triangle because all inequalities are satisfied.

Analyze the following set of side lengths: 10, 24, and 15. Which statement is true?

Hint: Evaluate the inequalities for these lengths.

- A) They can form a triangle because all inequalities are satisfied.
- B) They cannot form a triangle because one inequality is not satisfied. ✓
- C) They can form a triangle because they satisfy the Pythagorean theorem.
- D) They cannot form a triangle because they are not integers.

The correct answer is B) They cannot form a triangle because one inequality is not satisfied.

Create a set of three side lengths that cannot form a triangle. Which of the following sets meets this criterion?

Hint: Think about the Triangle Inequality Theorem.

- A) 3, 4, 5
- B) 1, 2, 3 ✓
- C) 6, 8, 10
- D) 5, 9, 14

The correct answer is B) 1, 2, 3, as they do not satisfy the triangle inequality.

Propose a real-world problem that involves using the Triangle Inequality Theorem to solve. Describe the problem and explain how the theorem would be applied.

Hint: Think about practical applications of the theorem.

A real-world problem could involve determining if a triangular piece of land can be formed with given side lengths.

Create a set of three side lengths that cannot form a triangle. Which of the following sets meets this criterion?

Hint: Evaluate each set against the Triangle Inequality Theorem.

- A) 3, 4, 5
- B) 1, 2, 3 ✓
- C) 6, 8, 10
- D) 5, 9, 14

■ The correct answer is B) 1, 2, 3, as they do not satisfy the Triangle Inequality Theorem.

Propose a real-world problem that involves using the Triangle Inequality Theorem to solve. Describe the problem and explain how the theorem would be applied.

Hint: Think about scenarios in construction or design.

■ An example could be determining if three lengths of wood can form a triangular support for a structure, applying the theorem to ensure stability.

Reflect on the importance of the Triangle Inequality Theorem in geometry. Provide two reasons why understanding this theorem is crucial for solving geometric problems.

Hint: Consider its applications in various geometric contexts.

1. First reason

■ It ensures that three lengths can form a triangle.

2. Second reason

| It helps in solving problems related to triangle construction.

| Understanding the theorem is crucial for ensuring that shapes can be formed and for solving problems related to triangle construction.