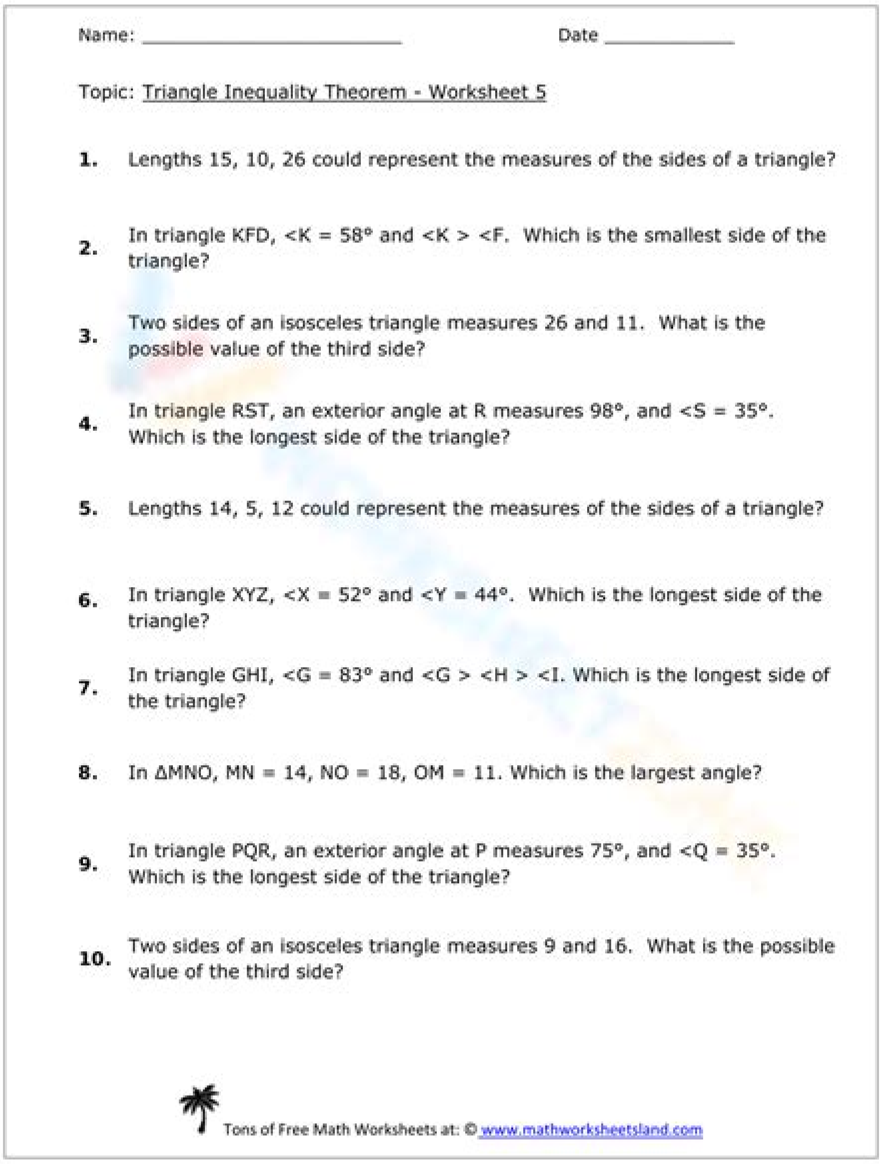
Triangle Inequality Theorem Answer Key



Name: ________________________ Date ____________

Topic: Triangle Inequality Theorem - Worksheet 5

1. Lengths 15, 10, 26 could represent the measures of the sides of a triangle?

2. In triangle KFD, <K = 58° and <K > <F. Which is the smallest side of the triangle?

3. Two sides of an isosceles triangle measures 26 and 11. What is the possible value of the third side?

4. In triangle RST, an exterior angle at R measures 98°, and <S = 35°. Which is the longest side of the triangle?

5. Lengths 14, 5, 12 could represent the measures of the sides of a triangle?

6. In triangle XYZ, <X = 52° and <Y = 44°. Which is the longest side of the triangle?

7. In triangle GHI, <G = 83° and <G > <H > <I. Which is the longest side of the triangle?

8. In ΔMNO, MN = 14, NO = 18, OM = 11. Which is the largest angle?

9. In triangle PQR, an exterior angle at P measures 75°, and <Q = 35°. Which is the longest side of the triangle?

10. Two sides of an isosceles triangle measures 9 and 16. What is the possible value of the third side?

Tons of Free Math Worksheets at: © www.mathworksheetsland.com

Triangle inequality theorem answer key serves as a fundamental concept in geometry that is crucial for understanding the relationships between the lengths of the sides of a triangle. This theorem states that the sum of the lengths of any two sides of a triangle must be greater than the length of the third side. The triangle inequality theorem not only applies to triangles but also has implications in various fields such as mathematics, physics, and engineering. This article will delve into the details of the triangle inequality theorem, provide examples, and offer a comprehensive answer key to help reinforce your understanding of this essential geometric principle.

Understanding the Triangle Inequality Theorem

The triangle inequality theorem can be formally expressed as follows:

For any triangle with sides of lengths a, b, and c:

1. $a + b > c$
2. $a + c > b$
3. $b + c > a$

These inequalities must hold true for any set of three lengths to form a triangle. If any of these conditions are violated, the lengths cannot form a triangle.

Geometric Interpretation

The triangle inequality theorem has a clear geometric interpretation. Visualizing a triangle, if you take any two sides and compare their combined length with the third side, the combined length must always be greater than the third side. This ensures that a triangle can "close" and maintain its shape. The theorem also indicates that if you were to stretch one side of the triangle beyond the sum of the other two sides, it would no longer be possible to form a triangle.

Applications of the Triangle Inequality Theorem

The implications of the triangle inequality theorem extend beyond pure geometry. Here are some significant applications:

- **Construction and Engineering:** In construction, ensuring that the frame of a structure adheres to the triangle inequality is crucial for stability.
- **Navigation:** In fields like navigation and robotics, the theorem can assist in determining feasible paths and distances.
- **Computer Graphics:** In computer graphics, the theorem is used in algorithms that detect whether a set of points can form a triangle.
- **Optimization Problems:** The triangle inequality is often leveraged in optimization and network flow problems.

Examples of the Triangle Inequality Theorem

To better understand the triangle inequality theorem, let’s consider a few examples that illustrate how to apply it.

Example 1: Validating Triangle Inequalities

Assume we have three lengths: 3, 4, and 5. We will check if these can form a triangle.

1. Check $3 + 4 > 5$:
- $7 > 5$ (True)

2. Check $3 + 5 > 4$:
- $8 > 4$ (True)

3. Check $4 + 5 > 3$:
- $9 > 3$ (True)

Since all three conditions are satisfied, these lengths can form a triangle.

Example 2: Invalid Triangle Lengths

Now, let us examine another set of lengths: 2, 2, and 5.

1. Check $2 + 2 > 5$:
- $4 > 5$ (False)

2. Check $2 + 5 > 2$:
- $7 > 2$ (True)

3. Check $2 + 5 > 2$:
- $7 > 2$ (True)

Since the first condition is false, these lengths cannot form a triangle.

Answer Key for Triangle Inequality Problems

To assist in solving triangle inequality problems, here is an answer key that outlines how to approach various scenarios.

Problem Type 1: Given Three Sides

When you are given three side lengths, follow these steps:

1. Identify the lengths: Let’s say a, b, and c.
2. Check the inequalities:
- Verify $a + b > c$
- Verify $a + c > b$
- Verify $b + c > a$

Answer Key: If all inequalities hold, the lengths form a triangle. Otherwise, they do not.

Problem Type 2: Finding a Valid Third Side

When two sides are given, and you need to find a possible length for the third side, follow these steps:

1. Identify the given sides: Let’s say a and b.
2. Determine the range for the third side c:
- The third side must be greater than the difference of a and b: $c > |a - b|$
- The third side must be less than the sum of a and b: $c < a + b$

Answer Key: The third side c must satisfy $|a - b| < c < a + b$.

Conclusion

The triangle inequality theorem is an essential principle in geometry that has broad applications across various fields. By understanding the conditions under which three lengths can form a triangle, students and professionals can apply this theorem effectively in real-world situations. Utilizing the provided examples and answer keys will enhance your ability to tackle triangle inequality problems confidently. Whether in academic studies, engineering projects, or practical applications, mastering the triangle inequality theorem is crucial for anyone working with geometric concepts.

Frequently Asked Questions

What is the triangle inequality theorem?

The triangle inequality theorem states that for any triangle, the sum of the lengths of any two sides must be greater than the length of the third side.

How can I use the triangle inequality theorem to check if a set of lengths can form a triangle?

To check if three lengths can form a triangle, verify that the sum of the lengths of any two sides is greater than the length of the third side for all three combinations.

Can the triangle inequality theorem be applied in higher dimensions?

Yes, the triangle inequality theorem can be extended to higher dimensions, stating that the distance between any two points is less than or equal to the sum of the distances between each point and a third point.

What are some real-world applications of the triangle inequality theorem?

The triangle inequality theorem is used in various fields, including architecture, engineering, computer graphics, and navigation, to determine feasible structures and optimize paths.

Is there a specific example demonstrating the triangle inequality theorem?

For example, if you have sides of lengths 3, 4, and 5, you can check: 3 + 4 > 5, 3 + 5 > 4, and 4 + 5 > 3. Since all conditions hold true, these lengths can form a triangle.

What happens if the triangle inequality theorem is not satisfied?

If the triangle inequality theorem is not satisfied, the lengths cannot form a triangle, indicating that one side is too long compared to the sum of the other two sides.

Can the triangle inequality theorem be used with negative or zero lengths?

No, the triangle inequality theorem only applies to positive lengths, as negative or zero lengths do not represent valid sides of a triangle.

How does the triangle inequality theorem relate to the concept of distance in a metric space?

In a metric space, the triangle inequality theorem ensures that the direct distance between two points is always less than or equal to the sum of distances through a third point, similar to its application in geometry.

Find other PDF article:
https://soc.up.edu.ph/56-quote/pdf?dataid=EIi50-1445&title=strategic-family-therapy-interventions-examples.pdf

[Triangle Inequality Theorem Answer Key](#)

□□□□ *Triangle* - □□□□
Oct 16, 2009 · □□Triangle□□□□□□□Jess□□□□□□□□□□□ □□□□□□□□□ □□

[□□□□□□□□□□Triangle□□□□□□□ - □□](#)
□□□□□□□□□□□□□□□□□□□□□□□□□□□ 30□□□□□□□□□□□□□□□□ □□□□□□□ 01 □□□□□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□□□□ …

□□□□ (□□)
May 21, 2022 · Carl□Yaya□□□ …

MATLAB□□□□□□□□□Triangle□ - □□□□
May 13, 2018 · MATLAB FILL TRIANGLE □□ □□ □□□2018-05-13□□□□□□□□□□□□□□ □ □ □□ □□□□

□□□□□□□□□□□Triangle□□□□□□
□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□□□□“□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□Project Triangle Strategy□□□□ …
□□ 2021 □ 2 □ 18 □□□□□□□□□□□Project TRIANGLE STRATEGY□□□□□□□□ □□□□ …

□□□□ (□□)
Jan 6, 2009 · Triangle □□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□180□□□□□□ □□□□□2009□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ …

□□□□□□□ (2371) - □□□□
Jan 30, 2010 · □□Triangle□□□□□□□□Jess□□□□□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□ (FEM)
Oct 28, 2023 · □□□□□□□□□□□□□□□□1943 □□ …

□□□□ (□□)
Jul 15, 2024 · In the four-part series, a fire tears through a holiday home in a scenic Lancashire lake town. Detective Ember Manning must work out how it connects to a podcast journalist …

□□□□ Triangle - □□□□
Oct 16, 2009 · □□Triangle□□□□□□□□Jess□□□□□□□□□□□□□□ □□□□□□□□□□ □□

□□□□□□□□□□□Triangle□□□□□□ - □□
□□□□□□□□□□□□□□□□□□□□□□□□□□□ 30□□□□□□□□□□□□□□□□ □□□□□□ 01 □□□□□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□□□□□□□□ …

□□□□ *(□□)*
May 21, 2022 · Carl□Yaya□□□ …

MATLAB□□□□□□□□□Triangle□ - □□□□
May 13, 2018 · MATLAB FILL TRIANGLE □□ □□ □□□2018-05-13□□□□□□□□□□□□□□ □ □ □□ □□□□

□□□□□□□□□□□Triangle□□□□□□
□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□Triangle□□□□□□□□□□□□□□□□□□□“□□□”□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□□□□□□□□□Project Triangle Strategy□□□□ …

□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ 2021 □ 2 □ 18 □□□□□□□□□Project TRIANGLE STRATEGY□□□□□□□ □□□□ …

□□□□□ (□□)
Jan 6, 2009 · Triangle □□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□180□□□□□□ □□□□□2009□□□□□□□□□□□□□□□□□□□□□□□□□□□□ …

□□□□□□□□ (2371) - □□□□
Jan 30, 2010 · □□Triangle□□□□□□□□Jess□□□□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

□□□□□□□ (FEM)
Oct 28, 2023 · □□□□□□□□□□□□□□□□1943 □□□ …

□□□□□ *(□□)*
Jul 15, 2024 · In the four-part series, a fire tears through a holiday home in a scenic Lancashire lake town. Detective Ember Manning must work out how it connects to a podcast journalist …

Unlock the secrets of the triangle inequality theorem with our comprehensive answer key. Discover how to master this essential concept in geometry. Learn more!

Back to Home