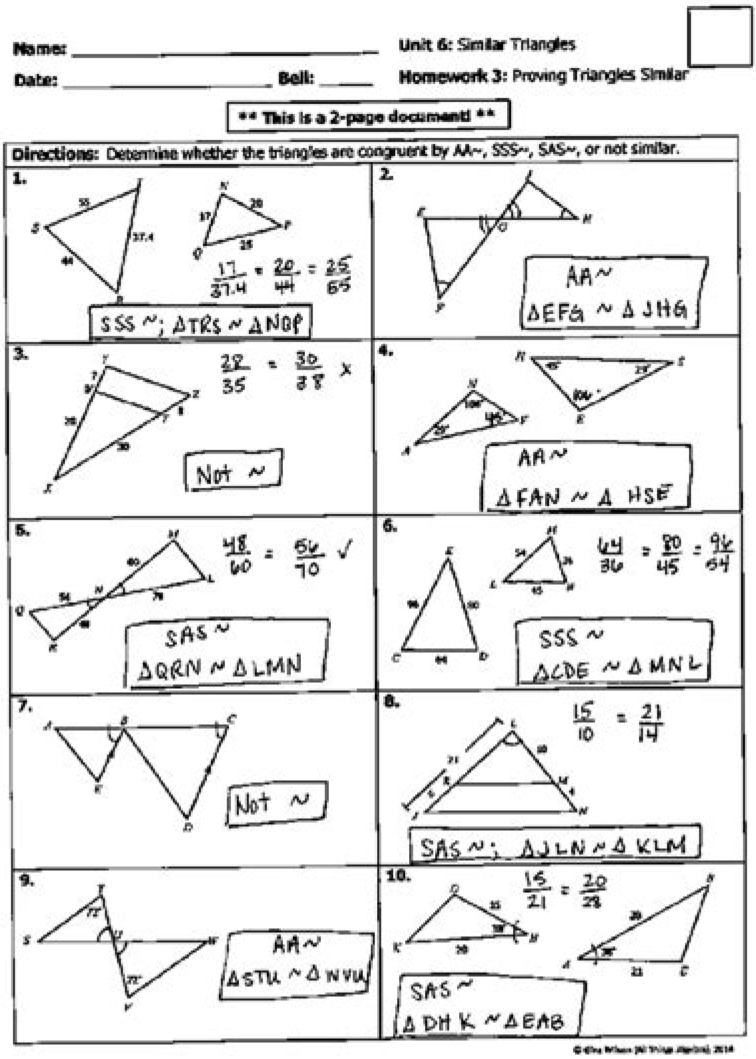
7 3 Similar Triangles Answer Key



7 3 similar triangles answer key is a concept that often surfaces in geometry, particularly when discussing properties of similar triangles. Understanding similar triangles is crucial in various mathematical applications, including solving real-world problems, proving theorems, and enhancing spatial reasoning. This article will delve into the definition of similar triangles, the criteria for triangle similarity, practical applications, and ultimately provide the answer key for a problem set centered around a 7 3 similar triangles scenario.

Understanding Similar Triangles

Definition of Similar Triangles

Similar triangles are triangles that have the same shape but may differ in size. This means that their corresponding angles are equal, and the lengths of their corresponding sides are proportional. The notation for similar triangles is often represented as ΔABC ~ ΔDEF, indicating that triangle ABC is similar to triangle DEF.

Properties of Similar Triangles

1. Angle-Angle (AA) Criterion: If two angles of one triangle are equal to two angles of another triangle, the two triangles are similar.
2. Side-Side-Side (SSS) Criterion: If the corresponding sides of two triangles are in proportion, then the triangles are similar.
3. Side-Angle-Side (SAS) Criterion: If one angle of a triangle is equal to one angle of another triangle, and the sides including those angles are in proportion, then the triangles are similar.

The Importance of Similar Triangles

Similar triangles serve as a fundamental concept not only in pure geometry but also in real-life applications such as:

- Architecture: Determining heights of buildings using similar triangles.
- Navigation: Using triangulation for positioning and mapping.
- Astronomy: Calculating distances to celestial bodies.

The 7 3 Similar Triangles Problem

When dealing with the 7 3 similar triangles, we often refer to a specific problem or set of problems that involve triangles where the ratio of their sides is 7:3. This ratio can be expressed in various contexts, such as:

- Length Ratios: If triangle ABC has sides of lengths 7x, 7y, and 7z, triangle DEF would have sides of lengths 3x, 3y, and 3z, where x, y, and z are the respective proportional factors.

Example Problem Set

Consider the following example problems involving similar triangles with a 7:3 ratio:

1. Problem 1: Triangle ABC has sides of lengths 14 cm, 21 cm, and 7 cm. Triangle DEF is similar to triangle ABC. What are the lengths of the sides of triangle DEF?

2. Problem 2: Triangle GHI is similar to triangle JKL, and the length of one side of triangle GHI is 21 cm. If the ratio of their sides is 7:3, what is the length of the corresponding side in triangle JKL?

3. Problem 3: If triangle MNO is similar to triangle PQR and the lengths of the sides of triangle MNO are 28 cm, 42 cm, and 14 cm, find the lengths of the sides of triangle PQR.

Answer Key

Now, let’s delve into the solutions for the problems outlined above.

Solution to Problem 1

- Given Triangle ABC: 14 cm, 21 cm, 7 cm.
- Ratio of similarity: 7:3.

To find the lengths of triangle DEF, we can set up the following proportion based on the ratio:

- For the first side:

$$
\frac{14}{x} = \frac{7}{3} \implies x = \frac{14 \times 3}{7} = 6 \text{ cm}
$$

- For the second side:

$$
\frac{21}{y} = \frac{7}{3} \implies y = \frac{21 \times 3}{7} = 9 \text{ cm}
$$

- For the third side:

$$
\frac{7}{z} = \frac{7}{3} \implies z = \frac{7 \times 3}{7} = 3 \text{ cm}
$$

Thus, the lengths of the sides of triangle DEF are 6 cm, 9 cm, and 3 cm.

Solution to Problem 2

- Given that one side of triangle GHI is 21 cm and the ratio is 7:3.

To find the corresponding side in triangle JKL, we can set up the proportion:

$$
\frac{21}{x} = \frac{7}{3} \implies x = \frac{21 \times 3}{7} = 9 \text{ cm}
$$

Thus, the length of the corresponding side in triangle JKL is 9 cm.

Solution to Problem 3

- Given triangle MNO with sides 28 cm, 42 cm, and 14 cm, we need to find the lengths of triangle PQR.

Using the ratio of 7:3:

- For the first side:

$$
\frac{28}{a} = \frac{7}{3} \implies a = \frac{28 \times 3}{7} = 12 \text{ cm}
$$

- For the second side:

$$
\frac{42}{b} = \frac{7}{3} \implies b = \frac{42 \times 3}{7} = 18 \text{ cm}
$$

- For the third side:

$$
\frac{14}{c} = \frac{7}{3} \implies c = \frac{14 \times 3}{7} = 6 \text{ cm}
$$

\]

Thus, the lengths of the sides of triangle PQR are 12 cm, 18 cm, and 6 cm.

Conclusion

The concept of similar triangles, particularly illustrated through the 7:3 ratio, plays a vital role in understanding geometric relationships. By recognizing the properties and criteria for similarity, one can solve various problems effectively. Understanding these principles not only enhances mathematical skills but also provides practical tools for real-life applications, from architecture to navigation. The answers provided in this article serve as a guide to mastering similar triangle problems, encouraging further exploration and application of these fundamental geometric concepts.

Frequently Asked Questions

What are similar triangles?

Similar triangles are triangles that have the same shape but may differ in size. Their corresponding angles are equal, and the lengths of their corresponding sides are proportional.

What is the significance of the ratio 7:3 in similar triangles?

The ratio 7:3 indicates that for every 7 units of one side in the first triangle, the corresponding side in the second triangle measures 3 units. This ratio reflects the proportional relationship between the sides of the triangles.

How do you calculate the lengths of sides in similar triangles given the ratio 7:3?

To calculate the lengths of sides, multiply the known length by the ratio's respective parts. For example, if the side of the larger triangle is 14 units, the corresponding side in the smaller triangle would be (14 3/7) = 6 units.

Can you provide an example of two similar triangles with a 7:3 ratio?

Sure! Triangle A has sides of 14, 21, and 28 units, while Triangle B has sides of 6, 9, and 12 units. The corresponding sides are in the ratio 7:3.

What are the properties of similar triangles?

The properties of similar triangles include: corresponding angles are equal, corresponding sides are proportional, and the area ratios are equal to the square of the side ratios.

How do you prove that two triangles are similar?

You can prove two triangles are similar using criteria such as Angle-Angle (AA), Side-Angle-Side (SAS), or Side-Side-Side (SSS) similarity.

What is the formula to find the area of similar triangles?

The area of similar triangles can be found using the formula: Area of Triangle = (1/2) base height. The ratio of their areas will be the square of the ratio of their corresponding sides.

What real-world applications utilize similar triangles?

Similar triangles are used in various real-world applications such as architecture, engineering, navigation, and in determining heights of objects through indirect measurement.

How can you set up a proportion to find an unknown side in similar triangles?

To set up a proportion, use the ratio of the sides of the triangles, such as (side1 / side2) = (unknown side / known side). Then, solve for the unknown side.

What is the relationship between similar triangles and scale factors?

The scale factor is the ratio of the lengths of corresponding sides of similar triangles. It determines how much one triangle is enlarged or reduced in comparison to the other.

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