Solving Right Triangles Worksheet Questions and Answers PDF

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Part 1: Building a Foundation

What is the definition of a right triangle?

Hint: Think about the angles in a triangle.

- ◯ A triangle with all sides equal
- ◯ **A triangle with one angle measuring 90 degrees ✓**
- ◯ A triangle with two equal angles
- ◯ A triangle with no equal sides

> A right triangle is defined as a triangle with one angle measuring 90 degrees.

Which of the following are components of a right triangle?

Hint: Consider the sides and angles of the triangle.

- ☐ **Hypotenuse ✓**
- ☐ **Two legs ✓**
- ☐ Two equal angles
- ☐ Three equal sides

> The components of a right triangle include the hypotenuse and the two legs.

Explain the Pythagorean Theorem in your own words and provide an example of how it is used.

Hint: Consider the relationship between the sides of a right triangle.

> **The Pythagorean Theorem states that in a right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other two sides. An example is using it to find the length of a side when the other two are known.**

List the trigonometric ratios used in right triangles and provide their formulas.

Hint: Think about sine, cosine, and tangent.

1. What is the sine ratio?

> sin(θ) = opposite/hypotenuse

2. What is the cosine ratio?

> cos(θ) = adjacent/hypotenuse

3. What is the tangent ratio?

> tan(θ) = opposite/adjacent

> The trigonometric ratios include sine (sin), cosine (cos), and tangent (tan), with their formulas being sin(θ) = opposite/hypotenuse, cos(θ) = adjacent/hypotenuse, and tan(θ) = opposite/adjacent.

Which trigonometric ratio is used to find the length of the opposite side when the hypotenuse and an angle are known?

Hint: Consider the definition of sine.

- ◯ **Sine ✓**
- ◯ Cosine
- ◯ tangent
- ◯ Secant

> The sine ratio is used to find the length of the opposite side when the hypotenuse and an angle are known.

Part 2: Understanding and Interpretation

If the angle of elevation from a point on the ground to the top of a building is 30 degrees, which trigonometric function would you use to find the height of the building if the distance from the point to the building is known?

Hint: Think about the relationship between the angle and the sides.

- ◯ Sine
- ◯ Cosine
- ◯ **tangent ✓**
- ◯ Cotangent

> You would use the tangent function to find the height of the building.

Which of the following statements about a 45°-45°-90° triangle are true?

Hint: Consider the properties of isosceles right triangles.

- ☐ **Both legs are equal ✓**
- ☐ The hypotenuse is twice the length of a leg
- ☐ **The hypotenuse is √2 times the length of a leg ✓**
- ☐ **The angles are 45°, 45°, and 90° ✓**

> In a 45°-45°-90° triangle, both legs are equal, and the hypotenuse is √2 times the length of a leg.

Describe how you would use a calculator to find the angle in a right triangle if you know the lengths of the opposite and adjacent sides.

Hint: Think about inverse trigonometric functions.

> **You would use the tangent function and its inverse (arctan) to find the angle, using the formula θ = arctan(opposite/adjacent).**

Part 3: Application and Analysis

A ladder is leaning against a wall, forming a 60-degree angle with the ground. If the ladder is 10 feet long, how high up the wall does the ladder reach?

Hint: Consider the sine function.

- ◯ 5 feet
- ◯ **8.66 feet ✓**
- ◯ 9 feet
- ◯ 10 feet

> The height the ladder reaches is approximately 8.66 feet, calculated using the sine function.

You are given a right triangle with one angle measuring 30 degrees and the opposite side measuring 5 units. Which of the following are true?

Hint: Think about the properties of a 30-60-90 triangle.

- ☐ **The hypotenuse is 10 units ✓**
- ☐ **The adjacent side is 5√3 units ✓**
- ☐ The hypotenuse is 5√2 units
- ☐ The adjacent side is 5 units

> The hypotenuse is 10 units, and the adjacent side is 5√3 units.

A surveyor needs to determine the height of a mountain. From a certain point, the angle of elevation to the top of the mountain is 45 degrees. If the surveyor is standing 1000 meters from the base, calculate the height of the mountain.

Hint: Consider the properties of a 45-degree angle.

> **The height of the mountain is 1000 meters, as the angle of elevation is 45 degrees, making the height equal to the distance from the base.**

In a right triangle, if the lengths of the two legs are 3 and 4, what is the length of the hypotenuse?

Hint: Use the Pythagorean Theorem.

- ◯ **5 ✓**
- ◯ 6
- ◯ 7
- ◯ 8

> The length of the hypotenuse is 5, calculated using the Pythagorean Theorem.

Which of the following can be deduced from the Pythagorean Theorem?

Hint: Think about the properties of right triangles.

- ☐ **The hypotenuse is always the longest side ✓**
- ☐ **The sum of the squares of the legs equals the square of the hypotenuse ✓**
- ☐ The theorem applies to all triangles
- ☐ It can be used to determine the type of triangle

> From the Pythagorean Theorem, we can deduce that the hypotenuse is always the longest side and that the sum of the squares of the legs equals the square of the hypotenuse.

Analyze the relationship between the angles and sides in a 30°-60°-90° triangle and explain why the ratios between the sides are consistent.

Hint: Consider the properties of special triangles.

In a 30°-60°-90° triangle, the ratios of the sides are consistent because the lengths of the sides are proportional to the angles, specifically 1:√3:2.

Part 4: Evaluation and Creation

Which scenario would require using the tangent function to solve a problem?

Hint: Think about the relationships in right triangles.

- ◯ **Finding the height of a tree when the distance and angle of elevation are known ✓**
- ◯ Calculating the length of a shadow when the height and angle of elevation are known
- ◯ Determining the distance to a point when the height and angle of depression are known
- ◯ All of the above

> Finding the height of a tree when the distance and angle of elevation are known would require using the tangent function.

Evaluate the following statements about solving right triangles:

Hint: Consider the properties of triangles and trigonometric functions.

- ☐ **The Pythagorean Theorem can be used to find any side of a right triangle ✓**
- ☐ Trigonometric ratios are only applicable when angles are in degrees
- ☐ **Inverse trigonometric functions are used to find angles ✓**
- ☐ **Special right triangles have predictable side ratios ✓**

> The Pythagorean Theorem can be used to find any side of a right triangle, and inverse trigonometric functions are used to find angles.

Create a real-world problem involving a right triangle, and provide a step-by-step solution using trigonometric ratios or the Pythagorean Theorem.

Hint: Think about a scenario that can be modeled with a right triangle.

> **An example could involve calculating the height of a tree using the angle of elevation and distance from the tree, applying the tangent function.**