Applying Trigonometric Functions to Solve Triangles and Word Problems

Introduction

Trigonometry is a branch of mathematics that deals with the relationships between the sides and angles of triangles. In this worksheet, we will explore how to apply trigonometric functions to solve triangles and word problems.

Section 1: Understanding Trigonometric Functions

Answer the following questions:

1. What is the definition of the sine function?

2. What is the definition of the cosine function?

3. What is the definition of the tangent function?

Section 2: Solving Triangles

Solve the following problems:

1. In a right-angled triangle, the length of the hypotenuse is 10 cm and the length of one of the legs is 6 cm. What is the length of the other leg?

2. In a right-angled triangle, the length of one of the legs is 8 cm and the length of the hypotenuse is 10 cm. What is the length of the other leg?

3. In a right-angled triangle, the angle of elevation is 45° and the length of the adjacent side is 5 cm. What is the length of the hypotenuse?

Section 3: Word Problems

Solve the following word problems:

1. A ship is sailing due east at a speed of 20 km/h. At the same time, a lighthouse is located 10 km due north of the ship. What is the distance between the ship and the lighthouse after 2 hours?

2. A surveyor is measuring the height of a building using a theodolite. The angle of elevation is 60° and the distance from the theodolite to the building is 20 m. What is the height of the building?

3. A pilot is flying a plane at an altitude of 1000 m. The angle of depression to a landmark is 30°. What is the distance from the plane to the landmark?

Section 4: Mixed Questions

Solve the following mixed questions:

1. In a right-angled triangle, the length of the hypotenuse is 15 cm and the length of one of the legs is 9 cm. What is the length of the other leg?

2. A crane is lifting a load at an angle of 60° to the horizontal. The length of the crane is 20 m and the load is 10 m from the base of the crane. What is the height of the load above the ground?

3. A cyclist is riding a bike at a speed of 20 km/h. The angle of elevation to a hill is 30°. What is the distance from the cyclist to the top of the hill?

Section 5: Challenge Questions

Solve the following challenge questions:

1. In a right-angled triangle, the length of the hypotenuse is 20 cm and the length of one of the legs is 12 cm. What is the length of the other leg?

2. A ship is sailing due east at a speed of 25 km/h. At the same time, a lighthouse is located 15 km due north of the ship. What is the distance between the ship and the lighthouse after 3 hours?

3. A surveyor is measuring the height of a building using a theodolite. The angle of elevation is 75° and the distance from the theodolite to the building is 30 m. What is the height of the building?

Conclusion

In this worksheet, we have explored how to apply trigonometric functions to solve triangles and word problems. We have covered the definitions of the sine, cosine, and tangent functions, and have applied these functions to solve a variety of problems.

Reflection

Individual Reflection:

1. What was the most challenging part of this worksheet for you?
2. What did you learn about trigonometric functions and how to apply them to solve triangles and word problems?
3. How will you apply what you have learned in this worksheet to real-world problems?