Trigonometry Worksheet for 13-year-old High School Students

Introduction to Trigonometry

Trigonometry is a branch of mathematics that deals with the relationships between the sides and angles of triangles. In this worksheet, we will explore the basics of trigonometry, including the definitions of sine, cosine, and tangent, and their applications in real-life situations.

Multiple Choice Questions

Choose the correct answer for each question:

1. What is the definition of sine?
    a. a) The ratio of the opposite side to the hypotenuse
    b. b) The ratio of the adjacent side to the hypotenuse
    c. c) The ratio of the opposite side to the adjacent side
    d. d) The ratio of the hypotenuse to the opposite side
   Answer: a) The ratio of the opposite side to the hypotenuse
2. What is the definition of cosine?
    a. a) The ratio of the opposite side to the hypotenuse
    b. b) The ratio of the adjacent side to the hypotenuse
    c. c) The ratio of the opposite side to the adjacent side
    d. d) The ratio of the hypotenuse to the opposite side
   Answer: b) The ratio of the adjacent side to the hypotenuse
3. What is the definition of tangent?
    a. a) The ratio of the opposite side to the hypotenuse
    b. b) The ratio of the adjacent side to the hypotenuse
    c. c) The ratio of the opposite side to the adjacent side
    d. d) The ratio of the hypotenuse to the opposite side
   Answer: c) The ratio of the opposite side to the adjacent side

Short Answer Questions

Answer the following questions in complete sentences:

1. What is the difference between sine, cosine, and tangent?

2. How are trigonometric functions used in real-life situations?

Word Problems

Solve the following word problems:

1. A building is 100 meters tall. If the angle of elevation from the ground to the top of the building is 30°, what is the distance from the building to the point where the angle is measured?

2. A car is traveling at a speed of 60 km/h. If the angle of elevation from the ground to the top of a hill is 45°, what is the height of the hill?

Graphing Trigonometric Functions

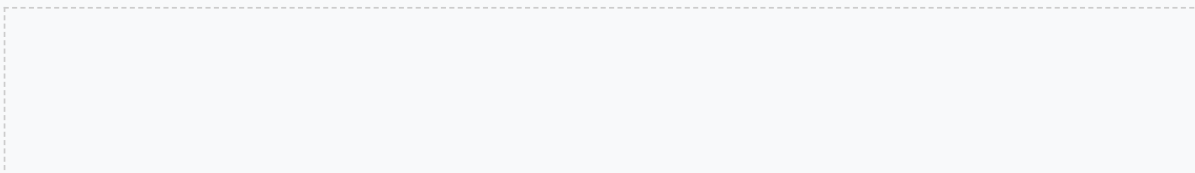*Graph the following trigonometric functions:*

1. y = sin(x)

2. y = cos(x)

3. y = tan(x)

Graphing Trigonometric Functions

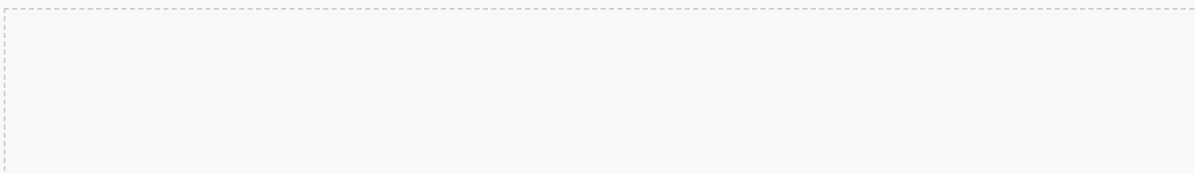*Graph the following trigonometric functions:*

Identifying Trigonometric Functions

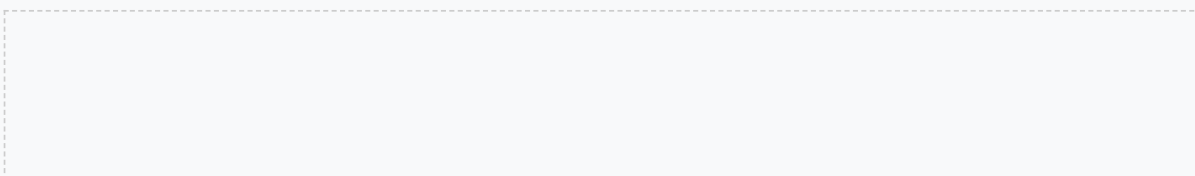*Identify the trigonometric function that matches each graph:*

1. A graph with a maximum value of 1 and a minimum value of -1

2. A graph with a maximum value of 1 and a minimum value of -1, with a period of 2π

3. A graph with a maximum value of 1 and a minimum value of -1, with a period of π

Trigonometric Identities

Simplify the following trigonometric expressions:

1. sin(2x)

2. cos(2x)

3. tan(2x)

Real-Life Applications

Solve the following real-life problems:

1. A surveyor is measuring the distance between two points. If the angle of elevation from one point to the other is 30°, and the distance from the surveyor to the point is 100 meters, what is the distance between the two points?

2. A pilot is flying a plane at an altitude of 1000 meters. If the angle of elevation from the ground to the plane is 45°, what is the distance from the plane to the point directly below it?

Review

Review the key concepts of trigonometry, including the definitions of sine, cosine, and tangent, and their applications in real-life situations.

Assessment

Assess your understanding of trigonometry by completing the following questions:

1. What is the definition of sine?

2. What is the definition of cosine?

3. What is the definition of tangent?

4. How are trigonometric functions used in real-life situations?

Answer key:

1. a) The ratio of the opposite side to the hypotenuse
2. b) The ratio of the adjacent side to the hypotenuse
3. c) The ratio of the opposite side to the adjacent side
4. Trigonometric functions are used in real-life situations such as measuring distances, heights, and angles in fields like architecture, engineering, and physics.