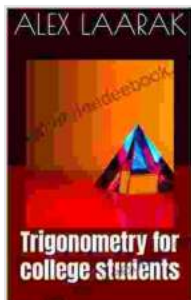# Trigonometry for College Students

Trigonometry is a branch of mathematics that deals with the relationships between the sides and angles of triangles. It is an essential tool for many fields of study, including engineering, architecture, navigation, and physics.

Trigonometry for college students by Course Hero

★★★★★ 4.8 out of 5

Language	: English
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In this article, we will provide a comprehensive overview of trigonometry for college students. We will cover the following topics:

- Basic concepts

- Trigonometric functions

- Trigonometric identities

- Applications of trigonometry

Basic Concepts

The basic concepts of trigonometry are shown in the image below.

Sin, cos, tan

In right triangle ABC

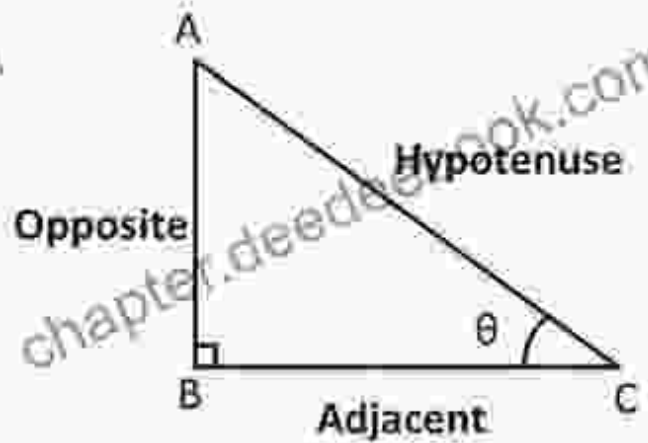$$\sin \theta = \frac{side\ opposite\ to\ angle\ \theta}{Hypotenuse}$$

$$\cos \theta = \frac{side\ adjacent\ to\ angle\ \theta}{Hypotenuse}$$

$$\tan \theta = \frac{side\ opposite\ to\ angle\ \theta}{side\ adjacent\ to\ angle\ \theta}$$

$$\operatorname{cosec} \theta = \frac{1}{\sin \theta}$$

$$\sec \theta = \frac{1}{\cos \theta}$$

$$\cot \theta = \frac{1}{\tan \theta}$$

- **Hypotenuse**: The side of a right triangle opposite the right angle.

- **Adjacent side**: The side of a right triangle that is adjacent to the angle in question.

- **Opposite side**: The side of a right triangle that is opposite the angle in question.

- **Angle**: The measure of the angle between two sides of a triangle.

Trigonometric Functions

The trigonometric functions are functions that relate the angles of a triangle to the lengths of its sides. The most common trigonometric functions are the sine, cosine, and tangent functions.

- **Sine (sin)**: The sine of an angle is the ratio of the opposite side to the hypotenuse.

- **Cosine (cos)**: The cosine of an angle is the ratio of the adjacent side to the hypotenuse.

- **Tangent (tan)**: The tangent of an angle is the ratio of the opposite side to the adjacent side.

The trigonometric functions can be calculated using the following formulas:

- $\sin(\theta) = $ opposite/hypotenuse

- $\cos(\theta) = $ adjacent/hypotenuse

- $\tan(\theta) = $ opposite/adjacent

Trigonometric Identities

Trigonometric identities are equations that relate the trigonometric functions to each other. These identities can be used to solve trigonometry problems and to simplify trigonometric expressions.

Some of the most common trigonometric identities are:

- $\sin^2(\theta) + \cos^2(\theta) = 1$

- $\tan^2(\theta) + 1 = \sec^2(\theta)$

- $\sin(\theta + \phi) = \sin(\theta)\cos(\phi) + \cos(\theta)\sin(\phi)$

- $\cos(\theta + \phi) = \cos(\theta)\cos(\phi) - \sin(\theta)\sin(\phi)$

Applications of Trigonometry

Trigonometry has a wide range of applications in many different fields. Some of the most common applications of trigonometry include:

- **Engineering**: Trigonometry is used in engineering to calculate the forces and stresses on structures, to design bridges and buildings, and to determine the trajectories of projectiles.

- **Architecture**: Trigonometry is used in architecture to design buildings that are structurally sound and aesthetically pleasing.

- **Navigation**: Trigonometry is used in navigation to calculate the location of a ship or aircraft and to determine the best course to take.

- **Physics**: Trigonometry is used in physics to calculate the motion of objects, to determine the forces acting on objects, and to study the properties of waves.

Trigonometry is a powerful tool that can be used to solve a wide range of problems in many different fields. By understanding the basic concepts of trigonometry, you will be able to use it to solve problems in your own studies and in your career.
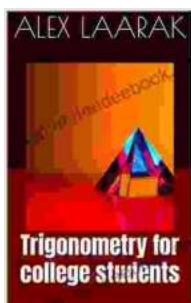
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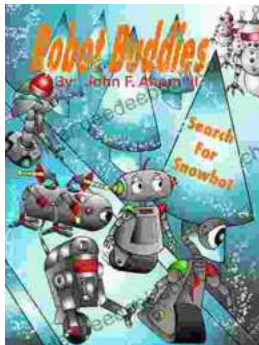|	
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