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## 1. Trigonometry

Trigonometry is a branch of mathematics that deals with the relationships between angles and sides of triangles. It is useful in various fields such as physics, engineering, and navigation. Trigonometry involves concepts such as sine, cosine, tangent, and the Pythagorean theorem.

### a. Basics of Trigonometry

Trigonometry is a branch of mathematics that deals with relationships between angles and sides of triangles. It includes the basic trigonometric functions: sine, cosine, and tangent, which relate angles to the ratios of the lengths of the sides in a right triangle. Trigonometry is used in various fields such as physics, engineering, and navigation to solve problems involving angles and distances.

#### - Introduction to angles

Angles in trigonometry are fundamental to understanding the relationships between sides and angles in triangles. They are measured in degrees or radians and play a crucial role in solving trigonometric equations and problems. Trigonometric functions such as sine, cosine, and tangent are used to calculate the values of angles in various situations.

#### - Trigonometric ratios

Trigonometric ratios are ratios derived from the angles of a right triangle in trigonometry. The main trigonometric ratios are sine, cosine, and tangent, which represent the opposite side, adjacent side, and ratio of the two sides respectively. These ratios help calculate angles and side lengths in various geometric problems.

Trigonometry is a branch of mathematics that deals with the relationships between the angles and sides of triangles. It is used in various fields such as engineering, physics, and astronomy to solve problems involving angles and distances. Trigonometric functions, such as sine, cosine, and tangent, are key tools in trigonometry.

### b. Trigonometric Identities

Trigonometric identities are equations that hold true for all values of the angles in a triangle. They help simplify calculations and proofs in trigonometry. Some common trigonometric identities include the Pythagorean identities, sum and difference identities, double angle identities, and the reciprocal identities. These identities are crucial in solving trigonometric equations and problems involving angles, triangles, and periodic motion.

#### - Pythagorean identities

Pythagorean identities in trigonometry are equations that establish relationships between trigonometric functions. They include  $\sin^2(x) + \cos^2(x) = 1$ ,  $\tan^2(x) + 1 = \sec^2(x)$ , and  $1 + \cot^2(x) = \csc^2(x)$ . These identities are fundamental in solving trigonometric equations and simplifying expressions.

#### - Addition and subtraction identities

Addition and subtraction identities in trigonometry involve the relationships between the trigonometric functions of the sum or difference of two angles. These identities are used to simplify trigonometric expressions and solve trigonometric equations. Examples of these identities include the sine and cosine of the sum or difference of two angles.