TRIGONOMETRY APPLICATIONS

KINEMATIC ANALYSIS

CONCEPT Kinematic analysis is the process of using trigonometric functions and equations to study the motion of objects. It involves analyzing the position, velocity, and acceleration of an object in motion, as well as the forces acting upon it. Kinematic analysis is used in a variety of fields, including physics, engineering, and astronomy, to study and predict the motion of objects in space and time.

APPLICATION

Roller coasters are a popular form of amusement park ride that require careful engineering to ensure the safety and enjoyment of riders. Kinematic analysis is used to study the motion of the roller coaster and to design the track layout and ride experience.

Designers use kinematic equations to calculate the maximum speed, acceleration, and force that riders will experience at different points on the roller coaster. They also use trigonometric functions to determine the angles of incline and decline of the track, which affect the speed and direction of the coaster. All of these considerations allow engineers to optimize the design to ensure a thrilling and safe ride.

One notable example of this application is the design of the Steel Vengeance roller coaster at Cedar Point amusement park in Ohio. The roller coaster features a 90-degree drop, multiple inversions, and high-speed maneuvers that generate up to 4 G's of force. The design team used kinematic analysis to determine the optimal track layout and ride experience, ensuring that riders would experience maximum thrills while remaining safe throughout the ride.