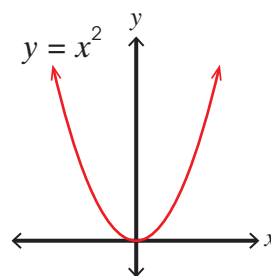


2.1 Parabolas in Everyday Life

The graph of the quadratic relation $y = ax^2 + bx + c$ is called a parabola. It is vertically symmetrical and is like the letter “U” that opens either upward or downward. Many architectural structures, including arches and bridges, have used the shape of parabolas throughout history. Aside from buildings, the shape resembles natural curvatures such as a stream of water. Parabolas can also be used to represent a variety of motions.



Architecture

The beauty of parabolic curves is not just appreciated by mathematicians; it is also frequently adopted by architects. The Allen Lambert Galleria is one example. This is an atrium in downtown Toronto designed by Santiago Calatrava, a Spanish architect. This six-storey structure is supported on each side by eight free-standing supports that branch out into parabolic shapes, giving it the appearance of a forest canopy. The parabolically arched roof makes this creation one of the most fascinating architectural designs.



Allen Lambert Galleria at night



Oakland Bay Bridge in California with cables following a parabolic curve

Have you ever noticed that many bridges are made parabolic? This is because of the stability the parabolic shape provides. Suspension bridges, for example, use parabolic curve cables. As a suspension bridge is suspended from the tops of its towers, the pressures on the cables are distributed more efficiently compared to other forms (i.e. straight lines) along a parabola. This parabolic design ensures that the cables can support the weight of hundreds of vehicles while keeping the bridge upright, so that the bridge remains stable against all the forces that act on it.

Motion

In basketball, being able to shoot the ball into the hoop is crucial. Shooting a ball straight down would be ideal but impractical since it requires the shooter to be right above the hoop. Therefore, a parabola is employed to accomplish the goal of shooting the ball to score points. The closer to the basket a shooter is, the higher the parabolic arc he or she needs to make; this is why the preferred shooting angle is between 35° and 55° . Professional basketball players are able to shoot



a successful shot during a basketball tournament

2.1 Parabolas in Everyday Life

with such accuracy because they understand how to adjust the force and angle applied based on their locations in the court relative to the hoop.

Due to the shape of the parabola, the quadratic relation has a wide range of applications. Other than those mentioned above, quadratic relations are also employed in science, engineering, and even business models. Recognizing how the variables affect quadratic equations is crucial for achieving a deeper understanding and for suitable implementation in any of these fields.