Real-life Examples of a Parabola

Parabolas are a set of points in one plane that form a U-shaped curve, but the application of this curve is not restricted to the world of mathematics. It can also be seen in objects and things around us in our everyday life. Buzzle lists out some real-life examples and their importance, which will help you understand this curve better.

Did You Know?
The path of an object thrown or hurled in the air forms a parabola. The first one to prove that was Galileo. In the early 17th century, he experimented with balls rolling on inclined planes.

Important Terms to Understand

Detailed diagram explaining a parabola
~ A focus of a parabola is a fixed point present on the interior of the curve of a parabola.
~ A directrix is a line perpendicular to the axis of symmetry.
~ An axis of symmetry is the line that passes through the focus and vertex.
~ A vertex is the point on the parabola where the line takes a turn to form the curve.

A parabola is a two-dimensional, somewhat U-shaped figure. This curve can be described as a locus of points, where every point on the curve is at equal distance from the focus and the directrix. We cannot call any U-shaped curve as a parabola; it is essential that every point on this curve be equidistant from the focus and directrix. The equation of a parabolic curve can be given by a graph of a quadratic function, like "y = x^2". Here is a figure to help you understand the concept of a parabola better.
Parabolas have different features too. If a material that reflects light is shaped like a parabola, the light rays parallel to its axis of symmetry will be reflected to its focus, irrespective of where the reflection occurs. Conversely, if the light comes from the focus, it will get reflected as a parallel beam that is parallel to the axis of symmetry. These principles work for light, sound, and other forms. This property is very useful in all the examples seen in the real world.

**Real-life Applications**

**Satellite Dish**

A satellite dish is a perfect example of the reflective properties of parabolas mention earlier. The signals that are received are directly sent to the focus, which are then correctly reflected to a receiver (signals are sent out parallel to the axis). These signals are then interpreted and are transmitted as channels on our TV. The same principle applies to radio frequencies too. Parabolic mirrors and heaters also work on the same principle.

**Headlight**
This is the same principle like the one used in a torch. The inner surface is smooth and made of glass which makes it a powerful reflector. The principle used here is that the light source is at the focus, and the light rays will be reflected parallel to the axis. This is the reason one can see a thick focused beam of light emitting from a headlight.
Prisms come to the rescue in night driving as you don’t want all the rays to be parallel. There are special lenses with prisms to bend the straight rays.

Suspension Bridge

If one is to observe suspension bridges, the shape of the cables which suspend the bridge resemble a parabolic curve. There has been sufficient confusion about whether the cables are suspended in a parabola or a catenary. Studies show that the shape is nearer to a parabola. The cables would have been hyperbolic, but when a uniform load (the horizontal deck) is present, they get deformed like a parabola.

Path of an Object in Air
Take the example of any object thrown up in the air. It goes up in the air till its highest attainable height or point and then comes down back to the ground. If one is to trace the path of the object, the resulting curve obtained is a parabola. The point at which you release the ball and the altitude forms a line (Y axis on a graph). The midpoint of this line is bisected by a perpendicular from the vertex of the parabola. The speed and air resistance might distort the shape sometimes.

Fountains

Fountains spray water in the air, the water jet propels upwards reaching a specific altitude, and then comes back. Again the path traced by the stream of water is similar to a parabola.

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