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Klein Bottle Queries Abstract

The purpose of this study is to observe characteristics of a Klein bottle and to examine if this object can be used in a practical, household setting. Most of the information from this study comes from interpreting Internet resources and texts, which have a main focus on the topic of three-dimensional objects in Euclidean space. Through examination of these sources, the precise definition of a Klein bottle appeared. A Klein bottle is a two-dimensional, non-orientable surface that does not technically hold a volume due to its unique properties. Essentially this peculiar object can be viewed as a tube with two open ends where the ends meet up but only after undergoing a half twist. A physical representation of this half twist is difficult, because in order to conduct the manipulation on the two-dimensional object that is being represented in three dimensions one would have to view from the forth dimension as to add another axis of distortion. Thus, to bend the rules while still making a half twist, one end of the tube will actually pass through the other, creating the representation of a Klein bottle that is most familiar in mathematics' communities.

Once the shape and qualities of the Klein bottle are nailed down, one can attempt to apply these features in a practical sense. One may notice that it could be implemented well as a pouring device since rotating it 360 degrees will release only a small amount of its continents. The application in this study focuses on incorporating the pouring of ingredients in a cooking environment. By manipulation the width of the Klein bottle at certain points, the object may actually be beneficial for measuring desired liquids or solids when needed in the kitchen. Through further research and experimentation this study examines the practicality of a Klein bottle.