An Application of Calculus Principles to Icicle Volume

Nichols, Jacob

This research project was conducted to apply calculus principles to the volumes of different icicles. Icicles have very complex structures with bulges and cavities along their walls. The hypothesis was that the volume of icicles with these bulges could accurately be found using different calculus principles. To study the structures, icicles first had to be collected. The straightest icicles with the most bulges were chosen and stored in a chest freezer to keep them from melting. Measurements of the icicle diameter were then taken so calculus could later be applied. The measurements were taken using a metric ruler and an electronic set of calipers. The diameter data was then used to apply two calculus principles: finding volume by plane slicing and using the trapezoid rule. These two principles were used to find the volume of the icicles. The calculated volumes were then compared to the actual icicle volumes found by dividing the icicle mass by the density of ice. The differences between the volumes and the percent error was fairly small. Therefore, the hypothesis that calculus could be applied to find icicle volumes was proven correct.

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