

The Problem of the Month
March 2021

Imagine that you have two cones, a big one and a smaller one. The big one has a height of H and a radius of its circular base equal to R . Your smaller cone has height and radius of circular base equal to h and r , respectively. These values satisfy the relation: $H/R = h/r$. Now, take the smaller cone and turn it upside down. Place its vertex at the center of the circular base of the large cone. Doing this yields the following: The circular base of the small inverted cone is tangent to the inside wall of the larger cone. (See figure, below.) Let V stand for the volume of the larger cone and v stand for the volume of the smaller. (Recall that the volume of a cone is equal to one third the area of the base times the height.) Show that V/v is a constant, independent of the values of H , R , h and r . What is this constant?

