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Perry Y.C. Lee* (plee@kutztown.edu), 267 Lytle Hall, Department of Mathematics, Kutztown University of Pennsylvania, Kutztown, PA 19530. *"Resistance" is Futile: Understanding the Effect of Resistance in Physical Systems.*

Resistance occurs in many physical systems, and its effect on a system can be measured by, for example, a force, temperature, or time. For example, a highly reliable micro-electronic circuit is one that can not only exceed design specifications in computing performance, but also one that can effectively remove generated heat before electronic components overheat and subsequently fail. Designing such a circuit requires knowledge of an important design concept known as 'thermal resistance.'

In this paper, to demonstrate the concept and the effect of resistance, the total time taken to mow a flat 2-D rectangular grass region is presented in detail using basic algebra. It was found that the total time taken to cover the entire area is primarily dependent on the speed of the lawn mower, and the paths taken called *sweeps* to cover the entire area.

'Natural' resistance is quantified where its effect is the minimum time taken to sweep across the area. Additional time taken due to directional changes from one sweep to the next is calculated. This time taken can be construed as a result of the effect of increased resistance, and can become a significant portion of the total time taken. Recommendations for minimizing the total time taken are proposed. (Received September 21, 2011)