Name(s)	Project Number
Jacob H. Nahama	**J0808**

Project Title

Let It Flow

Abstract

Objectives/Goals
My objective was to learn how the porosity of a porous medium impacts flowrate. My hypothesis was that the larger the porosity the faster the flowrate would be.

Methods/Materials
Using 4 different grain sizes (golf balls, marbles, bees bees, and sand), I calculated the porosity and then measured the flowrate of water through these different grain sizes. The porosity varied from 33% for sand to 57% for golf balls. I ran water through a bucket full of the different grains and measured the flowrate. I was careful to keep the pressure constant by always having the bucket of grains overflowing with water. Except for the sand, the flowrate was essentially the same. After my initial results did not show a significant difference, I ran the experiment with no grains (100% porosity) and a mixture of sand and bee bees. I modified my project mid-stream and included permeability as a factor. I was able to calculate permeability with the data I gathered using Darcy's Law.

Results
I found very little difference in flowrate, even though the grains' porosity was different, until I used sand. Once I included permeability, my results showed that even though golf balls, marbles and bees bees had a change in porosity, they didn't have a change in flowrate and this is because flowrate is directly related to permeability, not porosity.

Conclusions/Discussion
My initial results showed little difference between flowrate and porosity, except in the case of sand. With further testing, I realized that it is not how big the pores are (high porosity), but how well they are connected to each other (permeability) that determined flowrate. Darcy's Equation illustrates this.

Summary Statement

My project shows how permeability (how well the pores are connected) is the determining factor in flowrate through a porous medium, not porosity.

Help Received

My parents helped me at Home Depot figure out the configuration of parts I needed to design my experiment. They helped me research Darcy's Equation to include permeability in my experiment. My parents helped with my excel graphs. Also my teacher helped me find this project.