



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Garen Gevorkian	Project Number J0606
Project Title Darcy's Law and Underground Water Flow	
Abstract Objectives/Goals The purpose of my project is to calculate the flow rate of underground water using Darcy's formula. I also want to find the relation between the flow rate and head difference, and length of the flow path. Methods/Materials I made an apparatus using two bottles to simulate the underground water flow path. I used one bottle for inlet and one for outlet. I filled inlet with sand. Put the inlet underneath a faucet with the water running for the whole duration of experiment to maintain a constant water level and pressure in the inlet.(15 minutes each experiment). By moving the outlet's position up and down, I made head differences and calculate flow rate (Q). In second set of experiments I changed flow path length by changing the length of the sand filled in the inlet bottle, and calculated (Q). I used Darcy's formula $Q = K.A.(h_2-h_1)/L$ to calculate the flow rate. h1: inlet head h2: outlet head A: cross sectional Area K: permeability coefficient Results I learned that Darcy's law does not work with turbulent flow of water,it applies only to calm water. I learned from my experiments that the relation between head difference and flow rate is linear, and flow rate is inversely related to length of flow path. Conclusions/Discussion Through the research I learned that Darcy's Law has other applications. The formula could be used in petroleum industry to calculate the flow rate of underground petroleum.	
Summary Statement Calculate the flow rate of underground water using Darcy's formula.	
Help Received My Dad helped me to build the apparatus, and my Uncle provided me resources (books) for my research.	