



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

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<b>Project Title</b> <b>Does Dirt Drain?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> The purpose of my science project was to compare the permeability rates of various typical soils. I used gravel, poorly sorted sand, well sorted sand, and clay and I measured permeability rate and the porosity. This information is essential to farmers with large scale farms or people with personal gardens and flood control workers. It will help people to know which soil is right for their plants and where to safely put buildings.</p> <p><b>Methods</b> I obtained the various dirt samples from the gardening store, the beach, and an excavating site. I used a graduated cylinder, which I cut the bottom off of and covered with fine screen. All soils were dried completely in a household oven. The control was pouring 150 milliliters of water through the graduated cylinder without soil and timing how long it took to emerge. The way I measured the permeability rate was by pouring water through different types of soil and timing how long it took to come through and measuring how much was absorbed in milliliters.</p> <p><b>Results</b> My hypothesis for this project was, if I measured the permeability in well sorted sand, poorly sorted sand, gravel, and clay, then gravel would have the highest permeability followed by well sorted sand, poorly sorted sand, and lastly clay. The results of this experiment showed that gravel is the most permeable, followed by poorly sorted sand, then well sorted sand, and lastly clay. The results show that the hypothesis should be mostly accepted except for poorly sorted sand had higher permeability than well sorted sand.</p> <p><b>Conclusions</b> The results of this experiment prove that gravel has the highest permeability among gravel, poorly sorted sand, well sorted sand, and clay. It also has porosity, which because of the very high permeability, is hard to measure. The lowest permeability rate was in clay. However, clay had high porosity. The data from this experiment would be mostly beneficial to farmers or home gardeners because different plants grow better in different types of soils with different permeability. Also people working in public environmental services could use this information to determine where permeable pavement would be most effective and where it is most needed. These concepts could be useful to people in preventing floods because less permeable soils are more likely to flood and if they know the permeability in various areas they could predict which parts would be worse and more dangerous.</p>	
<b>Summary Statement</b> I determined that gravel had the highest permeability, then poorly sorted sand, well sorted sand, and lastly clay, in order to evaluate how permeability effects land use.	
<b>Help Received</b> Mike Guinella, Professor of Environmental Horticulture at Santa Barbara City College, provided a botanist's perspective on how the results from my experiment could be put to use in the real world.	