CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY

Name(s)
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Project Number
J0203

Project Title
The Effect of Slope Angle and Foundation Depth on Building Stability

Abstract

Objectives/Goals
The purpose of my project was to discover how foundation depth and angle of slope affect a building's stability.

Methods/Materials
The bottom quarter of a rain gutter was filled with landscaping rocks and the remaining space filled with potting soil. To simulate a slope the rain gutter was elevated with bricks at one end. The tower was built with 10 Lego Duplos. Four angles of slope were tested. Three foundation depths were tested at each slope angle (three times). A rubber ball was released up slope at each depth to test the tower's stability. The ball was released three times for each depth, creating a gap between the soil and the tower. Then the gap between the soil and tower was measured.

Results
On the slope of 10 degrees the tower moved the least overall. Slopes of 17 degrees and 15 degrees resulted in more movement in the tower. The tower on the slope of 13 degrees moved the most. The tower was not stable at one Lego Duplo block deep. While at three blocks deep the tower had little movement regardless of the slope. Since the data was inconsistent more trials will be conducted.

Conclusions/Discussion
The results did not support my hypothesis, because of inconsistent soil compaction and tower height. Inconsistent soil compaction led to poor data. The tower height changed when the foundation depth was increased, because the tower's height above the surface decreased. A 10 Lego Duplo tower was used throughout the experiment. By not adding a block as the depth increased the tower height and center of gravity was not held constant. In the new trials I will control both soil compaction and tower height.
Based on the data, increasing the foundation depth will result in a more stable building.

Summary Statement
My project is about how foundation depth and slope angle affect a building's stability.

Help Received
Mother helped cut red background pieces and proof read summary; Father helped cut rain gutter and taught me how to do math for my data.