# Title Information

Ishika Patel

Mass Wasting Lab

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N/A

Table of Contents

[Title Information 1](#_Toc46255144)

[Data and Observations / Calculations 2](#_Toc46255145)

[Exercise 1: Mass Wasting 2](#_Toc46255146)

[Data Table 1. Angle of Response Data 2](#_Toc46255147)

[Sample Calculations of Average 3](#_Toc46255148)

[Lab Question Answers 3](#_Toc46255149)

[Exercise 1 Questions 3](#_Toc46255150)

[Conclusions 4](#_Toc46255151)

[References 5](#_Toc46255152)

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# Data and Observations / Calculations

## Exercise 1: Mass Wasting

### Data Table 1. Angle of Response Data

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Material** | **Original Angle** | | | | **Damp Angle** | | | | **With 50 ml** | | | | **With 100 ml** | | | | **Total ml** |
| **Test #** | **1** | **2** | **3** | **Ave** | **1** | **2** | **3** | **Ave** | **1** | **2** | **3** | **Ave** | **1** | **2** | **3** | **Ave** | **to NO slope** |
| **Sand** | 45 | 40 | 47 | 44 | 30 | 32 | 27 | 29.6666667 | 27 | 24 | 27 | 26 | 9 | 5 | 7 | 7 | 90, No Slope near the end, small bunches but sand became thick then fell out in block |
| **Gravel** | 15 | 10 | 13 | 12.6666667 | 40 | 43 | 36 | 39.6666667 | 48 | 48 | 44 | 46.6666667 | 15 | 13 | 14 | 14 | 0, Slope disappeared as time went on |
| **Clay** | 70 | 66 | 62 | 66 | 85 | 87 | 82 | 84.6666667 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90 | 90, Very cohesive, became a block |
| **HOL Soil** | 71 | 65 | 63 | 66.3333333 | 57 | 55 | 55 | 55.6666667 | 30 | 28 | 27 | 28.3333333 | 5 | 0 | 0 | 1.66666667 | Approx. less than 5, Less of slope each time watered down, many small mountains |
| **Student Soil** | 42 | 40 | 43 | 41.6666667 | 30 | 26 | 27 | 27.6666667 | 17 | 15 | 11 | 14.3333333 | 3 | 0 | 0 | 1 | N/A, A mixture of all sorts of other materials small slope at the end |

**\*\*90 and 0 are the same angle. This means there was no slope.\*\***

### Sample Calculations of Average

Original Angle Sand:

Damp Angle Sand:

With 50 ml Sand:

With 100 ml Sand:

# Lab Question Answers

## Exercise 1 Questions

1. **Rank each material in order of increasing angle of repose when dry. Is there any relation between particle size and angle of repose? Explain.**

Gravel, Student Soil, Sand, Clay, HOL Soil. This ranking are the materials in order of increasing angle of repose when all dry. In the trials of this experiment, the HOL soil had the greatest angle of repose because of the chips in the soil. It also started off slightly damp right out from the bag, so this impacted the data. Otherwise as particle size increased angle of repose decreases as the grains are less willing to coagulate together. For example, the larger rocks bounced off one another in my first trial with the gravel creating a lower angle of repose

1. **Carefully study the response of each sediment sample to water. Rank the samples according to amount of water needed to completely destroy cohesion. Is there any relationship between particle size or type and increased water? Describe.**

As more water was added to the HOL soil and Student soil, the cohesion of the material was destroyed. The soils became liquidly and unable to keep together. For the finer grains such as sand and clay, the more water there thicker the clay became and extremely cohesive. With the sand, the water when mixed in made the substance liquefy, but when poured, the sand would coagulate and drop out in massive chunks due to gravity. For the gravel, the water did not necessarily make the gravel more or less cohesive, it simply made the rocks fall out differently. In a ranking form most to least water needed to destroy cohesion: HOL Soil, Student Soil, Gravel, Sand, Clay.

1. **Did any material exhibit an unusual response to a partial saturation with water (dampening) such as early failure or an extremely high angle of repose? Explain.**

The clay has the most interesting response visually to all the saturations in particular partial saturation. It became sticky and difficult to work with and pour out. AS water was added to the clay it just created a greater and bigger lump that made an angle of 0 (notes as 90 in the data) with thickness. What I also found interesting was the Gravel’s jump in angle upwards with more water towards the middle. I think this forced the smaller pebbles that settled at the bottom out and pushed the bigger rocks to mix in increasing the ability to create a conical shape.

1. **If you were to build a house on one of these sediments, which one would you choose and why?**

If I were to build a house of any of these settlements it would be the clay. I would have a couple of conditions though! I would choose the clay, but it would have to have been saturated with water then let dry so that the mixture was firm and stuck together. The clay, as noted in the HOL lab, dries rock hard, and as opposed to the legit gravel rocks, the clay dries as one unanimous rock.

1. **If two homes sat on slopes of identical angle and composition, how might climate affect which home is likely to be a victim of mass wasting?**

If there is one humid to wet climate versus a very dry climate the different slopes would react differently. If we were to look at a dry climate for the home on top of a sand slope, the sand would slide as its angle is increasingly high and the granules are not collating together. If we were to look at a house that is in a wet climate where the sand is sticking together the slope would be more towards 0 and there wouldn’t be much shift under the home because the weight of the home would simply compact the already 0 angle of repose. Rockier material is likely to not shift as much amongst one another while smaller grains would shift.

1. **If you were in the market for a new home and looked at several homes on hilltops featuring great views, what information would you need to gather before purchasing?**

I would need to gather info on the plate boundaries of the home to see if it was on a tectonic boundary that saw a lot of movement and faulting. I would also look at the type of rock that my hilltop home would be located. This factors in to how likely it is to shift and shake. I would look into the climate as that would impact soil quality and the likelihood of different natural disasters. For example, in a cold snowy climate avalanches might happen while in a coastal climate I’d have to look into saltwater damage to the Earth’s stability and the house structurally. I would lastly look into the renovations that my possible neighbors might have done to further secure their properties structurally.

# Conclusions

This messy lab looked into the principle of mass wasting. I know by no means are my measurements accurate to what they are supposed to be, but that are still in fact the numbers I pulled! In summarizing this lab, I will be doing an analysis on each of the materials to address the errors made and the impacts to results.

Beginning with the sand. The biggest difficulty with the sand was that as I added more water, it did not want to leave the cup to be funneled into a conical shape. This led the sand to fall out in dense chunks together. The sand did show the ultimate trend of becoming flatter in angle of repose as it became more saturated.

The next soil was the gravel. The gravel was interesting in that the smaller and bigger pebbles fell at different rates with more or less water. As the Gravel Became more saturated the smaller rocks fell with the water then the bigger pebbles fell. A difficulty that I had with the gravel was that as the gravel fell from the 6 inches height, it would hit the cookie pan and would bounce elsewhere. This drastically decreased the ability of the gravel to pile up.

Next was the clay in the data. The clay was by far the most difficult soil type to work with. It did not mix well; it made a gross and sticky mess and was difficult to collect for multiple trials.

The HOL soil lost cohesivity very quickly. It essentially liquified as the soil was saturated. However, one interesting visual icon of this soil type was that when it was poured that smaller mountains would form in the puddle of water. This gave it some angle of repose because some of the soil and chips created conic height.

The last soil was the student soil. My student soil was a mixture of all different types of the other soils. There was sand and gravel and chips like int eh HOL Soil. It was a mixture and reacted as such. The trend spotted in this data was how the angle decreased with saturation.

Some systematic errors in my experiment were during the time where I added water to the soils but lost water as I was transferring the soils back to their respective cups. This means that every time I conducted a trial, there was not a specific amount of water in the soil. Another systematic error was the loss of soil used as each trial went on. While doing 3 ties then adding more water each time, each soil inevitable loss mass along the way. One trend of the data was that as it got more saturated with water, all the types of soil either became close to 0 degree or 90-degree angles. I chose 90 degrees to represent some thickness to the soil as opposed to it liquefying.

This lab was a great way to interact with the soils. I Definitely understood the principles behind mass wasting and the volatility of soils form this. I did not understand until the lab questions how important It is to consider the ground you are building infrastructure on.

# References

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