



# Sand Science

The Effect of Particle Size on Speed of Water Flow

Fred Sullivan

# Hypothesis

- ▶ I predict that if I test which types of sand take the longest time for Water to pass through, then the coarse sand will take the longest amount of time. This is because fine sand is very permeable, and limestone has large gaps in between. Coarse sand is also made up of tiny rocks, and is much thicker than fine sand. Other information that supports my hypothesis is that coarse sand has extra layers, unlike both fine sand and limestone, which only have one.

# How will Data be Collected

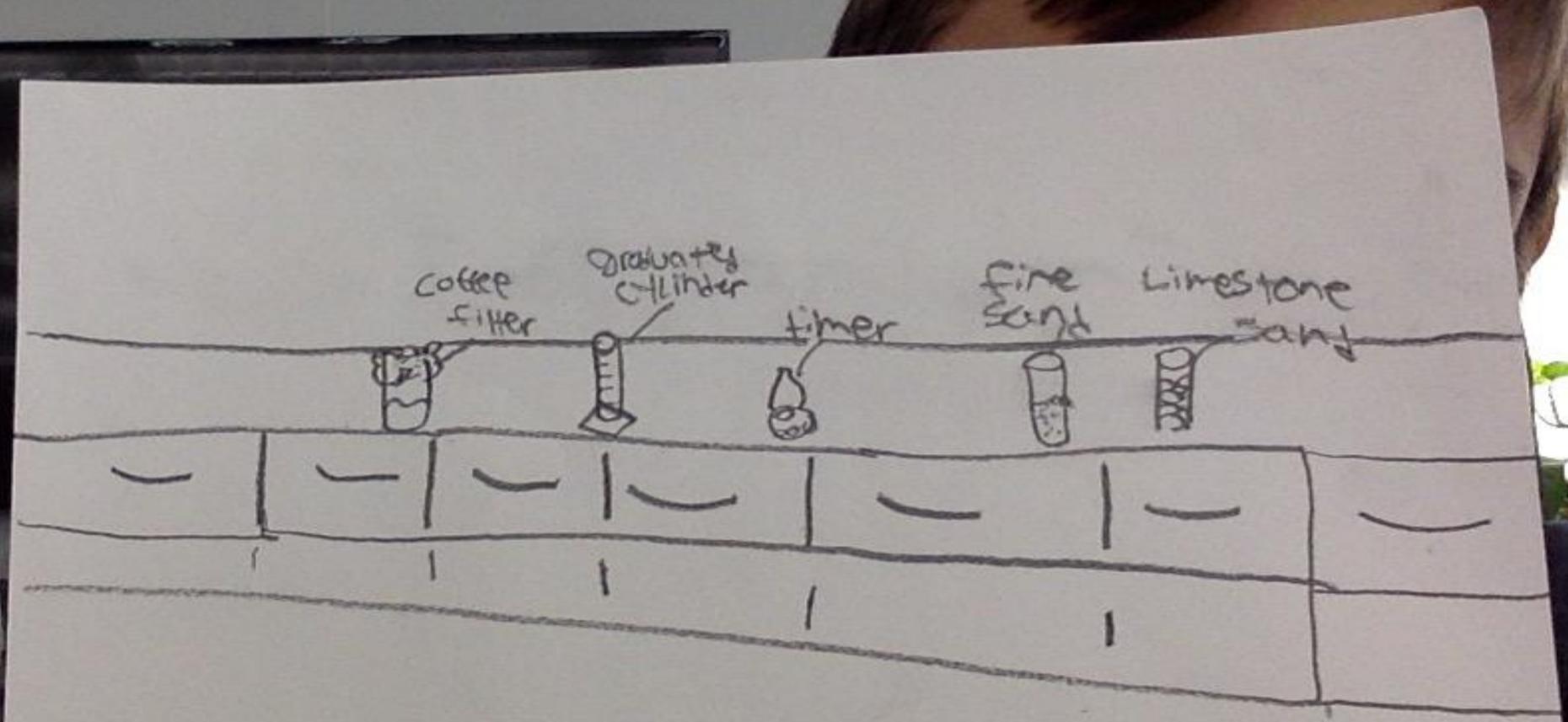
To get accurate results, I will use a timer to record the exact time it takes water to penetrate sand. The sand will be placed on top of a coffee filter. I will be testing the amount of time it takes for the water to flow through the sand. We will measure this by timing how long it takes for the water to completely pass through the coffee filter. This will all be recorded in my table, along with the amount of water used, and the time it took for the water to pass through the sand.

# Materials

<i>Equipment</i>	<i>Used in method</i>
<i>Sand</i>	<i>To be measured</i>
<i>Coffee filters</i>	<i>To place the sand on top of</i>
<i>Cloths and paper towel</i>	<i>To clean the testing surfaces</i>
<i>Tape</i>	<i>To secure the coffee filter onto the jar.</i>
<i>Timer</i>	<i>To time the water.</i>



# Labeled Diagram



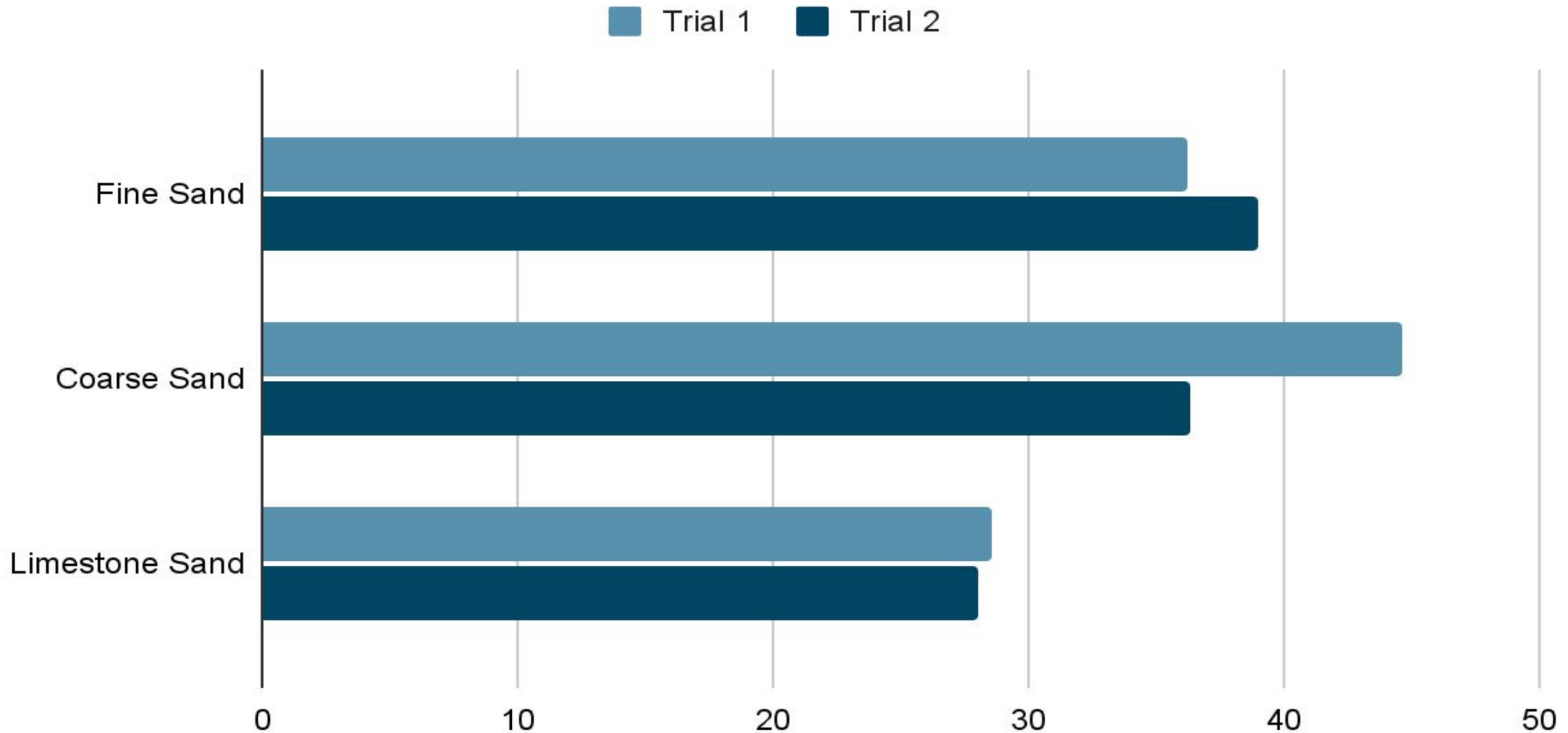
# Procedure

1. Gather all necessary materials to prepare for testing.
2. Pour 5 grams of fine sand on top of a coffee filter, making sure not to spill any sand.
3. Place the coffee filter full of sand on top of a pitcher by the sink and fill a graduated cylinder with 25ml of water.
4. Get a timer, pour the water into the coffee filter filled with all of the fine sand and start the timer. Stop it when the water has fully passed through all of the sand and hits the bottom of the pitcher.
5. Record the data in your table/ chart
6. Use the paper towel to clean both the filter and graduated cylinder used for this experiment.
7. Repeat steps 2-7, replacing the fine sand with coarse sand instead.
8. Repeat steps 2-7, replacing the type of sand with limestone instead of coarse sand.
9. Record all data in your table and chart

# Data Table

Trial Number	Fine Sand	Coarse Sand	Limestone
1	36.21 seconds	44.65 seconds	28.56 seconds
2	38.94 seconds	36.38 seconds	28.04 seconds

# Sand Experiment Results



# Analysis

- ▶ The results showed that coarse sand took the longest time for 25 ml of water to completely pass through it. This is because fine sand is very permeable, and limestone has large gaps in between due to its rough and uneven edges. The particle size of the sand also affected my experiment, as the sand with the largest particle size took the longest amount of time for water to pass through. Coarse sand is also made up of tiny rocks, is much thicker than fine sand, and has extra layers unlike fine sand and limestone sand which only have one.

# Summary

- ▶ My data shows that coarse sand is not only stronger, but also thicker than fine sand and limestone sand. My results show that overall, coarse sand is thicker than limestone and fine sand, with fine sand being a close second. This proves my hypothesis in which I stated that coarse sand, due to it consisting of rocks, and fine sand, is thicker than both fine sand and limestone sand therefore proving my hypothesis to be correct..



# Photos

