

Lab 2: Density

Student names (please print)

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Objective

The objective of this lab is for your group to take measurements, calculate quantities and convert units to SI units. You will determine the density of water, compacted granular material and measure a ramps angle.

Instructions - Density calculation

Density describes the mass that exists per volumetric unit for a given material. The SI unit for density is expressed in kilograms per meter cubed (kg/m^3). For example, water has a density of 1000 kg/m^3 (to be validated). A pail filled with compacted granular is on the lab bench. Using the measuring instruments provided, determine the density of the compacted granular.

Water Validation

1. Take measurements to determine the volume of water in the pail.
2. Take measurements that will allow you to determine the mass of the water in the pail (i.e. you should subtract the mass of the empty container).

Granular Material

1. Take measurements to determine the volume of granular material in the pail.
2. Take measurements that will allow you to determine the mass of the granular material in the pail.

Instructions - Ramp

An LVL board has been propped up on a slope. Take the measurements listed below to annotate a sketch.

1. Measure the length of the board.
2. Measure the distance from the start of the board to the plumb bob.
3. Measure the height of the board at the plumb bob.
4. Measure the distance from the start of the board to the base of the wall along the ground.

Conversions table

1 ton = 1000 kg

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Dimensioned sketch of water in pail

Draw a dimensioned sketch of the water and the container holding it. Annotate (label) it with your measurements. Make good use of paper space

Dimensioned sketch of granular material

Draw a dimensioned sketch of the granular material and the container holding it. Annotate it with your measurements.

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Calculations

Determine the density of water expressed in kg/m^3 using the measurements you collected. Show your work.

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Determine the density of the granular material expressed in kg/m^3 using the measurements you collected. Show your work.

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Discussion

Estimate the mass in metric tons of the granular material that needs to be hauled away after excavating a volume with dimensions:

0.4 m x 8 m x 10 m

using the material's density you calculated above.

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Dimensioned sketch of the ramp and wall

Using the data you collected draw a dimensioned sketch of the ramp and wall. Annotate all your measurements in metric units.

Calculations

What is the slope (rise/run) of the board in degrees?

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If the board was extended at the same slope until it reaches the wall, determine the height of the intersection? (Assume the ground is perfectly level between the start of the board and the wall.)