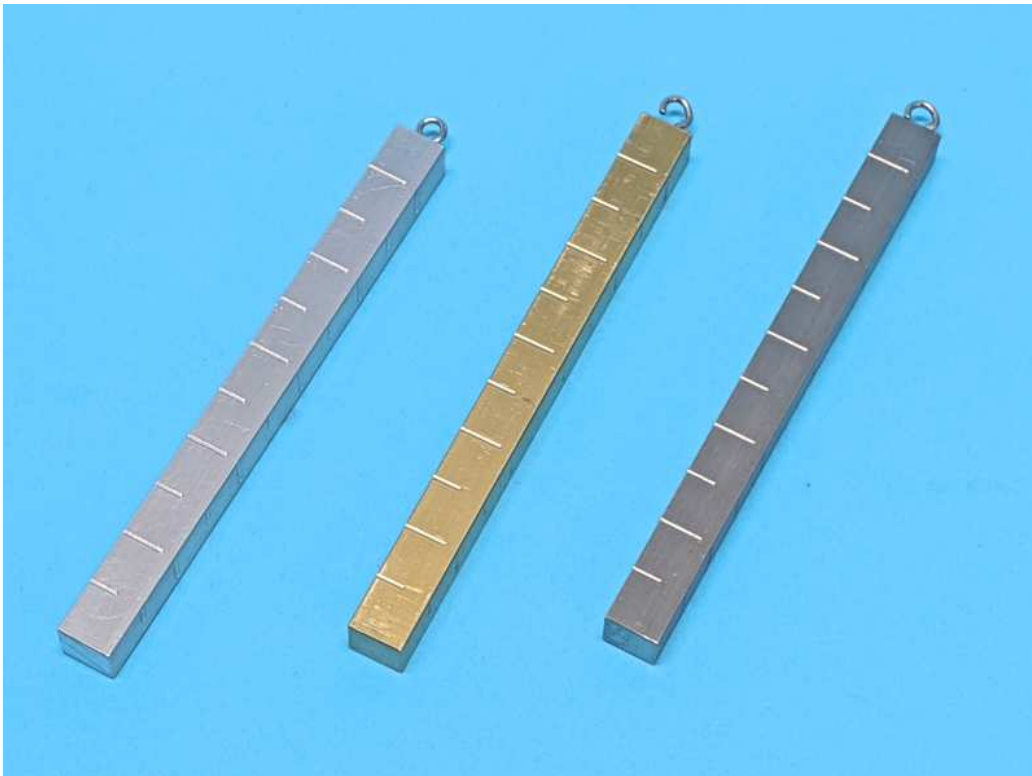


Instruction manual

C15-5352-W0

Archimedes' Sticks



Mar. 2022

Product's Feature

Set of three (3) metal square prisms (aluminum, brass, stainless steel) with engraved scales for measuring the buoyant force acting on the submerged portion of the stick with a spring balance.

Size of each stick is 1 x 1 x 11cm with engraved scales (1cm divisions). Therefore, when the submerged depth of the stick is 1cm, the volume of the partly submerged stick will be exactly 1cm³, which makes it easier to measure the buoyant force acting on the submerged stick and helps better understand **Archimedes' principle** that states the buoyant force acting on a submerged object is equal to the weight of the fluid (water) the object displaces.

Specification

- Material of each stick: Aluminum, Brass, Stainless steel
- Size: 10 x 10 x 110mm
- Weight: Aluminum – 29g, Brass – 92g, Stainless steel – 83g
- Others: With hook at one end of each stick

Experiment Guide

1. What to prepare:

Water container (with depth not less than 110 mm): 1 pc

String of appropriate length for hanging each stick: 1 pc

Spring balance: 1 pc

(Recommended equipment; A05-4054-W1 Spring balance in Newton range or A05-4065 Newton Meter GN-1.)

2. Experiment

1. Pour enough amount of water (up to the depth of not less than 110 mm) into the container to submerge Aluminum stick.

2. Hang the stick from the hook of the spring balance using string in between. (Tip: It is recommendable to use a kite string or a fishing line rather than a sewing thread.)

3. Record the weight value of each stick measured by the spring balance on a notebook.

4. Lower the spring balance slowly, so that the stick can be gradually and partly submerged in the water. Read the mass value indicated by the spring balance when the stick is submerged as deep as 2 cm (by 2 scales) and record it on the notebook.



5. Then, continue to submerge the stick and read the mass value the spring balance indicates every time the stick is submerged by two (2) scales (as deep as 2 cm).
6. Change the stick to another one (a brass or a stainless steel one) and repeat the above procedure (1~5).

3. Compare measured weight values using each type of the stick

1. Prepare a graph paper and draw x-axis to represent weight(g) and y-axis to represent depth (cm).
2. Plot measured the values of each stick (aluminum, brass, and stainless steel) on the graph.
3. Compare three of those linear graph lines to find the difference in gradients.

Consequently, the buoyant force generated by water will be represented by the gradient that does not differ between the sticks. As a set of three types of metal square prisms with different weight and specific gravity (relative density) but with the same size (1 x 1 x 11 cm), it helps students better understand connection between the weight and/or size of each stick and its buoyant force.

4. Recommendation for the experiment

Narika would like to recommend A05-4065 Newton Meter (digital) for this experiment because of easier reading of the values on its LCD display than spring balance that indicates weight value unstably.



A05-4065 Newton Meter

Note for storage

After the experiment, please keep the Archimedes' Sticks dry when stored. Otherwise, the sticks may get rusty.

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