Buoyant Force Measurement Set FK-1
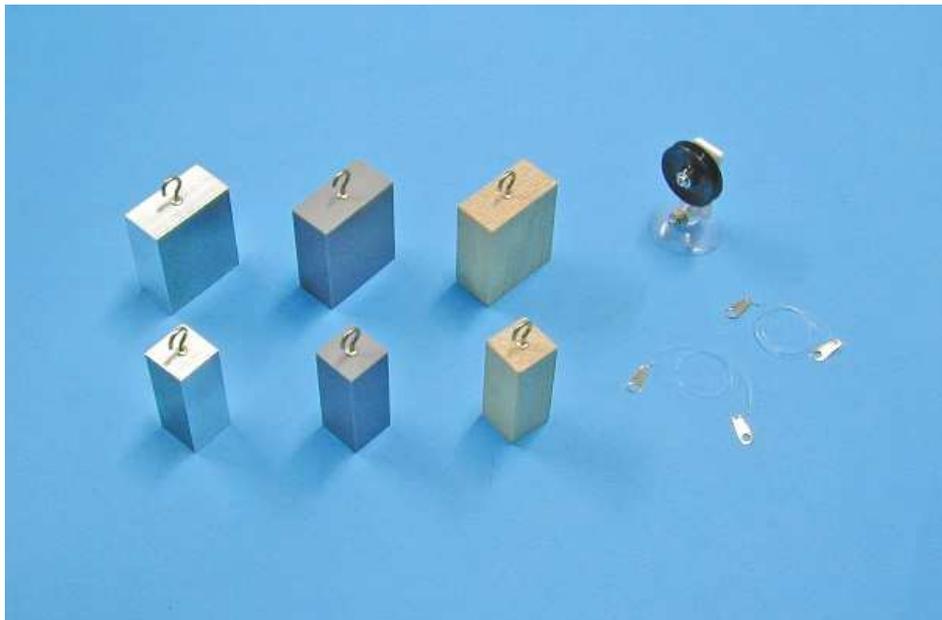
Cat. No. C15-5351-W0

Precaution

➢ Check the surface condition of each block before use. Should you find something adhered to the block, remove it and clean the surface.

Product Features

The set of assorted blocks for measuring and comparing buoyant forces acting on three types of blocks (aluminum, plastic, and wood) available in two sizes.

Easy for students to compare the magnitude of the buoyant forces acting on the blocks, if calculated by using the measured values, [1] between different materials/sizes, or [2] with the one theoretically calculated by using a rule known as Archimedes' principle.

Contents

➢ Block with a hook: x 6pcs

➢ Material: Aluminum, Plastic (PVC), Wood x 2pcs each

➢ Size: Small: 20 x 20 x 50 mm x 3pcs,

Large: 20 x 40 x 50 mm x 3pcs

Accessories:
Mechanical pulley with a suction cup: x 1 pc
String with metal rings at both ends: Longer string (ca. 50 cm) x 2 pcs, Shorter string (ca.15 cm) x 2 pcs

Examples of Experiments

1. Magnitude of buoyant force acting on a block

1. What to prepare:
- Blocks (Larger one): Aluminum or Plastic
- Beaker 500 ml: 1 pc
- String with a metal ring at both ends (Shorter one): 1 pc
- Newton Meter (digital) (A05-4065): 1 pc (not included), if you do not have a Newton Meter, use of Spring Balance (in Newton units) is possible too

2. Purpose:

To quantify the buoyant force acting on a submerged block (aluminum/plastic) by subtracting its force (N) measured in water from that (N) measured in air.

3. Procedure:

1. Press the "ON/OFF" button of Newton Meter for two seconds to turn the meter on. Check if the meter is in the newton unit (N) mode. Hook a block to one end of the string. Hang the other end of the string from the meter. Read and record the value (A) displayed on the meter.

2. Completely submerge the block in a beaker with sufficient amount of water. Make sure the block does not touch the inner surface of the beaker. Read and record the value (B) displayed on the meter.

3. Subtract the value (B) from (A) to determine the magnitude of the buoyant force acting on the block.

Sample data: Measured value of aluminum block in air = 1.1 [N]   ---------(A)

                   Measured value of aluminum block in water = 0.7 [N]   ---------(B)

                   Magnitude of the buoyant force acting on the block = 0.4 [N] (1.1 [N] – 0.7 [N]) ------(C)
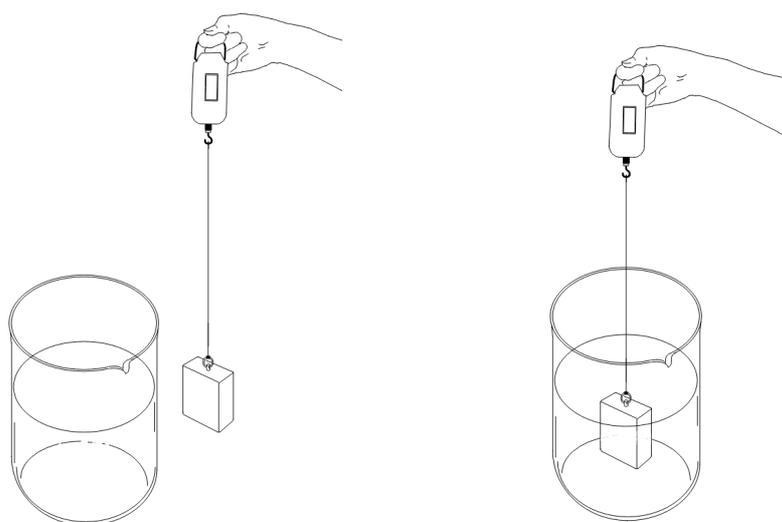
2. Magnitude of buoyant force acting on a floating block

1. What to prepare:

- Block (Larger one): Wooden block
- Beaker 1000 ml, 1 pc
- String with a metal ring at both ends (Longer one): 1 pc
- Mechanical pulley with a suction cup: 1 pc
- A small candle or a solid wax (not included)
- Newton Meter (digital) (A05-4065): 1 pc (not included), if you do not have a Newton Meter, use of Spring Balance (in Newton units) is possible too

2. Purpose:

To quantify the buoyant force acting on a submerged wooden block, by subtracting the negative value of force (N) measured in water using a mechanical pulley from the weight (N) measured in air.

3. Procedure:

1. Press the "ON/OFF" button of Newton Meter for two seconds to turn the meter on. Check if the meter is in the newton unit (N) mode. Hook the block to one end of the string. Hang the other end of the string from the meter. Read and record the value (C) displayed on the meter.

2. Hook one end of the string to the meter and the other end to the block. Then, thread the string through the mechanical pulley with a suction cup. Make sure none are disconnected from one another until the end of the experiment.

3. Sticks the pulley using the suction cup to the bottom of the empty beaker. Hang the meter and the block out of the beaker. Then, temporarily fasten both sides of the string close to the meter and block with adhesive tape to prevent it from being unthread from the pulley.

4. Pour sufficient amount of water into the beaker and remove the tape close to the meter. Raise the meter perpendicularly to the bottom of the beaker and strain the string between the meter and the pulley. Carefully remove the tape close to the block.

5. Keep an appropriate tension of the string between the meter and the pulley until the block is fully submerged. Make sure the block does not touch the inner surface of the beaker.

6. Read and record the value (D) displayed on the meter.

7. Subtract the negative value of the weight (N) measured in water (- D) from (C) to determine the magnitude of the buoyant force acting on the block.
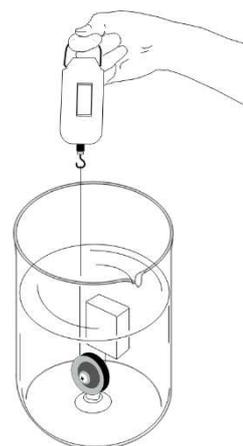
Sample data: Measured value of a wooden block in the air = 0.2 [N]

Negative value of the measured value of the wooden block in water = - 0.2 [N]

Magnitude of the buoyant force acting on the block = 0.4 [N] (= 0.2 [N] – (- 0.2 [N]))

Tips: Using a bigger container such as a bucket or a water bath, if not a beaker, with a capacity larger than one litter is recommended for easier handling of the setting mentioned above.

Note: Should you use a conventional spring balance with the scales in gram-weight, you would have to convert the measured value to newtons.

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