MARITIME SCIENCE Practical
Archimedes Principle

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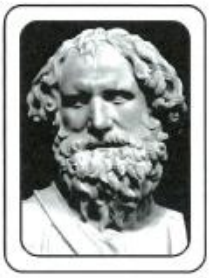
Student's Name : _____



ΑΡΧΗΙΜΕΔΕΣ

AIM : *To determine whether Archimedes Principle can be verified from an experimental point of view.*

ARCHIMEDES PRINCIPLE :

ANY OBJECT , WHOLLY OR PARTIALLY IMMERSED IN A FLUID, EXPERIENCES A VERTICAL BUOYANT FORCE EQUAL TO THE WEIGHT OF THE FLUID DISPLACED BY THE OBJECT.

ARCHIMEDES OF SYRACUSE

DESIGN an experiment / FORMULATE a Hypothesis regarding Archimedes Principle :

The overall weight of a test tube (with ballast) barely floating on water must be equal to the weight of the liquid displaced by this test tube.

LIST OF ITEMS NEEDED TO CARRY OUT THE EXPERIMENT :

> Small test tube

> Ballast (Small Lead sinkers)

> Transparent containers (to contain the fluid)

> Fluid (Water)

DRAW A DIAGRAM REPRESENTING THE EXPERIMENT :

MODUS OPERANDI (WHAT TO DO) :

Outline the different steps needed to carry out the experiment :

1> Measure the dimensions of the test tube with a Vernier Caliper.

Length of cylindrical part = ____ mm = _____ cm

Diameter = ____ mm = _____ cm

2> Measure the mass in grams of the dry test tube

Mass test tube = _____ grams

3> Fill the container almost to the top with water.

4> Add lead sinkers in the test tube until the top lip of the tube is level with the surface of the water.

5> Measure the mass in grams of the lead sinkers.

RESULTS & ANALYSIS :

1) *Calculate in grams (and in kilograms) the overall value of the mass of the test tube and sinkers.*

total mass =

2) *Calculate in Newton the overall value of the weight of the test tube and sinkers.*
(Given : W = mg with g = 9.81 m/s^2 , m in kg)

total weight =

3) *Calculate in cubic centimeters the volume of the test tube.*

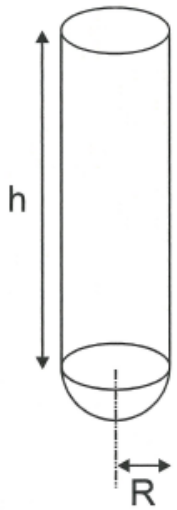
Volume of test tube = V cylinder + V 1/2 sphere.

Given : Volume cylinder = $\pi R^2 h$

Volume 1/2 Sphere = 1/2 x 4/3 πR^3

With R = D/2

VOLUME of CYLINDER :



VOLUME of 1/2 SPHERE :

V total (in cc):

4) Deduce the volume of water (in cubic centimeter) displaced by the test tube and the corresponding weight in Newton of this volume.

(Given : 1 cc of water has a mass of 1 gram and W = mg with g = 9.81 m/s^2 , m in kg)

5) Calculate the % error between the weight of the test tube and the weight of the displaced water.

$$\% \text{ error} = \frac{|\ \text{Value 1} - \text{value 2}\ |}{\left(\frac{\text{Value 1} + \text{value 2}}{2}\right)}$$

CONCLUSION / POSSIBLE IMPROVEMENT :

EXTENSION : You have built a wooden boat. Suggest a method that would allow you to find out in advance by how much the boat is going to sink in water before it stabilises and floats at rest. (This is called the draught of the boat).