

Approximate weight of a potato

By using Archimedes Principle, we can take out the approximate weight of an object without using any machine!!

Instruments used for this Experiment..

- A steel container
- A steel scale with maximum length 30cm
- An object whose weight is to be measured and in this case it is a potato

Experimental Setup

- I took a cylindrical container and calculated its radius with a tailor tape with an error of 1mm
- I used a scale to measure the height increment with an error of 1mm
- I did the experiment 5 times and calculated the volume of the water displaced

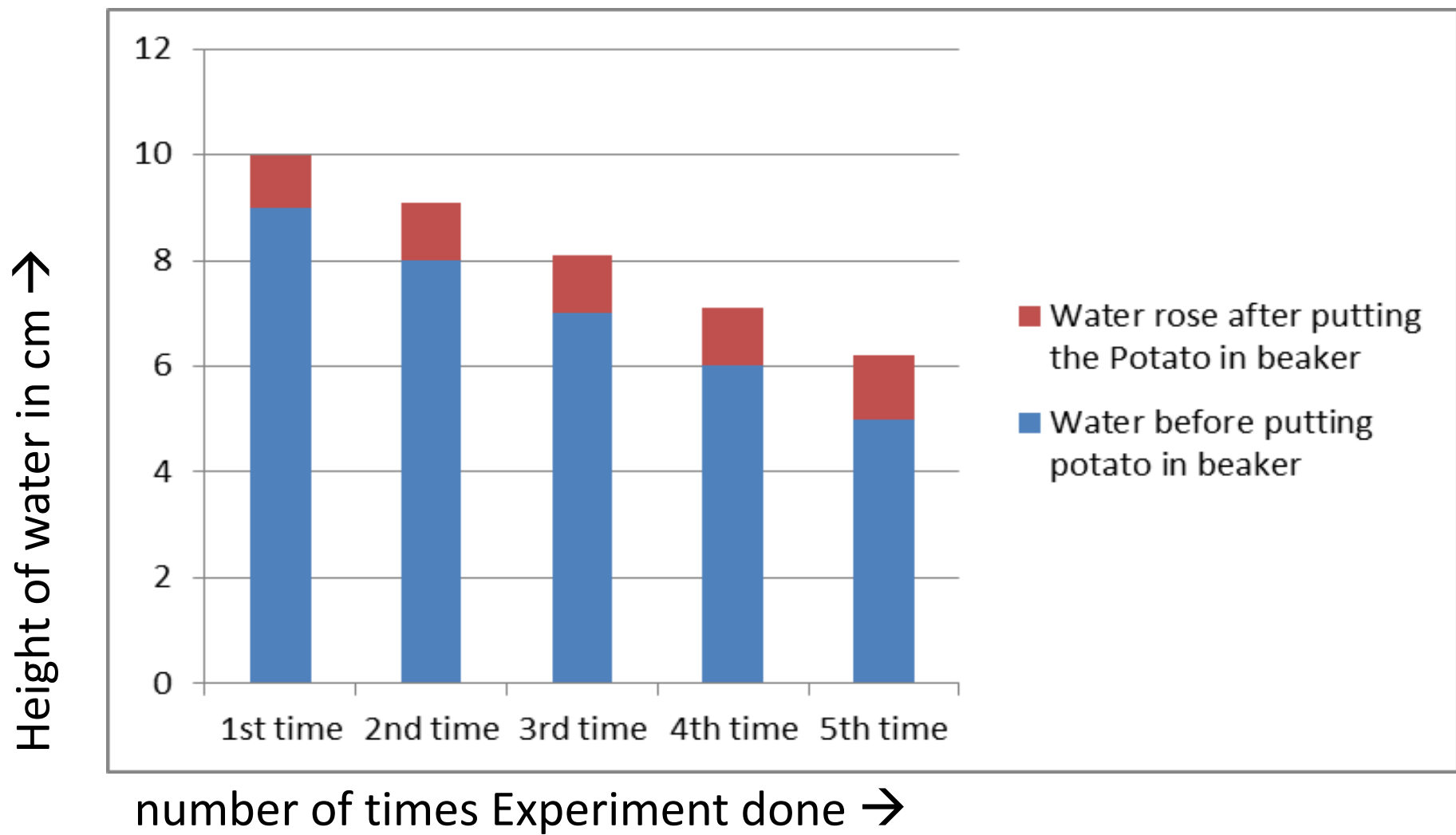
1st time:- I filled water in the container till 9cm and dropped the potato and observed that the water rises to 10 cm

2nd time:- I filled water in the container till 8cm and dropped the potato and observed that the water rises to 9.1 cm

3rd time :- I filled water in the container till 7cm and dropped the potato and observed that the water rises to 8.1 cm

4th time :- I filled water in the container till 6cm and dropped the potato and observed that the water rises to 7.1 cm

5th time:- I filled water in the container till 5cm and dropped the potato and observed that the water rises to 6.2 cm



Weight of potato

I took the radius of the container by measuring its circumference by measuring tape and then taking out its radius which comes out to be 4.6 cm. And for using Archimedes Principle, we need V (volume), the density of water (ρ), and g (acceleration due to gravity). But we can easily find the m (mass) of potato by the formula $\text{Density} = \text{Mass} / \text{volume}$ and we have volume and density of water as 1 gm/cm^3 (in gm/cm^3 because we have taken all units in CGS)

$$F_b = -\rho g V$$

$$\rho = \frac{m}{V}$$

Grid Data

	1 st time	2 nd time	3 rd time	4 th time	5 th time
Height of beaker without putting potato	9 cm	8 cm	7 cm	6 cm	5 cm
Height of beaker after putting the potato	10 cm	9.1 cm	8.1 cm	7.1 cm	6.2 cm
Elevated Height	1 cm	1.1 cm	1.1 cm	1.1 cm	1.2 cm
Volume of elevated height	66.4 cm ³	73.0 cm ³	73.0 cm ³	73.0 cm ³	79.6 cm ³
Mass	66.4 gm	73.0 gm	73.0 gm	73.0 gm	79.6 gm
				Average weight	73 gm

Results

- Mean = 73 gm
- Standard Deviation = 4.2 gm

Error in volume calculation:

- $\frac{\delta V}{V} = \sqrt{\left(\frac{2\delta r}{r}\right)^2 + \left(\frac{\delta h}{h}\right)^2}$
- $\delta V = 7.4 \text{ cm}^3$, where $V = 73 \text{ cm}^3$, $\delta r = \delta h = 0.1 \text{ cm}$, $r = 4.6 \text{ cm}$ and $h = 1.1 \text{ cm}$.

Some images of the Experiment

