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AP Physics

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**Measurement Lab**

**Purpose**- The purpose is to measure specific objects throughout the classroom and determine their volumes or thickness. As well as to learn how to use the lab tools in order to calculate the data.

**Equipment**- The following equipment was used in the experiment:

* Verneir Caliper – used to measure the different lengths of the hand held objects.
* Wood block – measured to find its volume
* Cylinder – measured to find its volume
* 15 pages of notebook paper – measured all and then divided by the total thickness to find the thickness of a single page.
* Meter stick – used to measure the length, height, and width of the classroom

**Procedure** –

* Determining the volume of a block of wood-
	1. Measure the length, height, and width of the wood block
	2. Use the formula ( Volume = length x width x height ) to determine the volume

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| --- | --- | --- |
| Measurement  | Millimeters  | Meters  |
| height | 51.0 mm | 0.051 m |
| width | 50.0 mm | 0.050 m |
| length | 20.3 mm | 0.0203 m |
| **Data Analysis-** (0.051 m) x (0.050 m) x (0.0203 m) = $5.18 x 10^{-5}$ $m^{3}$ |

Total volume of the block of wood: $5.18 x 10^{-5}m^{3}$

* Determining the volume of a cylinder-
	1. Find the diameter of the cylinder using the Verneir caliper
	2. Measure the total height then just the base of the cylinder and subtract the base from the total height.
	3. Use the formula ( Volume = $πr^{2}$h ) to determine the volume

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| Measurement |  Millimeters | Meters |
| Diameter | 12.2 mm | 0.0122 m |
| Total height | 112.7 mm | 0.1127 m  |
| Base height | 10.4 mm | 0.0104 m |
| Cylinder height | 102.3 mm | 0.1023 m |
| **Data Analysis-**$ π (0.0061)^{2}\left(.1023\right)= 1.2 x 10^{-5}m^{3}$  |

Total volume of the cylinder: $1.2 x 10^{-5}m^{3}$

* Determining the thickness of a single sheet of notebook paper-
	1. Use 15 pages of notebook paper and hold them together
	2. Use the Verneir Caliper to measure all 15 sheets together
	3. Once you’ve figured the total thickness of all the sheets, divide the number of sheets by the total thickness determining the thickness of a single page.

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| --- | --- |
| Measured | Millimeters |
| 15 pages of notebook paper | 1.1 mm |
| 1 page of notebook paper | .073 mm |
| **Data Analysis-** $\frac{1.1mm}{15 pages}$ = .073 mm per page = $7.3 x 10^{-5}$m |

Total thickness of a sheet of notebook paper: $7.3 x 10^{-5}m$

* Determine the volume of the classroom-
	1. Measure the length, height, and width of the classroom with a meter stick.
	2. Used the formula (Volume = length x width x height ) to determine the total volume

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| --- | --- |
| Measurement | Meters |
| height | 2.8 m |
| length | 11.93 m  |
| width | 7.33 m  |
| **Data Analysis-** $\left(11.93m\right) x \left(7.33m\right) x \left(2.8m\right)= 233.85m^{3}$ |

Total volume of the classroom: $233.85m^{3}$

**Conclusion-** My conclusion of this measurement lab is it resulted in refreshing my memory of using the lab tools properly as well as introduced me to new ones such as the Verneir Caliper. I was also able to reconsider the formulas for finding specific volumes. It was interesting to find out the volume of the class room and the thickness of a single piece of notebook paper. Overall it resulted in the finding of the volumes of the everyday classroom items.