

Laboratory 1- Physiological Instrumentation

Purpose

This experiment introduced the concepts and equipment that will be used in human physiology. It introduces many types of units of measurement from different concepts and shows how to convert one unit to another, the amount of pH that a liquid has based on the color range and allows students to use and observe a black box that is responsible for recording your pulse rate.

Procedures

1-A: Demystifying the black box

1. Observe the operation of these experiments
2. Make a concerted effort to recognize and identify each on sight
3. Understand the application of the "black box" instrumentation to experiments and measurements of human physiological events

1-B: Units of measure

1. Become familiar with the basic metric units of measure
2. Learn the basic unit of each measurement
3. Understand the significance of the prefixes of each unit

Linear measurements-State the length, width and depth of the lecture text
Convert it from millimeters to centimeters

Volume measurements

Pour some water in the beaker and state the volume
Pour the water in the beaker and state the volume
Convert it from milliliters to liters

Mass measurements

State the mass of the beaker and pour some water into the beaker
State the mass of the liquid in the beaker
Convert it from milligrams to grams

pH measurements-State the pH of the liquids in containers A,B, and C

Determine your pulse rate after 15 and after 60 seconds

Results

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Linear measurements

Length: 27.9mm 2.79cm

Width: 21.6mm 2.16cm

Depth: 0.09mm 0.009cm

$27.9\text{mm} \times 1\text{cm}/10\text{mm} = 2.79\text{cm}$

$21.6\text{mm} \times 1\text{cm}/10\text{mm} = 2.16\text{cm}$

$0.09\text{mm} \times 1\text{cm}/10\text{mm} = 0.009\text{cm}$

Volume measurements

150ml 0.15liters(l)

90ml 0.09liters(l)

$150\text{ ml} \times 1\text{L}/1000\text{ml} = 0.15\text{ liters}$

$90\text{ml} \times 1\text{L}/1000\text{ml} = 0.09\text{ liters}$

Mass measurements

Mass of weight: 0.28459mg 284.59g

Mass of liquid in beaker: 0.08748mg 87.48g

$284.59\text{g} \times 1\text{mg}/1000\text{g} = 0.28459\text{mg}$

$203.13\text{g} - 115.65\text{g} = 87.48\text{g}$

pH measurements

Container A: 6

Container B: 7

Container C: 9

Time measurements

Pulse rate after 15 seconds: 75 beats/second 1.25 beats/minute

Pulse rate after 60 seconds: 1.30 beats/minute 78 beats/second/millisecond

Discussion

The linear measurements of the lecture text introduced measuring the varying length, width and depth of different objects and converting millimeters into centimeters. For the volume measurements, it introduced the concept of finding the volume of an irregular object by the placement of water involving the conversion of milliliters to liters. The mass measurements introduced the idea of using a weight balance and finding the mass of different objects with the conversion of milligrams to grams. The pH measurements are introduced to find the pH of different liquids based on the pH color scale that reveals what a liquid's type of condition it is. In the final part of the lab, the time measurements with the black box showed the many different pulse rates of many participants that was broadcasted on a computer screen showing a red waveform that had

peaks demonstrating each heartbeat of a certain individual. This box introduced the idea of providing insights on someone's cardiovascular health along with finding someone's pulse rate after a certain amount of time. The potential errors that could come from this lab is that the math that converts one unit into another could be wrong, something could have not been measured properly or for the box with the pulse rates, either someone's finger might not be fully on the scanner enough or it could be affected by if the person was recording their pulse rate while they were standing or sitting.

Conclusion

This lab demonstrates the techniques of how to use physiological instrumentation when it comes to linear, volume, mass, pH, time and pulse measurements. The recordings of the many types of pulse rates created by the black box reveals important information about cardiovascular health to many types of participants. This lab highlights the many measurements and concepts that are used in human physiology while showing the importance of having the right measurements and doing the correct conversions. All the results of this lab contribute to a better understanding of the different units and measurements that lays the foundation of future studies in human physiology.