

# Lab - Measurement

**Purpose:** To determine mass, volume and distances of several objects that are difficult to measure through calculations from measured components of the object.

**Introduction:** In this experiment, the teacher will give you several objects around the school that need to be measured to determine a certain value of the object. In all these cases, the object cannot be measured directly and some sort of calculation will need to be done to determine the information desired. As the student, you will need to determine a procedure and list of measurements that need to be taken to determine the value desired. The following materials will be provided for you to use:

**Materials:**

meter stick	graduated cylinder	protractor	measuring cups
meter tape measure	metal cylinders	compass	ruler
gallon jug	water	string	flashlight
balance	air	laser	stopwatch

**Procedure:**

Part 1: The height of the flagpole near the stadium.

Part 2: The mass of 1 gallon of water.

Part 3: The volume of air in the classroom.

Part 4: The difference in the distance around the track in lane 6 versus lane 1.

Part 5: The difference in area of the floor in the main rotunda compared to the classroom rotunda..

**Data Tables/Lists:**

**Calculations & Questions:**

- 1) Using the data acquired from part 1, describe how you will use it to determine the height of the flagpole.
- 2) Show your calculation and determine the height of the flagpole.
- 3) Would it be possible to use a similar procedure to determine the height of a hot air balloon in the sky? What other precautions would need to be taken?
- 4) Using the data acquired from part 2, describe how you will use it to determine the mass of 1 gallon of water.

- 5) Show your calculation and determine the mass of 1 gallon of water.
- 6) What is the density of water? Calculate it in terms of g/mL.
- 7) Using the data acquired from part 3, describe how you will use it to determine the volume of air in the classroom.
- 8) Show your calculation and determine the volume of air in the classroom.
- 9) The density of air at sea level is 1.225 g/L. What would be the mass of the air in the room?
- 10) Using the data acquired from part 4, describe how you will use it to determine the difference in the distance around the track in lane 8 versus lane 1.
- 11) Show your calculation and determine the difference in the distance around the track in lane 8 versus lane 1.
- 12) Suppose the OHSAA instituted a new rule in running the 1600 m race that you had to stay in your lane the entire time. How far ahead on the track would the person in lane 8 need to start in relationship to lane 1 in order for them to run the same distance? About where would that be in relation to the start/finish line?
- 13) Using the data acquired from part 5, describe how you will use it to determine the area of the walkway in the upper part of the rotunda.
- 14) Show your calculation and determine the area of the walkway in the upper part of the rotunda.
- 15) The flooring material used in the rotundas are 2.5 cm thick. What is the total volume of flooring material used in the main rotunda?

**Conclusion:**