Mr. Ulrich
Regent's Biology

Name:……Block:..……...

Lab #.....

LUNG CAPACITY LAB

Human lung capacity can be measured in several ways. One way, is by using a piece of laboratory equipment called a spirometer. However, lung capacity can also be measured using a balloon. The data you obtain may not be as accurate as that obtained using a spirometer though.

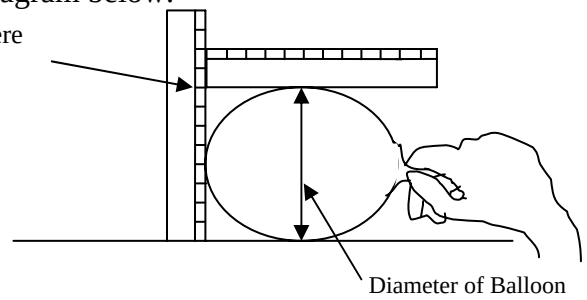
Several different lung volume measurements can be made. The largest possible amount of air that can be exhaled after drawing a deep breath, is the **vital capacity**. The amount of air that remains in the lungs after exhaling normally but which can be expelled is the **expiratory reserve**. The amount of air taken in or expelled during normal breathing is called the **tidal volume**. A certain amount of air in the lungs cannot be expelled. This is the **residual volume**.

Purpose: To determine your lung capacity.

Procedure: Part A Vital Capacity

1. Stretch balloon several times.
2. Take as deep a breath as possible. Then exhale all the air you can into the balloon and pinch the balloon closed to prevent air from escaping.
3. Measure and record the diameter of the balloon in centimeters in column A of the Data Table. This is done by using two metric rulers as shown in the diagram below.

Record measurement where the height of the balloon meets the side ruler (with the balloon on its side). This is the balloon's diameter.



4. Deflate balloon and do three more trials. Record the diameters of the balloon in column A.

Part B Expiratory Reserve

1. Exhale normally.
2. Without inhaling as you normally would, put the balloon in your mouth and exhale all the air still left in your lungs.
3. Measure and record the diameter of the balloon in centimeters in column B of the Data Table.
4. Do three more trials. Record the diameters of the balloon in column B.

Part C Tidal Volume

1. Take in a normal breath. Exhale into the balloon **only** as much air as you would **normally exhale**. DO NOT force your breathing.
2. Record the diameter of the balloon in centimeters in column C of Data Table.
3. Do three more trials. Record the diameters of the balloon in column C.

Part D: Convert Diameters to Volume Using Graph Lung volume is expressed in cubic centimeters (cm^3). (1,000 cm^3 is slightly more than a quart.)

1. To convert from balloon diameter to volume, locate the balloon diameter on the x-axis on the graph in Figure 1. Follow this number up to the curve, then read across to locate the corresponding volume. **Example**: if balloon diameter is 14.5 cm, then the corresponding lung volume is 1500 cm^3.
2. Convert each diameter in your Data Table to its corresponding volume and record each volume onto the Data Table in columns D, E, and F.
3. Calculate and record your average lung volume for each of the three measurements.

Results:

Data Table

	Balloon Diameter (cm)			Lung Volume (cm^3)		
Trial	Column A Vital Capacity	Column B Expiratory Reserve	Column C Tidal Volume	Column D Vital Capacity	Column E Expiratory Reserve	Column F Tidal Volume
1						
2						
3						
4						
			Total			
			Average			

Analysis: Compare results to normal (average) lung volumes for males and females.

"Average" Lung Volumes Measured with a Spirometer

	Male	Female
Vital Capacity	5000 cm^3	4000 cm^3
Expiratory Reserve	1200 cm^3	1000 cm^3
Tidal Volume	525 cm^3	475 cm^3

Conclusion: Answer the following on a separate sheet of paper **in complete sentences**. Typing is appreciated!

1. What was the purpose of this investigation?

2. Compare/contrast your results with the average values. Why do you think there are differences?

3. Where was error introduced in this experiment?

4. Give at least 2 suggestions for improving the accuracy of your results. (How can you reduce sources of error?)

Figure 1:

Relationship Between Balloon Diameter (cm) and Lung Volume (cm^3)