NAME:_____ DUE DATE:_____

LAB: Lung Capacity

_____
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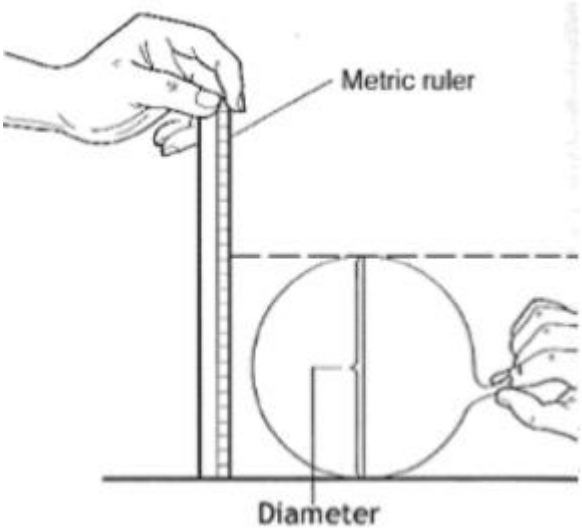
The purpose of this lab is to determine our own lung capacity using a balloon.

Materials

- Balloon
- 2 rulers

Procedure A: Vital Capacity



1. Stretch a 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 Column A of Table 1 (below). Use the figure to the right as a guide for measuring balloon diameter.

4. Deflate the balloon and run FOUR MORE. Record the diameter of the balloon for each.

Table 1: Balloon Diameters and Lung Volumes

	BALLOON DIAMETER IN CENTIMETERS			LUNG VOLUME IN CUBIC CENTIMETERS		
Trial	A Vital Capacity	B Expiratory Reserve	C Tidal Volume	D Vital Capacity	E Expiratory Reserve	F Tidal Volume
1						
2						
3						
4						
5						
			Total			
			Average			

[7 Pts]

Procedure 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. NOTE: This step is different from what you did in Part A.

3. Measure and record the diameter of the balloon in Column B.

4. Run FOUR MORE trials. Record the diameter of the balloon for each trial.

Procedure 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 centimetres in Column C.

3. Run FOUR MORE trials.

Procedure Part D: Conversion of Diameters to Volume

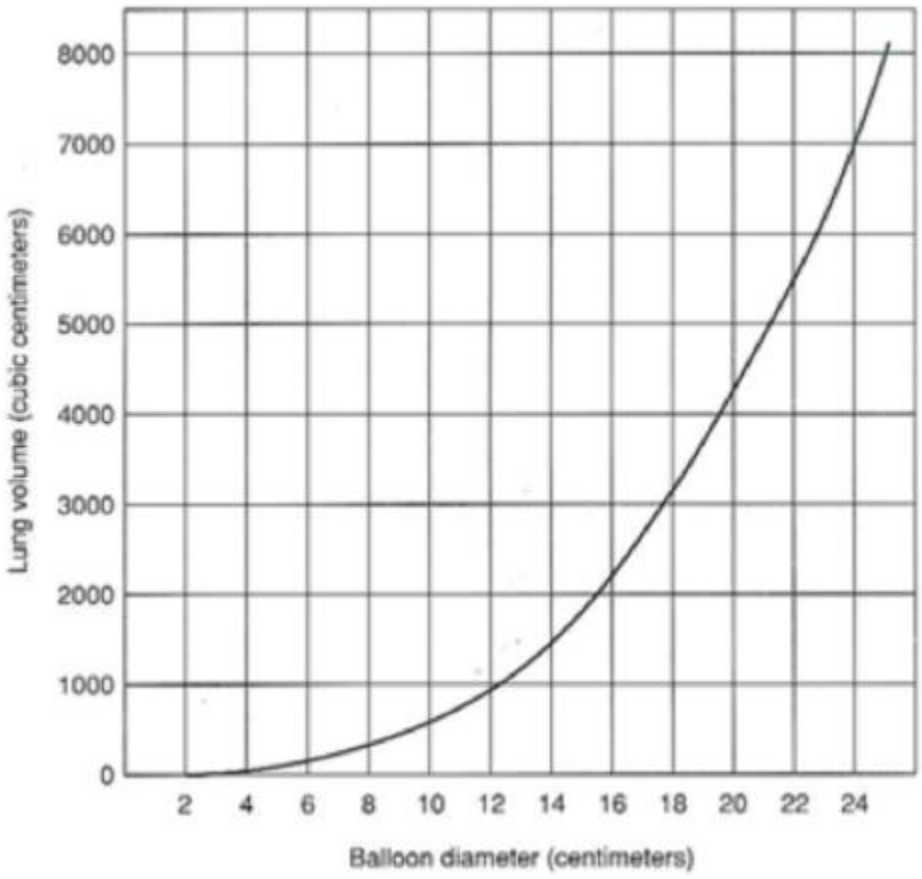
Lung volume is expressed in cubic centimetre units (cm3). (1000 cm3 is equal to a litre)

1. To convert from balloon diameter to volume, locate the balloon diameter on the horizontal axis of the graph on the next page. Follow this number up to the heavy line, then move across to locate the corresponding volume. For example, if your balloon diameter is 14.5 cm, then the corresponding lung volume is 1500 cm3. Use the dashed line on the graph as an example of how this procedure is done.

2. Convert each diameter for vital capacity, tidal volume, and expiratory reserve to volume.

3. Record the volumes in Column D, E and F in the table below.

4. Calculate and record for average lung volume for each of the 3 measurements.



ANALYSIS

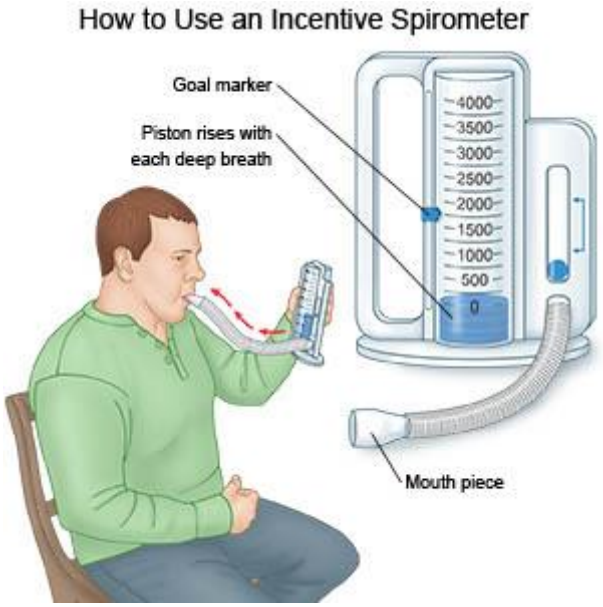
1. Define the following terms: [3 PTs]

a) vital capacity

b) expiratory reserve volume

c) tidal volume

2. The following values were obtained using a special machine called a SPIROMETER. Note that these are average values. **[3 PTs]**



	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

a) How does your average vital capacity compare to the value obtained by a spirometer?

b) Why might these numbers not agree?

c) How could you improve the accuracy of this experiment without using a spirometer?

3. A close relationship between height and vital capacity exists. Complete this chart using your height for

Column A and one of the following factors for Column B:

20 for females	22 for female athletes
25 for males	29 for male athletes

A YOUR HEIGHT IN CM	B FACTOR	C CALCULATED VITAL CAPACITY (A x B)

a) Are your calculated and experimental values the same? Explain. [2 Pts]

5. Put on a timer for one minute and calculate your normal breathing. To get a more accurate result, have a partner put on the timer and count. Your partner should place a hand on your back to feel your breathing.

a) What is your breathing rate for 1 minute? [1 Pt]

(Measure the number of times you breathe in or out in 1 minute)

b) How much air (in cm3) do you inhale in 1 minute? [2 Pts]

(HINT: Use your average tidal volume from your table)