

Lung Capacity Lab

NAME: _____

Human lung capacity – or how much air can fit in your lungs – can be measured in several ways. One way is by using a piece of laboratory equipment called a spirometer. 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.

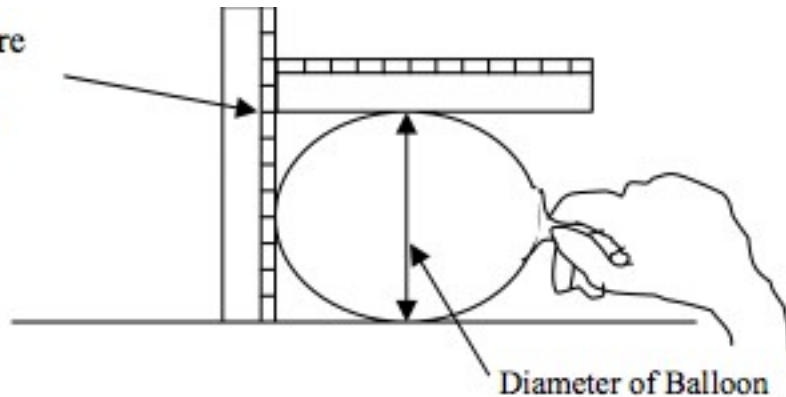
Several different lung volume measurements can be made:

1. **Vital capacity** is the largest possible amount of air that can be exhaled after drawing a deep breath
2. **Expiratory reserve** is the amount of air that remains in the lungs after exhaling normally (it is the extra air that can be breathed out)
3. **Tidal volume** is the amount of air taken in or expelled during normal breathing

Part A: Vital Capacity

1. Stretch the 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 your Data Table below. You will need a helper to hold the two metric rulers to measure it.

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 the balloon and do two more trials. Record the diameters of the balloon in your Data Table.
5. Using Graph A on the LAST PAGE of this worksheet, find the volume that goes with the diameter.

Trial Number	Diameter of Balloon in CENTIMETERS	Volume of Balloon (see graph)
1		
2		
3		
Average		

Part B: Expiratory Reserve

1. Inhale normally then exhale normally. **Then exhale the REST of the air still in your lungs into the balloon**
2. Measure and record the diameter of the balloon in centimeters in your Data Table below. You will need a helper to hold the two metric rulers to measure it.
3. Deflate the balloon and do two more trials. Record the diameters of the balloon in your Data Table.
4. Using Graph A on the LAST PAGE of this worksheet, find the volume that goes with the diameter.

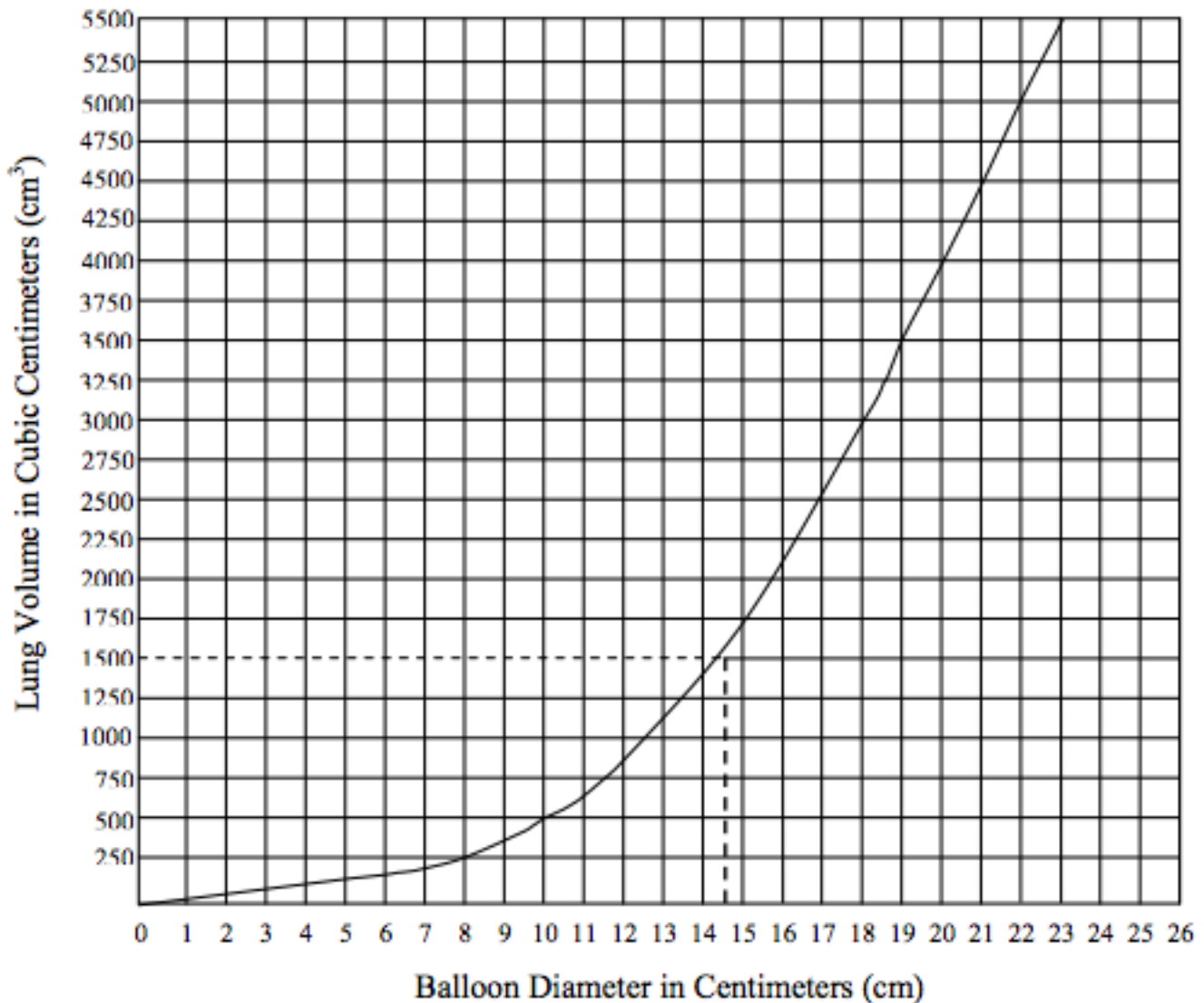
Trial Number	Diameter of Balloon in CENTIMETERS	Volume of Balloon (see graph)
1		
2		
3		
Average		

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. Measure and record the diameter of the balloon in centimeters in your Data Table below. You will need a helper to hold the two metric rulers to measure it.
3. Deflate the balloon and do two more trials. Record the diameters of the balloon in your Data Table.
4. Using Graph A on the LAST PAGE of this worksheet, find the volume that goes with the diameter.

Trial Number	Diameter of Balloon in CENTIMETERS	Volume of Balloon (see graph)
1		
2		
3		
Average		

Relationship Between Balloon Diameter (cm) and Lung Volume (cm³)



ANALYSIS QUESTIONS: Written on separate in complete sentences. Staple to this paper.

1. Compare the volumes of the balloons in part A, B and C. Which has the greatest volume: Vital capacity, expiratory volume, or tidal volume? Explain why.
2. Compare your results to someone else in the room. How are their results different compared to yours? Explain why.
3. Why do you think different people have different lung volumes? Name two variables.
4. What were some of the difficulties you had in doing this lab? What were your mistakes? (i.e. outside variables)
5. Predict the effect of smoking on lung capacity. Which type of lung capacity might it affect? Explain why you think this.