The Lung Lab

**\*Everyone will do this lab and record their own data. You can help each other measure the diameter of the balloon if needed.**

**Background:**

(read the procedure and identify the following terms)

1. Tidal volume:
2. Expiratory reserve:
3. Vital capacity:

**Question:** How much air can your lungs hold?

**Variables:** (read the procedure and then copy the variables into your notebook)

Independent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Dependent Variable: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Controlled Variables (3): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Hypothesis:** (Make a hypothesis using “If, then and because”)

**Data Table:** (make the following data tables in your notebook – there are 3 different tables!)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data Table 1: Tidal Volume** | | | | |
|  | **Trial 1** | **Trial 2** | **Trial 3** | **Average** |
| **Volume (liters)** |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data Table 2: Expiratory Reserve** | | | | |
|  | **Trial 1** | **Trial 2** | **Trial 3** | **Average** |
| **Volume (liters)** |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Data Table 3: Vital Capacity** | | | | |
|  | **Trial 1** | **Trial 2** | **Trial 3** | **Average** |
| **Volume (liters)** |  |  |  |  |

**Procedure:**

1. Stretch your balloon and ***blow it up a few times to stretch out the balloon.***
2. Take a **normal breath**, and exhale normally into the balloon. DO not try to get the balloon as large as possible (you’ll have a chance to do that later).
3. Hold the end of the filled balloon closed. Lay the balloon on the ruler or tape measure to measure it (see diagram below). You are measuring the DIAMETER of the balloon.
4. Look at the chart below. It tells you how the diameter of the balloon corresponds to the volume, or amount, of air in the balloon (if in-between numbers, round to the nearest whole number).
5. In Data Table 1, record the volume of air in the balloon in the Trial 1 column. The amount of air you breathe out after a normal breath is known as the tidal volume.
6. Release the air from the balloon and do two more trials. Measure the balloon and record your results in the table.
7. Rest for a few minutes after the trials. Now you will measure the amount of air still left in your lungs after a normal exhale. This is known as the expiratory reserve. Inhale **and exhale normally. Before you inhale again, try to blow up the balloon with the air that is still in your lungs**. Record the volume of air in the balloon in Data Table 2 below. Do two more trials.
8. Next you will measure vital capacity, or the amount of air you breathe out after taking a deep breath. **Take as deep a breath as you can, and exhale completely** into the balloon. Do three trials. Measure the balloon and record your results in Data Table 3.
9. Determine the average volume for each test.

**Conclusion:**

**(Answer the questions in your notebook)**

1. In which tests did you fill the balloon with the greatest volume of air? (Tidal volume, expiratory reserve or vital capacity)
2. Add together the average tidal volume and the average expiratory reserve and record. How does that volume compare with your average volume for vital capacity?
3. Compare your results to your hypothesis. Do the results support your hypothesis?
4. What possible experimental errors did you encounter during this experiment? How do you think they affected your results?
5. Is it necessary to always completely fill and empty your lungs with each inhalation and exhalation? Use your results to explain your answer.
6. Think about the various activities you do in your life. What types of activities require you to take deep breaths? Which activities do not require deep breaths? Why do your lungs take in different amounts of air at different times?
7. Do you think that some people’s lungs are able to take in more air than others? Which people might have a greater vital lung capacity than others? Think about what you have learned about lungs. Consider factors such as age and health.

\*\*Write an AHA Connection for this lab – be sure to discuss what you learned about the respiratory system. Make connections to our AHA questions!

**Conclusion:**

**(Answer the questions in your notebook)**

1. In which tests did you fill the balloon with the greatest volume of air? (Tidal volume, expiratory reserve or vital capacity)
2. Add together the average tidal volume and the average expiratory reserve and record. How does that volume compare with your average volume for vital capacity?
3. Compare your results to your hypothesis. Do the results support your hypothesis?
4. What possible experimental errors did you encounter during this experiment? How do you think they affected your results?
5. Is it necessary to always completely fill and empty your lungs with each inhalation and exhalation? Use your results to explain your answer.
6. Think about the various activities you do in your life. What types of activities require you to take deep breaths? Which activities do not require deep breaths? Why do your lungs take in different amounts of air at different times?
7. Do you think that some people’s lungs are able to take in more air than others? Which people might have a greater vital lung capacity than others? Think about what you have learned about lungs. Consider factors such as age and health.

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