



Breathing Lessons

Diagnosing lung disease

Name(s) _____ Date _____

Instructor/Class _____

Please answer the following questions.

1. As the patient exhales, in what order will the air pass through the organs listed below?

nasal cavity _____
 trachea _____
 alveoli _____
 bronchi _____
 bronchioles _____
 larynx _____
 pharynx _____

2. Why is it a good idea to analyze two slices?

- It's more accurate to make more than one measurement.
- When a healthy patient exhales, air is only expelled from the upper section of the lungs.
- It's possible to get different reading from different areas of the lungs, so more readings give a more realistic picture.

3. Compare image 4/9 to 5/9, which is the lower slice of Anne's lung. Choose the appropriate answer in the following sentence:

Anne's lungs appear _____ (*larger / smaller*) in the upper slice than in the lower.

4. What is the total lung area for Anne's upper slice?

Record the answer in the table on the next page of your Data Sheet.

5. What is the area of dead air in Anne's upper slice as indicated in the **Measure Results** box?

(Again, record your answer on the Data Sheet on the next page.)

Patient	Upper Lung Area (ULA)	Upper Dead Air (UDA)	Lower Lung Area (LLA)	Lower Dead Air (LDA)	Total Lung Area (TLA)	Total Dead Air (TDA)	% Dead Air Area
Anne							
Terry							
Norris							

6. Which statement describes Anne’s lung capacity the best?

- Anne’s total lung area (TLA) is approximately 9,500 pixels, and the total dead air area (TDA) is about 360 pixels.
- Anne’s total lung area (TLA) is approximately 27,000 pixels, and the total dead air area (TDA) is about 750 pixels.
- Anne’s total lung area (TLA) is approximately 27,000 pixels, and her total dead air area (TDA) is about 2,800 pixels.

7. To be diagnosed with emphysema, a person has to have more than 15 percent dead air in their lungs. According to your calculations, using the formula below, does Anne have emphysema?

$$\% \text{ Dead Air} = \frac{(\text{UDA} + \text{LDA})}{(\text{ULA} + \text{LLA})} \times 100$$

- Since the amount of percentage of dead air in Anne’s lungs is 10%, Anne can go home happy, knowing that she does not have emphysema.
- Anne now knows the reason behind her coughing and shortness of breath; since she’s unable to expel 16% of the air in her lungs, she is quite likely to have emphysema.

8. Does Terry have emphysema?

- No, because his total dead air area was only 2%.
- Yes, because his percentage of dead air was around 30%, and the cutoff is 15%.
- It’s hard to tell because his lungs show 16% dead air. That’s so close to the 15% cutoff that he should probably be re-tested.

9. Does Norris have emphysema?

- It's hard to tell because his lungs show 13% dead air. That's so close to the 15% cutoff that he should probably be re-tested.
- No, because he can exhale all but 3% of the air in his lungs.
- Yes, because his lungs show 21% dead air area.

10. Suppose these three patients have to run to catch the bus. Put the names below in order; the one with the healthiest lungs who is most likely to catch the bus should be at the top.

Anne _____

Terry _____

Norris _____