

CHAPTER 7	Investigation 7.A: Measuring Respiratory Volumes Answer Key	BLM 7.2.3A
ANSWER KEY		

Answers to Analysis Questions

1. The difference in the calculated vital capacity and the recorded vital capacity can be accounted for by experimental error. The experimental error is due to differences in breathing that occur when breathing into the spirometer. For instance, you may exhale more forcefully into the spirometer than you would in a normal exhalation.
2. The inspiratory reserve volume is larger than the expiratory reserve volume. This larger inspiratory reserve volume allows us to make take in more air when exercising or participating in a strenuous activity.

Answers to Conclusions Questions

3. No, the spirometer cannot be used to measure the total lung capacity because it cannot measure the residual volume that always remains in our lungs to prevent them from collapsing.
4. An athlete may use vital capacity to assess their training program. Measuring their vital capacity could indicate whether or not they are increasing their respiratory fitness through training. Generally, a larger respiratory volume indicates more surface area for gas exchange, resulting in improved athletic performance.

Answer to Extension Question

5. The respiratory volumes will differ based on student size, gender, physical fitness, smoking, and, in theory, the presence of any respiratory disorders such as asthma or bronchitis. To assess the effects of these factors on respiratory volumes, the class may take the respiratory volumes of various students, representing the variables above, and compare the differences. For instance, you may take two large males, a smoker and a non-smoker, and evaluate the effects of smoking on lung capacity.

Another test may compare the lung volumes of two females of the same size, one of whom is very athletic.

Answers to Application Questions

6. Some respiratory disorders that may be investigated are emphysema, in which alveoli collapse and lung volumes decrease; farmer's, or miner's, lung, which is caused by the build-up of dust and particles in the lung; or asthma, which results in a constricted respiratory tract.
7. A ventilator should not be adjusted to maximize the volume of air inhaled and exhaled because the individual does not require large amounts of oxygen. The individual is not engaging in any physical activity, so the body cells do not need large amounts of oxygen. Likewise, very little carbon dioxide is produced. To increase the ventilator setting would be a waste because the individual does not need to exchange this volume of air.