Pre-lab Quiz Results
You scored 100% by answering 5 out of 5 questions correctly.

1. A normal resting tidal volume is expected to be around
   You correctly answered: d. 500 ml.

2. Which respiratory process is impaired the most by emphysema?
   You correctly answered: c. expiration

3. During an asthma attack
   You correctly answered: b. inspiration and expiration are impaired.

4. During moderate aerobic exercise, which respiratory variable increases the most?
   You correctly answered: a. tidal volume

5. Inhaler medications for an asthma patient are designed to
   You correctly answered: b. dilate the patient's bronchioles.
Experiment Results

Predict Question:
Predict Question 1: With emphysema, there is a significant loss of elastic recoil in the lung tissue and a noticeable, exhausting muscular effort is required for each expiration. Inspiration actually becomes easier because the lung is now overly compliant.

What lung values will change (from those of the normal patient) in the spirogram when the patient with emphysema is selected (select all that apply)?
Your answer: b. ERV  c. IRV  d. RV  e. FVC  f. TLC  g. FEV1  h. FEV1 (%)

Predict Question 2: During an acute asthma attack, airway resistance is significantly increased by (1) increased thick mucous secretions and (2) airway smooth muscle spasms.

What lung values will change (from those of the normal patient) in the spirogram when the patient suffering an acute asthma attack is selected (select all that apply)?
Your answer: b. ERV  c. IRV  d. RV  f. TLC  h. FEV1 (%)

Predict Question 3: When an acute asthma attack occurs, many people seek relief from the increased airway resistance by using an inhaler. This device atomizes the medication and induces bronchiole dilation (though it can also contain an anti-inflammatory agent).

What lung values will change back to those of the normal patient in the spirogram after the asthma patient uses an inhaler (select all that apply)?
Your answer: a. TV  b. ERV  c. IRV  d. RV  e. FVC  f. TLC  g. FEV1  h. FEV1 (%)

Predict Question 4: During moderate aerobic exercise, the human body will change its respiratory cycle in order to meet increased metabolic demands. During heavy exercise, further changes in respiration are required to meet the extreme metabolic demands of the body.

Which lung value will change more during moderate exercise, the ERV or the IRV?
Your answer: a. IRV

Stop & Think Questions:
When obstructive lung disease develops, what happens to the FEV1 (%)?
You correctly answered: b. It decreases.

Compared with the normal patient, what happened to the FVC in this patient?
You correctly answered: b. It decreased.

Compared with the normal patient, what happened to the FEV1 in this patient?
You correctly answered: b. It decreased.

Compared with the normal patient, what happened to the FVC in this patient?
You correctly answered: b. It decreased.

Compared with the normal patient, what happened to the FEV1 in this patient?
You correctly answered: b. It decreased.
Which values in this spirogram have not returned to those of the normal patient (select all that apply)?
You correctly answered: c. IRV  d. RV  e. FVC  g. FEV1

For both types of exercise, the tidal volumes and breathing rates were increased. Compared with normal values, did tidal volume or breathing rate increase more during moderate exercise? (Determine the percentage by which each value changed.)
You correctly answered: b. tidal volume

Experiment Data:

<table>
<thead>
<tr>
<th>Patient Type</th>
<th>TV</th>
<th>ERV</th>
<th>IRV</th>
<th>RV</th>
<th>FVC</th>
<th>TLC</th>
<th>FEV1</th>
<th>FEV1 (%)</th>
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<tbody>
<tr>
<td>Heavy Exercise</td>
<td>3650</td>
<td>750</td>
<td>600</td>
<td>1000</td>
<td>ND</td>
<td>6000</td>
<td>ND</td>
<td>ND</td>
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<tr>
<td>Moderate Exercise</td>
<td>1875</td>
<td>1125</td>
<td>2000</td>
<td>1000</td>
<td>ND</td>
<td>6000</td>
<td>ND</td>
<td>ND</td>
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<tr>
<td>Plus Inhaler</td>
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<td>1500</td>
<td>2800</td>
<td>1200</td>
<td>4800</td>
<td>6000</td>
<td>3840</td>
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<tr>
<td>Acute Asthma Attack</td>
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<td>750</td>
<td>2700</td>
<td>2250</td>
<td>3750</td>
<td>6000</td>
<td>1500</td>
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<tr>
<td>Emphysema</td>
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<td>750</td>
<td>2000</td>
<td>2750</td>
<td>3250</td>
<td>6000</td>
<td>1625</td>
<td>50%</td>
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<td>1500</td>
<td>2000</td>
<td>1000</td>
<td>5000</td>
<td>6000</td>
<td>4000</td>
<td>80%</td>
</tr>
</tbody>
</table>
Post-lab Quiz Results
You scored 100% by answering 5 out of 5 questions correctly.

1. Which of the following respiratory values represents a decreased flow rate during the obstructive lung disease(s)?
   You correctly answered: c. FEV1

2. Calculate the ERV of an individual with the following respiratory volumes: TLC = 6000 ml, FVC = 4800 ml, RV = 1200 ml, IRV = 2900 ml, TV = 500 ml.
   You correctly answered: d. 1400 ml

3. Calculate the FVC of an individual with the following respiratory volumes: RV = 1000 ml, IRV = 3000 ml, TV = 500 ml, ERV = 1500 ml.
   You correctly answered: b. 5000 ml

4. What is the largest volume for the normal patient?
   You correctly answered: a. IRV

5. What happened to the RV for the emphysema patient and the asthmatic patient?
   You correctly answered: d. It increased for both patients.
Review Sheet Results

1. What lung values changed (from those of the normal patient) in the spirogram when the patient with emphysema was selected? Why did these values change as they did? How well did the results compare with your prediction?
   Your answer:
   the results and my predictions compared well.
   The increase of mucous secretion made an airway resistance.

2. Which of these two parameters changed more for the patient with emphysema, the FVC or the FEV1?
   Your answer:
   It was the FEV1 that changed the most. From about 4000 to 1625

3. What lung values changed (from those of the normal patient) in the spirogram when the patient experiencing an acute asthma attack was selected? Why did these values change as they did? How well did the results compare with your prediction?
   Your answer:
   I had most values except the TV.
   There was mucous changes that was responsible for value changes.

4. How is having an acute asthma attack similar to having emphysema? How is it different?
   Your answer:
   They both cause a constriction and close before expiration is completed.
   But in an acute asthma attack, there is no diminishing of elastic recoil in lungs.

5. Describe the effect that the inhaler medication had on the asthmatic patient. Did all spirogram values return to “normal”? Why do you think some values did not return all the way to normal? How well did the results compare with your prediction?
   Your answer:
   I did not predict correctly and chose to many values to be better. It was only TV, ERV, TLC and FEV-1% that will return.
   The medicine causes the lungs to relax (smooth muscle) and therefore increase the diameter of airways.
   Even though medication helps the patient, he is still asthmatic and the values can go back to normal in every case.

6. How much of an increase in FEV1 do you think is required for it to be considered significantly improved by the medication?
   Your answer:
   There should be at least more than 40% increase to say its improved by medication.

7. With moderate aerobic exercise, which changed more from normal breathing, the ERV or the IRV? How well did the results compare with your prediction?
   Your answer:
   EVC changed more than IRV. EVC decreased from 1125 to 1500, but IRV stayed the same.

8. Compare the breathing rates during normal breathing, moderate exercise, and heavy exercise.
   Your answer:
   Normal breathing: 15 breaths per minute
   Moderate exercise: increase in breathing rate, but tidal volume increases more
Heavy exercise: both increases to maximum tolerable levels.