# Breathing is Essential to Life

**Grades (9-12)**

## Objectives

After conducting the experiments in the lab, the students will be able to:

- Recognize that breathing is a necessary and automatic life process.
- Observe and record data on respiration rate.
- Demonstrate how air enters and leaves the lungs.
- Use counting as a means of measurement.

## Materials

<table>
<thead>
<tr>
<th>Paper towel</th>
<th>Hand mirror</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clock with seconds</td>
<td>Balloons</td>
</tr>
<tr>
<td>Cloth tape measure</td>
<td>Paper and pencil</td>
</tr>
<tr>
<td>Large bucket 5 gallon</td>
<td>1 empty half gallon bucket</td>
</tr>
<tr>
<td>Plastic tubing</td>
<td>Antiseptic wipes</td>
</tr>
<tr>
<td>Mulaboration access</td>
<td>Computers</td>
</tr>
<tr>
<td>Windows Media</td>
<td></td>
</tr>
</tbody>
</table>

## Procedures

1. Have the students compete the first experiment on their own.
   - Tell the students to exhale a couple of times on the glass to observe the gases that are in their lungs.
2. Walk the students through the process of experiment two.
   - Show the students how to take audio of their respiration on the computers using Windows Media.
   - Assign the students to pick a partner and create a community with them on Mulaboration and upload their videos.
   - Instruct the students to comment on their partner’s video about the measurements of the videos respiration.
3. In the final experiment, have the students gather around the teacher’s lab table.
   - Do not allow students with asthma to do this experiment.
   - Have students blow up a balloon as much as they can with one breath.
   - Measure each student’s balloon with the cloth tape measure.
   - Record the measurements on a class roster.
   - Let air out of the balloons and repeat three more times, then find the average.
   - The person in the class with the largest average has the biggest lung capacity.

## Standard

8.2 Scientific Thinking – Students use computers to organize and compare information. The evidence will be used for an argument.

http://mypages.iit.edu/~smile/bi9708.html