

Out Of Breath

The total air volume in your lungs is about 6 liters. With every breath only part of the air is exchanged. At rest only about half a liter is exchanged. What happens when you exercise?

Strategy

What You Will Investigate

The effect of exercise on your breathing

Goals


- To measure the exchanged air volume while you breathe
- To measure your breathing rate

Materials

- MultiLogPRO
- Breathing sensor (also called spirometer)

Procedure

Setup MultiLogPRO

1. Turn on MultiLogPRO
2. Connect the temperature sensor to input 1 (I/O-1) of MultiLogPRO
3. Connect MultiLogPRO to the computer
4. Run MultiLab
5. Click **Setup wizard**  on the upper toolbar and set MultiLogPRO up according to the specifications below:

Sensors

Input 1: Spirometer

Sensor properties:

Uncheck L/min and check L/sec


Rate:

25 samples per second

Recording time:

03:20 MM:SS (5000 samples)

Experimental procedure


1. Exercise inhaling through your nose and exhaling through your mouse
2. Click **Run**  on the upper toolbar to begin recording data




- Inhale through your nose and exhale through your mouse right into the white plastic tube of the breathing sensor (see Figure 1)




Figure 1

- After 1 minute click **Stop** 
- Save your data by clicking **Save**  on the upper toolbar
- Jog** in place for 3 minutes
- Immediately after jogging repeat steps 2 to 5

Data and observations

To read values on the graph, click **Toggle first cursor**  on the lower toolbar and move the cursor to the desired point either by dragging it with the mouse or by using the right and left arrow keys on the keyboard. The point values will be displayed on the information bar below the graph

To read the difference between the two data point values position one cursor on the first point and a second cursor  on the second point

- Calculate the air volume that you exhaled in one breath at rest:
Select one period of exhaling with two cursors, click **Analysis** on the menu bar and then click **Statistics**. The air volume will appear next to Area. Record this value in your data table below

2. Repeat step 1 to calculate the air volume after jogging
3. Calculate your breathing rate at rest: count the number of peaks in the graph over one minute or count the number of peaks in the graph over a 10 second period and multiply by 6. Record this value in your data table below
4. Repeat step 3 to calculate your breathing rate after jogging

Data table

	Air volume (L)	Breathing rate (Number per minute)
At rest		
After jogging		

Questions and Conclusions

1. How did jogging affect the volume of air you exhaled?

2. How did jogging affect your breathing rate?

Strategy check

- _____ Can you measure the volume of air that you exhale?
- _____ Can you measure your breathing rate?

Communicating Your Data

Compare your results with the results of other students in your classroom. Explain any differences in your data or conclusions