PULMONARY FUNCTION II

- **Pulmonary Flow Rates**
- **Forced Expiratory Volume (FEV)**
- **Maximal Voluntary Ventilation (MVV)**

DATA REPORT

Student’s Name: ____________________________
Lab Section: ______________________________
Date: ____________________________

Subject Profile

Name: ____________________________
Height: __________________
Age: ____________
Gender: Male / Female
Weight: ________________

I. Data and Calculations

A. **Vital Capacity (VC)**

   \[
   \text{Vital Capacity (VC)} = \text{P-P} \times 2
   \]

B. **Forced Expiratory Volumes: FEV\(_{1.0}\), FEV\(_{2.0}\), FEV\(_{3.0}\)**

<table>
<thead>
<tr>
<th>Time Interval (sec)</th>
<th>Forced Expiratory Volume</th>
<th>Vital Capacity (VC) from A</th>
<th>FEV/VC calculate</th>
<th>(FEV/VC) (\times 100 = %) calculate</th>
<th>(\text{FEV}_x)</th>
<th>Normal Adult Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1</td>
<td>P-P</td>
<td></td>
<td>%</td>
<td>(\text{FEV}_{1.0}) 66% - 83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-2</td>
<td></td>
<td>%</td>
<td>(\text{FEV}_{2.0}) 75% - 94%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-3</td>
<td></td>
<td>%</td>
<td>(\text{FEV}_{3.0}) 78% - 97%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. **MVV Measurements** (Note, all volume measurements are in liters)

1) Number of cycles in 12-second interval: ______
2) Calculate the number of respiratory cycles per minute (RR):

   \[
   \text{RR} = \text{Cycles/min} = \text{Number of cycles in 12-second interval} \times 5
   \]

   Number of cycles in 12-second interval (from above): ______ \(\times 5 = ______\) cycles/min
3) Measure each cycle

   Complete Table 13.3 with a measurement for each individual cycle. If Subject had only 5 complete cycles/12-see period, then only fill in the volumes for 5 cycles. If there is an incomplete cycle, do not record it. (The Table may have more cycles than you need.)

<table>
<thead>
<tr>
<th>Cycle Number</th>
<th>Volume Measurement</th>
<th>Cycle Number</th>
<th>Volume Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>P-P</td>
<td>2</td>
<td>P-P</td>
</tr>
<tr>
<td>Cycle 1</td>
<td></td>
<td>Cycle 9</td>
<td></td>
</tr>
<tr>
<td>Cycle 2</td>
<td></td>
<td>Cycle 10</td>
<td></td>
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<tr>
<td>Cycle 3</td>
<td></td>
<td>Cycle 11</td>
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<tr>
<td>Cycle 4</td>
<td></td>
<td>Cycle 12</td>
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<tr>
<td>Cycle 5</td>
<td></td>
<td>Cycle 13</td>
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</tr>
<tr>
<td>Cycle 6</td>
<td></td>
<td>Cycle 14</td>
<td></td>
</tr>
<tr>
<td>Cycle 7</td>
<td></td>
<td>Cycle 15</td>
<td></td>
</tr>
<tr>
<td>Cycle 8</td>
<td></td>
<td>Cycle 16</td>
<td></td>
</tr>
</tbody>
</table>

4) Calculate the average volume per cycle (AVPC):
Add the volumes of all counted cycles from Table 13.3.

\[ \text{Sum} = \underline{\text{______________}} \text{ liters} \]

Divide the above sum by the number of counted cycles. The answer is the average volume per cycle (AVPC)

\[ \frac{\text{AVPC}}{\text{Sum}} = \frac{\underline{\text{______________}}}{\underline{\text{______________}}} = \underline{\text{______________}} \text{ liters} \]

5) Calculate the MVV\text{est}

Multiply the AVPC by the number of respiratory cycles per minute (RR) as calculated earlier.

\[ \text{MVV} = \frac{\text{AVPC} \times RR}{\underline{\text{______________}}} = \underline{\text{______________}} \text{ liters/min} \]

II. Questions

D. Define **Forced Expiratory Volume** (FEV).

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E. How do Subject’s FEV values compare to the average per Table 13.2?

- FEV\textsubscript{1.0}  
  - less than  
  - same as  
  - greater than  

- FEV\textsubscript{2.0}  
  - less than  
  - same as  
  - greater than  

- FEV\textsubscript{3.0}  
  - less than  
  - same as  
  - greater than  

F. Is it possible for a Subject to have a vital capacity (single stage) within normal range but a value for FEV\textsubscript{1.0} below normal range? Explain your answer.

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G. Define **Maximal Voluntary Ventilation** (MVV.).

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H. How does Subject’s MVV compare to others in the class?  
   - less than  
   - same as  
   - greater than  

I. Maximal voluntary ventilation decreases with age. Why?
J. Asthmatics tend to have smaller airways narrowed by smooth muscle constriction, thickening of the walls, and mucous secretion. How would this affect vital capacity, FEV\textsubscript{1.0}, and MVV?

K. Bronchodilator drugs open up airways and clear mucous. How would this affect the FEV and MVV measurements?

L. Would a smaller person tend to have less or more vital capacity than a larger person? Less More

M. How would an asthmatic person’s measurement of FEV\textsubscript{1.0} and MVV compare to an athlete?

   Explain your answer.