RESPIRATION PRACTICALS
BELL – TYPE SPIROMETRY

OBJECTIVES:

To be able to:-
a) use a spirometer and-determine lung volumes and capacities
b) define and provide normal values for the various lung volumes and capacities and
c) recognize the physiological and some pathological factors that modify lung volumes and capacities

APPARATUS:

A variety of spirometers are currently available. A diagram of one of them is presented in the figure.

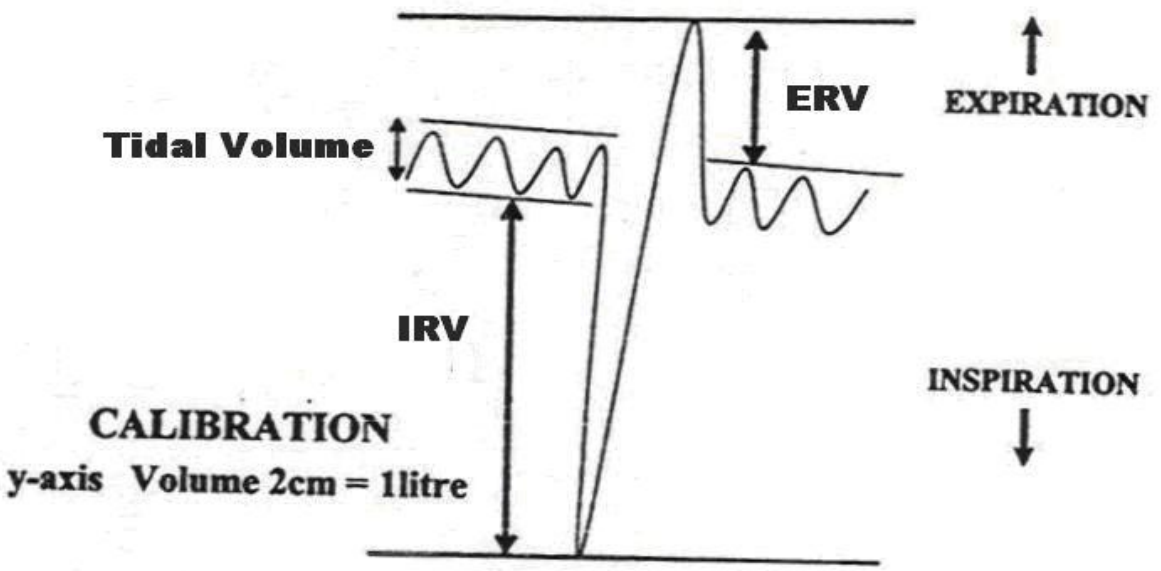
METHOD:

Insert a sterilized mouthpiece in such a way that the edges of it are between the subject's lips and gums.

1. Close the nose with the nose clip. Ask the subject to take normal breaths through the mouthpiece for a short time, then take a deep forceful inspiration to fill the lungs completely, then breath normally for a short time.
2. Ask the subject to expire quickly, forcibly and as completely as possible, and then ask the subject to breath normally for a short time.
3. Ask the subject to take a deep forceful inspiration and immediately to expire quickly, forcibly and as completely as possible, then ask the subject to breath normally for a short time.

The spirogram is recorded on a moving drum.

RESULTS:



QUESTIONS AND PROBLEMS:

1. Define the following terms and calculate their values from the data collected:-
   a) Tidal volume

   b) Inspiratory Reserve Volume

   c) Expiratory Reserve Volume

d) Vital Capacity

e) Inspiratory Capacity

2. A number of physiological factors influence lung volumes and capacities. What are they and how do they exert their effects?

3. Lung volumes and capacities are altered in a variety of pathological conditions. Name a few of them and explain how these changes are produced.

4. What is the physiological significance of the Residual Volume and the Functional Residual Capacity?

5. Functional Residual Capacity cannot be directly measured by spirometry. If residual volume is given, calculate the functional residual capacity.

RESPIRATION PRACTICALS
DYNAMIC SPIROMETRY
BY SCHILLER AT-2 PLUS

OBJECTIVE:

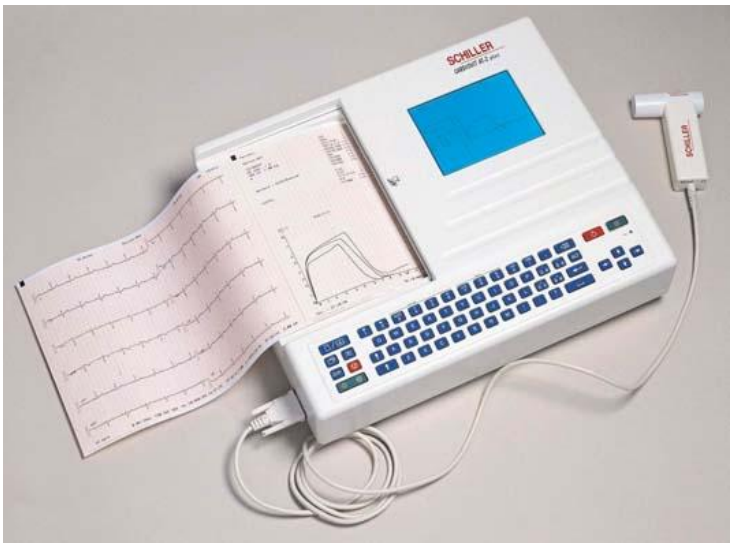
To test pulmonary functions e.g. Forced Vital Capacity (F.V.C.) measurements including FEV_1 and Flow Volume Curve.

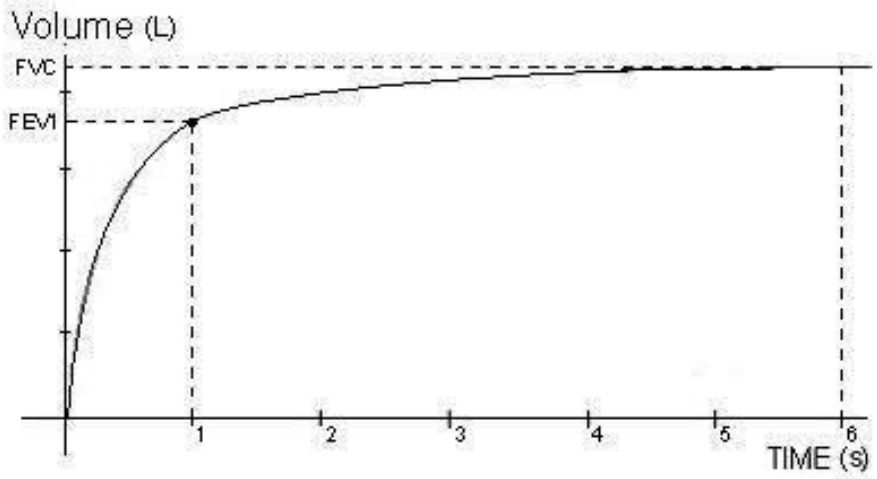
METHOD:

a- Insert a new disposable mouthpiece into the flow sensor (SP-250)
b- Hold the sensor in upright position.
c- Insert the mouthpiece in the oral cavity (mouth) and close the lips around the mouthpiece. Put the nose clip.
d- In the standing position breathe normally through mouthpiece 3 times, then inhale maximally and then exhale maximally as quickly as possible.

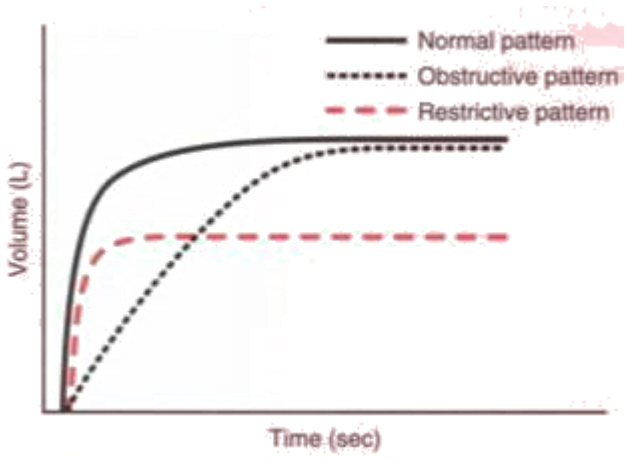
RESULTS:

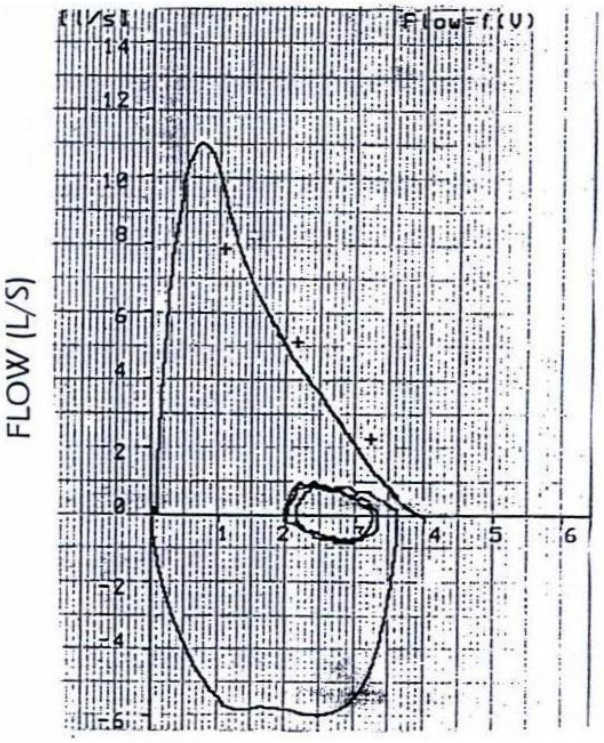
You will get the print out for the graph and values of FEV_1 and flow volume curve. Analyze these graphs yourself and compare your result with the data obtained by print out results from the AT-2 plus.





FEV_1 Curve





Flow – Volume Loop

QUESTIONS AND PROBLEMS

1. From the FEV_1 curve produced, calculate:-
   a) the forced vital capacity (FVC) i.e. the volume of air expired with a forceful effort after a maximum inspiration

   b) The forced expiratory volume in the first second (FEV1)

   c) FEV1 % = FEV1 x 100 / FVC

2. The FEV1 % is a good index of airway resistance while expiring.
   a) What values would be expected for a normal person?

   b) How long does it take for healthy subjects to expire their vital capacities?

   c) Briefly explain what happens to FEVl and FEV1 % measurements in patients with obstructive and restrictive lung diseases.

1. From the flow volume loop recorded, calculate:-

a) The vital capacity (VC)

b) The peak expiratory flow rate (PEFR)

c) The peak inspiratory flow rate (PIFR)

d) The MEF50 (maximum expiratory flow at 50% vital capacity)

e) The MIF50 (maximum inspiratory flow at 50% vital capacity)

2. Briefly describe the important characteristics of the flow-volume curve recorded with a normal healthy person.

3. Why is the force-independent part of the expiratory loop curvilinear in obstructive lung disease?

4. What is the clinical significance of MEF50 measurements?