

Draw a lung pressure volume loop including tidal volume, and submaximal efforts. Discuss dynamic airways compression works. What happens with COPD and restrictive lung disease. What equipment is used to measure gas flow. The main area of weakness was a lack of understanding of how pressure and flow change in the lungs during quiet and forced expiration. Also most candidates did not appreciate the importance of alveolar (lung) elastic recoil pressure in determining the pressure gradient for gas flow during quiet and forced expiration and how this depends on lung volume.

What is the definition of flow?

Flow is the quantity of fluid or gas passing a point per unit time

“Please write the Hagen-Poiseuille equation”

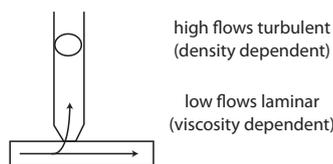
$$\text{Flow} = \frac{\Delta P \pi r^4}{8 \eta l}$$

η = viscosity
 l = length
 P = pressure
 r = radius

“Please describe how a rotameter works”

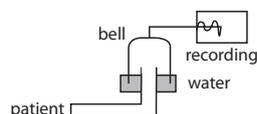
Rotameter

is a fixed pressure variable orifice flowmeter
 calibration is required, is gas specific
 measured from the centre of the bobbin
 inaccuracies due to static electricity and sticking



“What is a wet spirometer and how does it work?”

actually measures gas volumes (but because flow = volume/time)



“Can you name other methods to measure gas flow?”

Pneumotachograph

is a constant resistance, variable pressure flowmeter
 across a screen gauze gas flows and there is a pressure drop which is recorded by transducer
 flow = pressure change/resistance, and since resistance is constant, flow is derived

Wright’s respirometer

has a weathervane like mechanism
 is unidirectional
 is only accurate to around 5-10% and varies with flow
 can stick with water condensation

“Please draw and describe a flow volume loop for healthy adult male”

