Respiratory Equations 3

1) B

The equation for calculating the mean airway pressure in VCV is: 0.5 X (PIP - PEEP) X (Ti / T tot)

PIP: Peak inspiratory pressure, PEEP: positive end expiratory pressure, Ti: inspiratory time, Ttot: total respiratory cycle

2) B

The equation for calculating the mean airway pressure in PCV is: Ti / Ttotal X (DP + PEEP)

3) B

The ventilator does not measure the tidal volume directly, however it integrates it from the flow signal as: Peak inspiratory flow – end inspiratory flow / Inspiratory time. Similarly expiratory tidal volume is peak expiratory flow – end expiratory flow / expiratory time

4) C

The equation for inspiratory flow in PCV is: $\Delta P/Raw) e^{t/\tau}$

DP is the pressure applied to the airway above PEEP, t is the elapsed time after initiation of the inspiratory phase, and e is the base of the natural logarithm.

Simplified equation is Driving Pressure / Resistance

5) A
6) D

In the example above, the time constant τ (Compliance X Resistance) of the respiratory system is 0.5 seconds. Time constant is the time for the flow decay to 37 %. It usually takes 3-4 time constants to reach almost zero flow.
Increasing the inspiratory time from 0.75 seconds to 1 second would increase the tidal volume without increasing theinspiratory pressure. Increasing the I time beyound 1.5-2 seconds would not affect the tidal volume

7) B

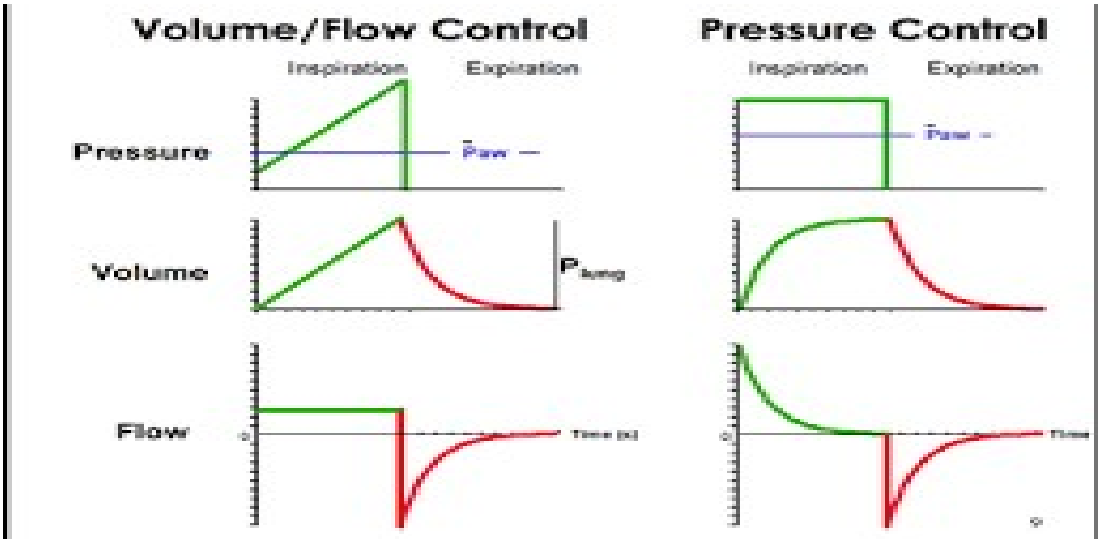
As tidal volume = Flow / I Time, the I time = tidal volume / Flow
300 ml / 30 L/min (500 ml/sec)
300 / 500 = 0.66 seconds

8) B

As in question 4, Increasing the resistance will result in decreasing the inspiratory flow

9) B

Per the equations listed above, and figure below. The mean airay pressure is higher in PCV compared to VCV with same PIP, Tidal volume, Inspiratory time



10) A

The equation of Resistance (cmH20/L/s) is the difference between PIP and Plateau pressure (using the inspiratory hold maneuver) divided by the inspiratory flow