RSP 1050: Module B Practice Problems

1. A patient weighs 80 kg. Calculate the patient's normal tidal volume (V_t).

$$80kg \times 5\frac{mL}{kg} = 400mL \quad 80kg \times 8\frac{mL}{kg} = 640mL$$

2. A patient weighs 250 lb. Calculate the patient's normal tidal volume (V_t).

$$250lb \times \frac{1kg}{2.2lb} = 113.6 \quad 113.6kg \times 5\frac{mL}{kg} = 568mL \quad 113.6kg \times 8\frac{mL}{kg} = 909mL$$

NOTE: BE CAREFUL AND SUSPICOUS OF PROBLEMS THAT JUST LIST BODY WEIGHTS. REMEMBER NORMAL TIDAL VOLUMES ARE CALCUALTED ON IDEAL BODY WEIGHT, NOT ACTUAL.

3. Given a tidal volume of 400 mL and a respiratory rate of 20/minute, calculate the minute volume ($\dot{V}_E$).

$$\dot{V}_E = V_t \times f = 400\,{mL}/{breath} \times 20\,{breaths}/{\text{min}} = 8{,}000\,{mL}/{\text{min}} = 8.0\,{L}/{\text{min}}$$

4. Given a tidal volume of 700 mL and a respiratory rate of 18/minute, calculate the minute volume ($\dot{V}_E$).

$$\dot{V}_E = V_t \times f = 700\,{mL}/{breath} \times 18\,{breaths}/{\text{min}} = 12{,}600\,{mL}/{\text{min}} = 12.6\,{L}/{\text{min}}$$

5. Given a tidal volume of 600 mL and a minute volume ($\dot{V}_E$) of 8 L/min, calculate the respiratory rate (f).

$$f = \frac{\dot{V}_E}{V_t} = \frac{8\,{L}/{\text{min}}}{600\,\frac{mL}{breath}} = \frac{8\,{L}/{\text{min}}}{0.6\,{L}/{breath}} = 13\,{breaths}/{\text{min}}$$

6. Given a tidal volume of 450 mL and a minute volume ($\dot{V}_E$) of 6.6 L/min, calculate the respiratory rate (f).

$$f = \frac{\dot{V}_E}{V_t} = \frac{6.6\,{L}/{\text{min}}}{450\,\frac{mL}{breath}} = \frac{6.6\,{L}/{\text{min}}}{0.45\,{L}/{breath}} = 15\,{breaths}/{\text{min}}$$

7. Given a respiratory rate of 20/minute and a minute volume ($\dot{V}_E$) of 6.8 L/min, calculate the tidal volume (V_t).

$$V_t = \frac{\dot{V}_E}{f} = \frac{6.8\,{L}/{\text{min}}}{20\,\frac{breaths}{\text{min}}} = 0.34\,{mL}/{breath}$$

8. Given a respiratory rate of 18/minute and a minute volume ($\dot{V}_E$) of 8.8 L/min, calculate the tidal volume (V_t).

$$V_t = \frac{\dot{V}_E}{f} = \frac{8.8\,{L}/{\text{min}}}{18\,\frac{breaths}{\text{min}}} = 0.489\,{L}/{breath}$$

9. Given a tidal volume (V_t) of 500 mL and a deadspace volume (V_d) of 150 mL, calculate the alveolar volume (V_A).

$$V_t = V_d + V_A \quad V_A = V_t - V_d = 500mL - 150mL = 350mL$$

10. Given a tidal volume (V_t) of 600 mL and a deadspace volume (V_d) of 200 mL, calculate the alveolar volume (V_A).

$$V_A = V_t - V_d = 600mL - 200mL = 400mL$$

11. Given a tidal volume (V_t) of 450 mL, a deadspace volume (V_d) of 150 mL, and a respiratory rate (f) of 12/minute, calculate the alveolar minute volume ($\dot{V}_A$).

$$\dot{V}_A = (V_t - V_d) \times f = (450mL - 150mL) \times 12 = 300mL \times 12 = 3{,}600\, {}^{mL}\!/_{\min} = 3.6\, {}^{L}\!/_{\min}$$

12. Given a tidal volume (V_t) of 800 mL, a deadspace volume (V_d) of 200 mL, and a respiratory rate (f) of 20/minute, calculate the alveolar minute volume ($\dot{V}_A$).

$$\dot{V}_A = (V_t - V_d) \times f = (800mL - 200mL) \times 20 = 600mL \times 20 = 12{,}000\, {}^{mL}\!/_{\min} = 12\, {}^{L}\!/_{\min}$$