Q: A DKA pt is about to be intubated. He is breathing at 30 breaths per minute as part of his respiratory compensation for his ACIDOSIS. As you prepare him for intubation, you know that you need to set the respiratory rate on the ventilator to a high level to allow him to continue to do his "respiratory compensation." He is 80 kg, ideal body weight. Show the math as to how you would estimate what the RR should be set at.

Ans:

- normally, we need to have minute ventilation of 60 mL/kg/min to maintain EUCAPNIA (pCO_2=40)
- since we WANT TO keep pt's pCO_2 at 20 to prevent his pCO_2 from rising too much in the face of acidosis, we will need to move 120 mL/kg/min.
- However, once we intubate him, We will need to ACCOUNT for Dead Space VENTILATION from the EXTRA VENTILATOR TUBING.
  ∴ we will need to move 240 mL/kg/min!
- So... in one minute,
  80 kg pt needs: $\frac{240\ mL}{kg} \times 80\ kg = \boxed{19,200\ mL}$

If TV is set at $\frac{8\ mL}{kg}$: then $\left(\frac{8\ mL}{kg} \times 80\ kg\right) = \boxed{\frac{640\ mL}{BREATH}}$

So... in one minute:
I need to move 19,200 mL of air;
if each breath is 640 mL,
then I need to breathe 30 times
to move 19,200 mL.

i.e. $\frac{19{,}200\ \text{mL/min}}{640\ \text{mL/breath}} \Rightarrow 30\ \frac{\text{breaths.}}{\text{min.}}$