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- For the variables P, V and T the relationships are:
  - $PV = \text{constant}$  (Boyle's law),  $V/T = \text{constant}$  (Charles's law),  $P/T = \text{constant}$  (John's law)
  - You don't need to memorize which law is which
  - These three laws merge to become the combined gas law:  $PV/T = \text{constant}$
  - Make sure T is ALWAYS in Kelvins only and P, V may be any units (but SAME throughout problem)
- Combined gas law is useful when something changes (P, V or T), so:

$$P_1V_1/T_1 = P_2V_2/T_2$$

- Ideal gas law:  $PV = nRT$ 
  - An "equation of state" – nothing changes; also, moles are part of problem
  - Use ONLY proper units for each: P (atm), V (liters), n (moles), T (Kelvins)
  - $R = 0.0821 \text{ L-atm/mol-K}$  (you must memorize the number, not the units)
  - Easy way to remember: 0.08 is legal limit and 21 is