Simple Approach to Acid Base

Things you need:
1) ABG
2) Renal (Na⁺, Cl⁻, HCO₃⁻)

1) pH – (normal 7.38-7.42) – acidemic or alkalemic?
2) Anion Gap [Na⁺ - (Cl⁻ + HCO₃⁻)] - (normal 12-16)
   if >16 then **Anion Gap Metabolic Acidosis** (AGMA)
3) CO₂ – (normal about 40)
   if <40 consider **Respiratory Alkalosis**
   if >40 consider **Respiratory Acidosis**
4) HCO₃⁻ (normal 18-24)
   if <18 consider **Metabolic Acidosis**
   if >24 consider **Metabolic Alkalosis**

Special situations:
If patient has AGMA then evaluate delta-delta (gap-gap, corrected HCO₃⁻)
Corrected HCO₃⁻ = AG - 12 + HCO₃⁻
If Corrected HCO₃⁻ > 30 consider **Metabolic Alkalosis**

What to do:
1) AGMA – go through MUDPILES differential diagnosis
   labs: serum ketones, ASA, lactic acid, osmoles
   osm gap – measure osm - calculated osm (Na⁺ x 2 + BUN/2.8 + Glucose/18)
   if osm gap > 20 then consider toxins (ethanol, ethylene glycol, methanol)
2) NAGMA – HARD UP mnemonic for differential
   a. Hyperal
   b. Acetazolamide
   c. RTA
   d. diarrhea
   e. ureteral diversion
   f. pancreatic fistula
   labs: urine Na⁺, K⁺, Cl⁻, pH, serum K⁺
   urinary anion gap – U₁Na⁺ + U₁K⁺ - U₁Cl⁻
   Negative gap = GI loss of HCO₃⁻
   Positive anion gap = altered distal urinary acidification
   Urine pH <5.5, high plasma K⁺ = type 4 (Hyperkalemic) RTA
   Urine pH <5.5, low K⁺ = type 2 (Proximal) RTA
   Urine pH >5.5, low-normal K⁺ = type 1 (Distal) RTA
3) Metabolic Alkalosis – Chloride responsive vs. Chloride resistant
   labs: urine Cl⁻
   U₁Cl⁻ < 15 = Cl⁻ responsive (contraction alkalosis)
   U₁Cl⁻ > 15 = Cl⁻ resistant (Cushings, hyperaldosteronism, hypo Mg²⁺, hypo K⁺)
4) Respiratory Acidosis (intubated patient) – Increase Resp Rate or Tidal Volume
5) Respiratory Alkalosis (intubated patient) – Decrease Resp Rate or Tidal Volume