Bicarb. Eq.

$$CO_2 + H_2O \longleftrightarrow H_2CO_3 \longleftrightarrow HCO_3^- + H^+$$

Approach

1. Determine pH status
   - Normal pH: 7.36 - 7.44

2. Determine whether the primary process is respiratory or metabolic
   - if respiratory, pH and $PaCO_2$ are on opposite sides of normal
   - from HH, pH ~ $HCO_3^-/PaCO_2$

3. Calculate anion gap
   - AG = Na - (HCO_3 + Cl)
   - normal: 10 meq/L ± 2, ≥20 highly suggestive of of anion gap metabolic acidosis

4. Check for compensation
   - metabolic acidosis/alkalosis:
     - w/ appropriate compensation, last 2 digits of pH ≈ $PaCO_2$ (ex. 7.20/20)
     - alternatively...

↓pH, ↑H^+, hyperventilate to ↓$PaCO_2$

- acidosis: 1.2 mm Hg ↓ per 1 mEq/L ↓ in HCO_3^-
- alkalosis: 0.6 mm Hg ↑ per 1 mEq/L ↑ in HCO_3^-

5. If AG metabolic acidosis, ΔΔ analysis
   - Δ AG ≈ Δ bicarb
     - ex. AG 22 (+10) ≈ HCO_3^- 14 (−10)
   - If bicarb is lower than expected → concurrent non-elevated AG metabolic acidosis
   - If bicarb higher than expected → concurrent metabolic alkalosis

Causes

- AG Metabolic Acidosis
  - M ethanol
  - U remia
  - D KA
  - P araldehyde
  - I nfection, Ischemia
  - L actic acid
  - E thanol, ethylene glycol
  - S alicylates

- Non AG Metabolic Acidosis
  - U reto-enterostomy
  - S aline
  - E ndocrine disorders
  - D iarrhea
  - C arbonic anhydrase inhibitors
  - A mmonium chloride
  - R TA

S pirondactone

- Metabolic Alkalosis
  - Chloride responsive ($U_{Cl} < 15$)
    - GI loss
    - Post- hypercapnia
    - Diuretics (distant use)
  - Chloride resistant ($U_{Cl} > 20$)
    - Alkali ingestion
    - Adrenal issue
    - Bartter's
    - Gitelman's
    - Liddle's
    - Licorice
    - "Refeeding"
    - Diuretics (current use)