ABG Interpretation

$[HCO_3^-]$ Metabolic — Normal: 22-26 mEq/L

$PaCO_2$ Respiratory — Normal 35 - 45 mm Hg

- ↓ pH ↓ HCO_3^- Acidosis
- ↑ pH ↑ HCO_3^- Alkalosis
- ↓ pH ↑ $PaCO_2$ Acidosis
- ↑ pH ↓ $PaCO_2$ Alkalosis

Anion Gap: $(Na^+ + K^+) - (Cl^- + HCO_3^-) < 12$ mEq/L ± 2 (Normal)

Non-Anion Gap

	Metabolic Acidosis	Metabolic Alkalosis	Respiratory Acidosis	Respiratory Alkalosis
Compensation	↓ $PaCO_2$	↑ $PaCO_2$	↑ HCO_3	↓ HCO_3
	1 PCO_2 down for every 1 HCO_3 down	PCO_2 up 0.5-0.7 for every 1 HCO_3 up	Acute HCO_3^- up by **1** mEq/L for every 10 PCO_2 up Chronic HCO_3^- up by **3.5** mEq/L for every 10 PCO_2 up	Acute HCO_3^- down by **2** mEq/L for every 10 PCO_2 down Chronic HCO_3^- down by **4** mEq/L for every 10 PCO_2 down
Example	Anion Gap: M ethanol U remia D iabetic ketoacidosis P araldehyde I ron, isoniazid L actate E thylene glycol S alicylates Non-Anion Gap: Hyperchloremic metabolic acidosis GI loss of HCO3 • Diarrhea, NEC, small bowel drainage/fistula Renal loss of HCO3 • renal tubular acidosis (RTA), interstitial nephritis, early renal failure, CA inhibitors • Administration of HCl or other chloride-containing substances (i.e. NS) hyperalimentation, acetazolamide	Chloride-responsive (responds to NaCl/ KCl) - (Diuretics, corticosteroids, gastric suctioning, vomiting) Chloride-resistant (Any hyperaldosterone state (e.g., Cushing's syndrome), severe K+ depletion)	Breathing Slow Respiratory Acidosis = Respiratory failure • Central nervous system depression • Muscle dysfunction • Disease of lungs and/ or upper airway	Breathing Fast Voluntary hyperventilation • Hypoxemia (includes altitude) • Liver failure • Anxiety • Hyperventilation syndrome • Any acute pulmonary problem • Acute pulmonary embolism, pneumonia, mild asthma attack, mild pulmonary edema

Important Definitions
-"emia" change in H+ [] (simply the change in pH)
-"osis" the process changing H+ [] (you have Diagnosis)

1- Does the patient have an acidosis or an alkalosis?
Look at the pH

2- What is the primary problem – metabolic or respiratory?
Look at the pCO_2
Think ROME = Respiratory Opposite, Metabolic Equal
(If pCO_2 change is in the opposite direction of the pH change, the primary problem is respiratory)

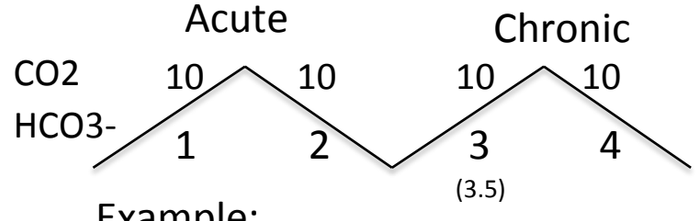
3- Is there any compensation by the patient? Do the calculations.

For a primary respiratory problem, is the pH change completely accounted for by the change in pCO_2
- if yes, then there is no metabolic compensation
- if not, then there is either partial compensation or concomitant metabolic problem

For a metabolic problem, calculate the expected pCO_2
- if equal to calculated, then there is appropriate respiratory compensation
- if higher than calculated, there is concomitant respiratory acidosis
- if lower than calculated, there is concomitant respiratory alkalosis

**If it is a metabolic acidosis, you need to do more work = ANION GAP

Resp Tree Compensation Short Cut



Example:

pH	/ CO_2	/ O_2	/ HCO_3^-
7.34	/ 51 (40)	/ 68	/ 27(24)
N	11 up		3 up

= chronic resp acidosis