Carbohydrate Metabolism

Hexose
- 6-Carbons
- All major Carbs used in carb metab/ Protein modification
  - glucose
  - fructose
  - mannose
  - galactose
- All similar in sx except furanose (fructose)
- hexofuranose
- looks more like ribose

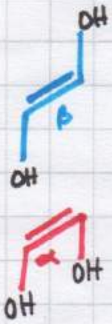
"Fru-Gal Glucose Mann"

mannose

galactose

Pentose
- 5-Carbons
- ribose
- DNA, RNA, NADH

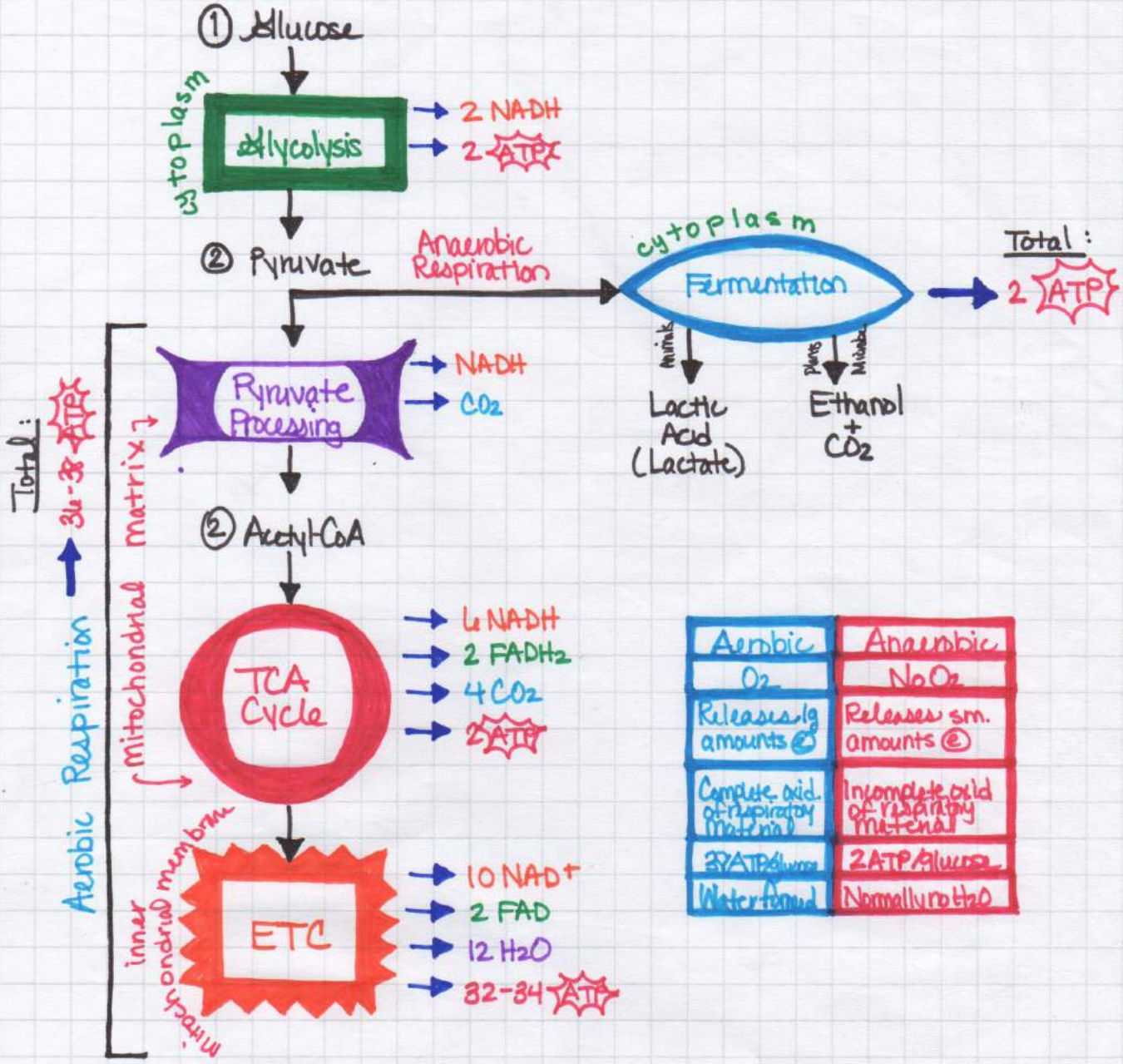
D & L-sugars
- Enantiomers
- Mirror Images
- D → Most sugars in Mammals
- L → In plants & in microorganisms → Cell wall of bact. or fungi
- Can be α or β-stereoisomers
  - OH is Cis
  - OH is Trans
- Significant bc enzymes recognize specific stereoisomers



Di-saccharide
- Storage
  - Lactose → galactose + glucose → milk sugar
  - Sucrose → glucose + fructose → saccharose → Table-sugar
- POLY-saccharide
- long term storage & Sx-al
  - Glycogen (animals) → Starch (plant) → Dextrans (yeast & bacteria) → (Glucose)n → α-linked
  - Cellulose (plant) → (Glucose)n → β-linked
  - Chitin (insects) → (N-acetylglucosamine)n → β-linked
  - Cellulose & Chitin: Cannot be digested; need symbionts

Mono-saccharides ✗ → *Not as advantageous bc wouldn't be as accessible & Polysacch's take up less space (bc removes excess H_2O) → Polysaccharides are less osmotically active; Removes 2 OH's @ saccharide bond

Cellular Respiration



Aerobic	Anaerobic
O_2	No O_2
Releases lg amounts ☺	Releases sm. amounts ☹
Complete oxid. of respiratory material	Incomplete oxid of respiratory material
32 ATP/glucose	2 ATP/glucose
Water formed	Normally no H_2O

Pathway Counts

Glycolysis

2 Substrate Level Phosphorylations

1 Oxidation Rxn

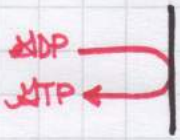
No O_2 needed!

Aerobic Glycolysis = 2ATP + 2NADH / Glucose
Anaerobic Glycolysis = 2ATP / Glucose

} 4ATP produced total → 2 consumed initially

TCA

1 Substrate Level Phosph.



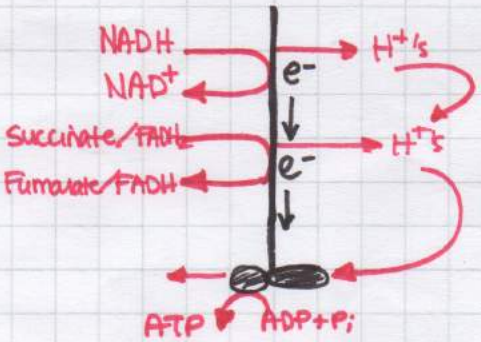
Doesn't use O_2 directly, but NEEDS O_2 to run!

Oxidation of Pyruvate + Krebs's = 1ATP (GTP)
4NADH (1 = Pyruvate → Acetyl CoA) (3 = Krebs)
1$FADH_2$
3CO_2 (1 = Pyruvate → Acetyl CoA) (2 = Krebs)

Per Glucose (x2)
2ATP (GTP)
8NADH
2$FADH_2$
6CO_2

ETC

Oxidative Phosphorylation



Directly uses O_2!

NADH → 3ATP
$FADH_2$ → 2ATP

$3H^+$'s / 1ATP

Produces btwn 32-34 ATP total (depending on NADH/$FADH_2$)