Anaerobic Fermentation

Fermentation

When does fermentation occur? – no O_2 –
break down glucose in ABSENCE of O_2

Lactic acid fermentation:
produced by muscles during exercise/work – muscle soreness

Alcoholic fermentation:
Produces CO_2 and alcohol

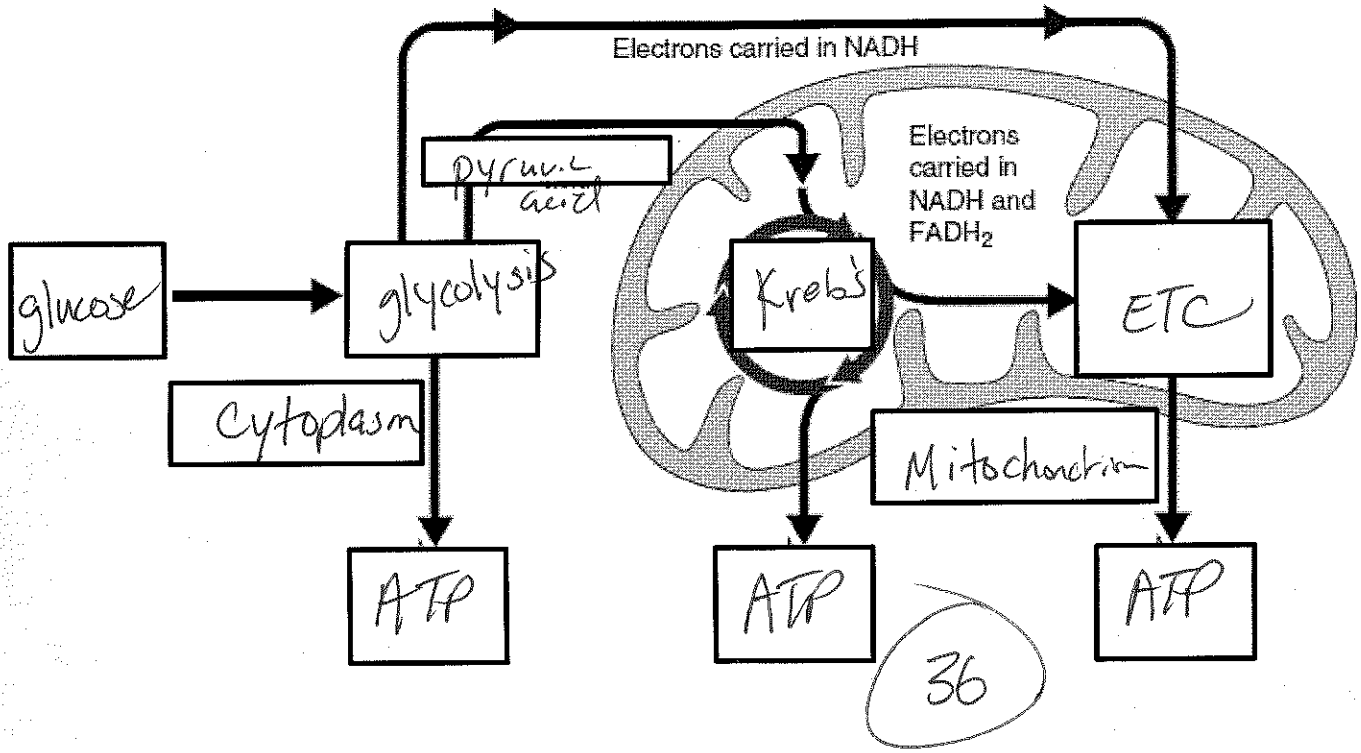
Stage 1 – Glycolysis

What is it?
1 glucose is broken in ½ – creates pyruvic acid

Where does it occur?
cytoplasm (all cells)

What goes in?
Glucose, NAD+, ADP, 2ATP

What comes out?
2 pyruvic acids, NADH, 4 ATP (Net 2 ATP)



Stage 2 – Kreb's Cycle

What is it?
breaks pyruvate into CO_2 and e⁻ carriers in presence of O_2

Where does it occur?
Matrix – mitochondria

What goes in?
2 pyruvic acids, ADP, NAD+, FAD

What comes out?
CO_2, NADH, $FADH_2$, 2ATP

Stage 3 – ETC

What is it?
O_2 & high energy e⁻ carriers from Kreb's convert ADP → ATP

Where does it occur?
Cristae of mitochondria (folds)

What goes in?
O_2, NADH, $FADH_2$, 2ATP

What comes out?
34 ATP (32 Net)

Glycolysis

Cellular Respiration
$C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O +$ energy
forming ATP by breaking down glucose in presence of O_2

Cellular Respiration Overview

Exercise
- 10-15 seconds = stored ATP
- <90s = fermentation
- 790s = aerobic
- 15-20 m - carbs
- 715-20 - fats

- Happens in both plant & animal cells
- Needs glucose to start (from photosynthesis)

- ALWAYS starts w/ Glycolysis
  - w/ O_2 - Kreb's follows
  - w/out O_2 - fermentation follows
- Makes 36 ATP
  - 38% efficient (good)
  - fermentation less efficient
  - rest lost as heat
    - Why your body gets warm during exercise
- inverse of photosynthesis

Kreb's Cycle
(Citric Acid Cycle)

Electron Transport Chain
(ETC)