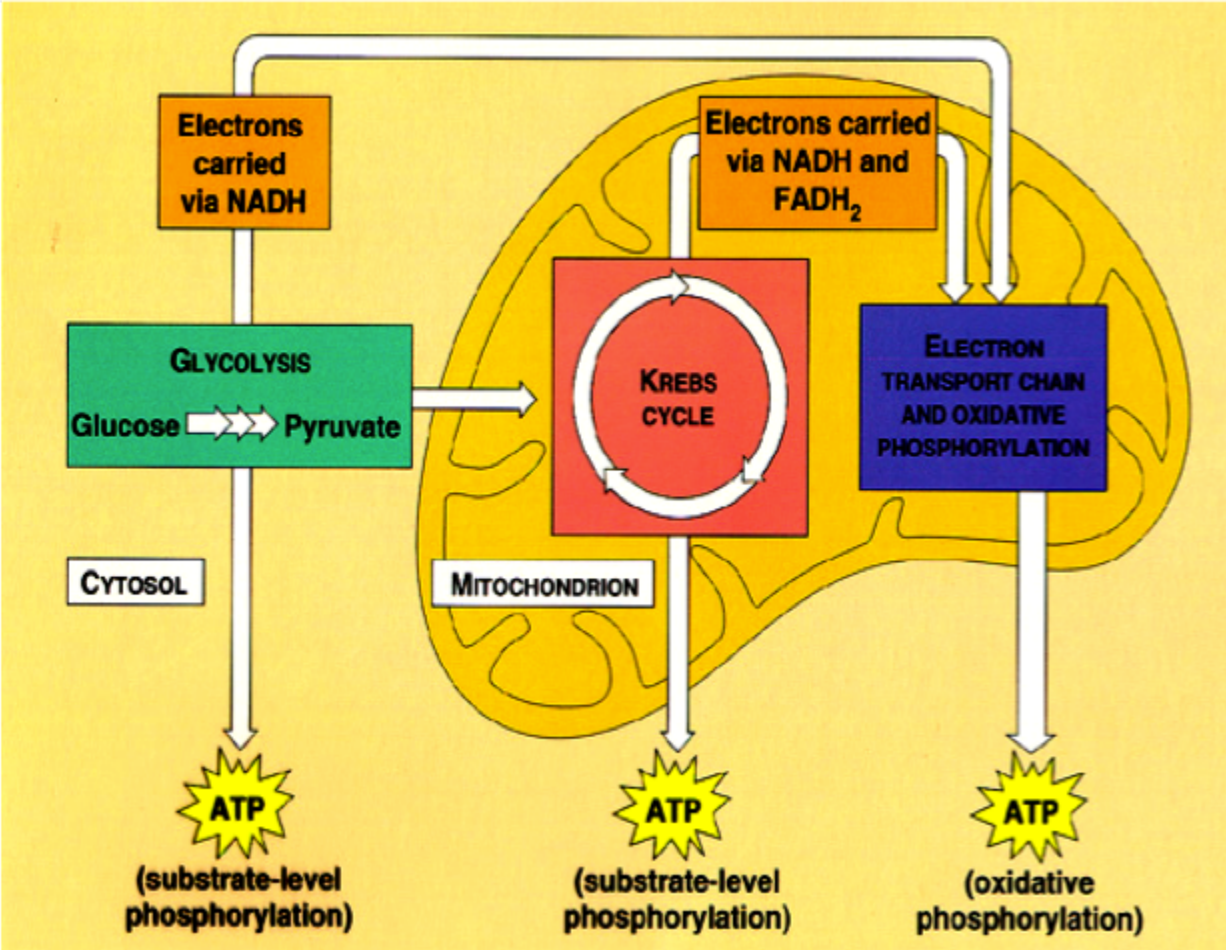
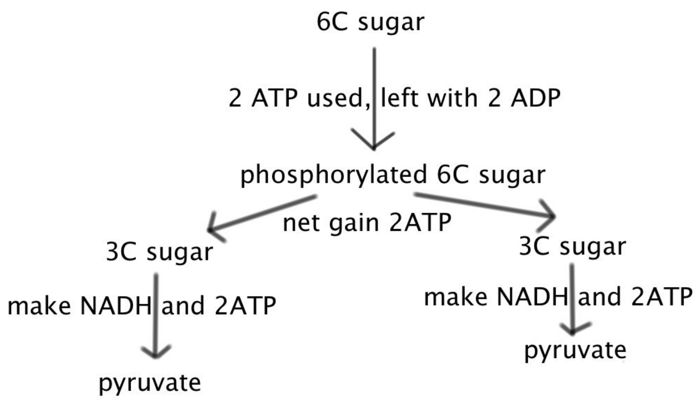
http://www.youtube.com/watch?v=juM2ROSLWfw (a really helpful video on kreb cycle YOU HAVE TO WATCH THIS IT IS COLOURFUL)
http://www.youtube.com/watch?v=mfgCcFXUZRk (and another colourful video by the same guy about ETC)
Photosynthesis: Carbon Dioxide + Water → Sugar + Oxygen
Respiration: Sugar + $O_2 \rightarrow CO_2 + H_2O$ + ATP
cristae?
in the inner membrane, will find etc and atp synthase
but where does it take place?

1	**Glycolysis** When sugar molecules in cytoplasm get broken down. Product of this (pyruvate) enters mitochondria	Located in the ***cytoplasm***
2	**Link reaction**	Located in the ***mitochondrial matrix***
3	**Krebs cycle**	Located in the ***mitochondrial matrix***
4	**Oxidative phosphorylation**	Located in the inner ***mitochondrial membrane***



Glucose broken into two, ATP released. Broken down to produce more ATP. This occurs in cytoplasm.
Glycolysis has up hill preparatory phase and down hill payoff phase.
Glucose has a lot of potential energy (biker at top of hill), coasts to down hill spot.
But sometimes must go up hill
So glucose has ATP added, as it goes up the hill, it breaks into two, then more stuff is added when it goes down the hill.

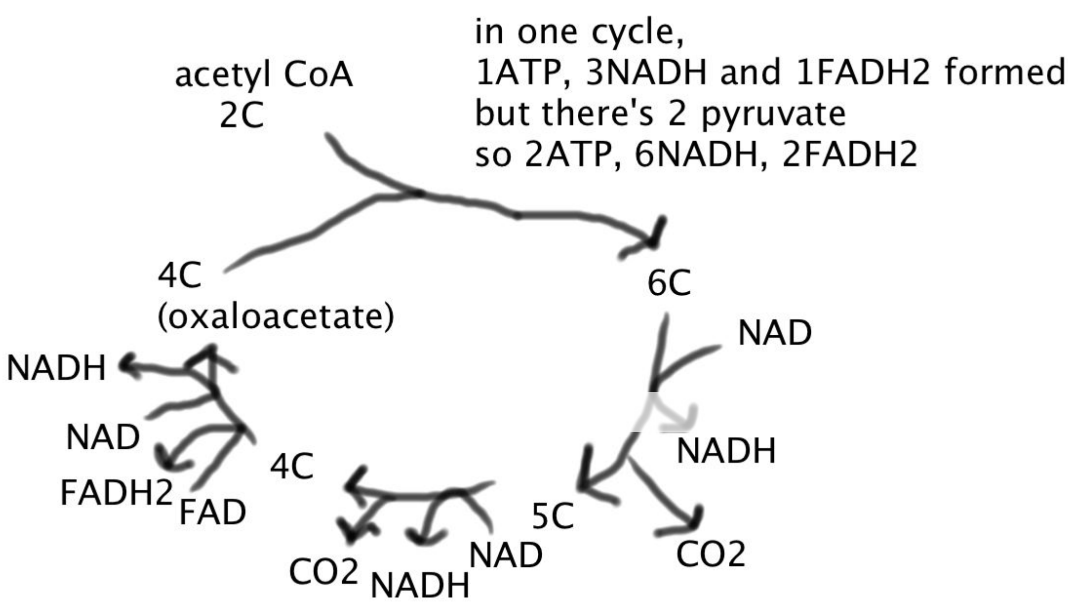


Pyruvate 3 carbon enter mitochondrion matrix, combine with co-enzyme A, removal of carbon compound as carbon dioxide→ decarboxylation
NAD reduced to NADH (has been oxidised)
Forms acetyl CoA (2 carbon)

Link reaction (links glycolysis to kreb cycle)

pyruvate 3C → Acetyle CoA 2C + CO_2

Respiration has no phosphate so it is just NADH, not NADPH
Hydrolysis: break down of water
Glycolysis: break down of glucose



	ATP	NADH	FADH2

Glycolysis (in cytoplasm)	2	2	
Link reaction (in matrix)		2	
Kreb cycle (or citric acid cycle in matrix)	2	3 in 1 cycle but 6 in 2 cycles (it has to go twice)	2 (formed by FAD)

<u>Citric acid</u>
1 NADH→ 3 ATP
1 $FADH_2$→ 2 ATP

Total amount of ATP formed in aerobic respiration
From table above, no. of ATP from ATP = x1
no. of ATP from NADH = x3
no. of ATP from $FADH_2$ = x2
altogether: 2+2+6+6+18+4
=38

Term 1: the mitochondria makes your energy ^^
Term 2: KREB CYCLE GLYCOLYSIS EAT THIS INFO MAKE YO ENERGY GURL AYYTEEPEE

Oxidative phosphorylation

Thing that receives the electrons (final acceptor): oxygen
Occurs in inner membrane of mitochondria

- In the mitochondrion, the energy stored in NADH is used to generate a proton gradient across the mitochondrial membrane and the energy of the proton gradient is used to make ATP.
- When glucose is oxidised during glycolysis and the Krebs Cycle, the coenzymes NAD and FAD are reduced to NADH and $FADH_2$.
- Inside the mitochondrial matrix, the electrons from NADH are transferred to the Coenzyme Q by NADH dehydrogenase, and the protons are transferred across the membrane to the intermembrane space
- CHECK THE TEACHER SITE and watch the animations

Lack of oxygen→ gradient disappears→ ATP production stopped
No oxygen→ no link reaction, no kreb cycle, only glycolysis

Anaerobic Respiration

Plants & Yeast

$C_6H_{12}O_6$ ----> C_2H_5OH + CO_2 + energy

glucose ethanol + carbon dioxide + small amount of energy

Animals

$C_6H_{12}O_6$ ----> $C_3H_6O_3$ + energy

glucose lactic acid + small amount of energy

In the presence of oxygen, aerobic respiration occurs (glycolysis, link reaction, kreb cycle, oxidative phosphorylation)

In the absence of oxygen, we have anaerobic respiration. The molecule of sugar, instead of going through aerobic respiration, still goes through glycolysis. Instead, the final molecules of pyruvate go through the anaerobic processes: lactic acid fermentation and alcoholic fermentation.

Glucose→ pyruvate→ enters cytoplasm→ enters mitochondria

Soybean contains starch (polysaccharide), cannot enter the cell (too big), so it has to be broken down through amylase (breaking the glycosidic bond). The amylase comes from the fungi, the yeast cell, it secretes the soluble enzyme. Now the starch (glucose) is now small enough to enter the cell through facilitated diffusion and active transport.

Human respiratory system

How is carbon dioxide removed from your lungs?

- CO_2 from cells reacts with water to form carbonic acid in red blood cells
- This reaction is catalysed by the enzyme carbonic anhydrase present in the red blood cell
- The carbonic acid is then converted into hydrogencarbonate ions which diffuse out of the red blood cell. Hence most of the carbon dioxide is carried as hydrogencarbonate ions in the blood plasma
- In the lungs, hydrogencarbonate ions diffuse back into the red blood cells where they are converted into carbonic acid, and then into water and CO_2.
- The CO_2 then diffuses out of the blood capillaries into the alveoli, and is expelled when you breathe.

How are the lungs adapted for efficient gaseous exchange?

- The numerous alveoli in the lungs provide **a large surface area**.
- The wall of alveolus and blood capillary is only one cell thick (no more than 0.5 µm thick). This ensures **short diffusion distance** and hence a fast rate of diffusion.
- A thin film of moisture (surfactant) covers the surface of the alveolus. This allows **oxygen to dissolve** in it and diffuse into the blood capillaries.
- The walls of the alveoli are richly supplied with blood capillaries with a constant flow of deoxygenated blood (with a lower concentration of oxygen and a higher concentration of carbon

dioxide than the air in the alveoli). Breathing brings supplies of fresh air into the lungs, with a relatively high oxygen concentration and a relatively low carbon dioxide concentration.A **steep concentration gradient of gases** is maintained at the alveoli and capillaries