

Hello and welcome to this week's science lesson. We will be learning about cellular respiration.

cellular respiration is the process where chemical energy in food is converted to chemical energy stored in ATP. It occurs in the mitochondria as pictured to the right.

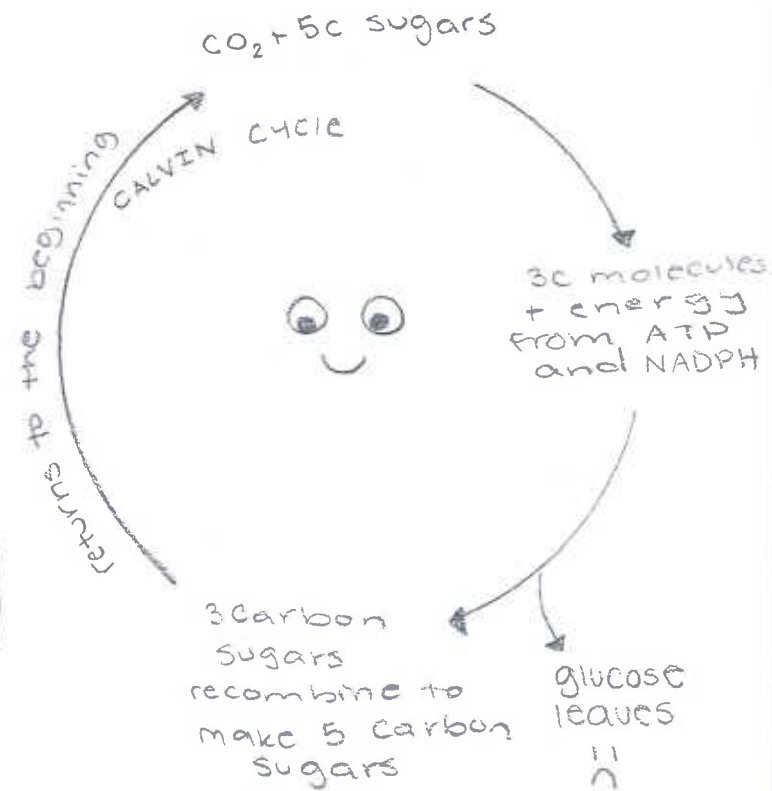


Photosynthesis... the prequel

There are 3 stages of respiration. Glycolysis, the Krebs Cycle and the Electron transport chain. (Train) Before respiration can occur, photosynthesis is required so that cellular respiration has glucose to start with.

The last stage of photosynthesis is the Calvin cycle. In the diagram you can see how glucose is produced so it can be used in cellular respiration.

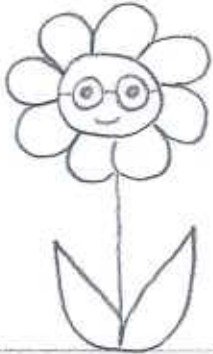
the glucose is then passed to the process of cellular respiration.



Our Story Begins: Glycolysis

Welcome to the first stage, glycolysis. We are here in the cytoplasm.

2 ATP is produced and 2 NAD⁺ becomes 2 NADH and pyruvic acids are produced



First, the 6 glucose molecule is broken down into 2 3 glucose molecules.

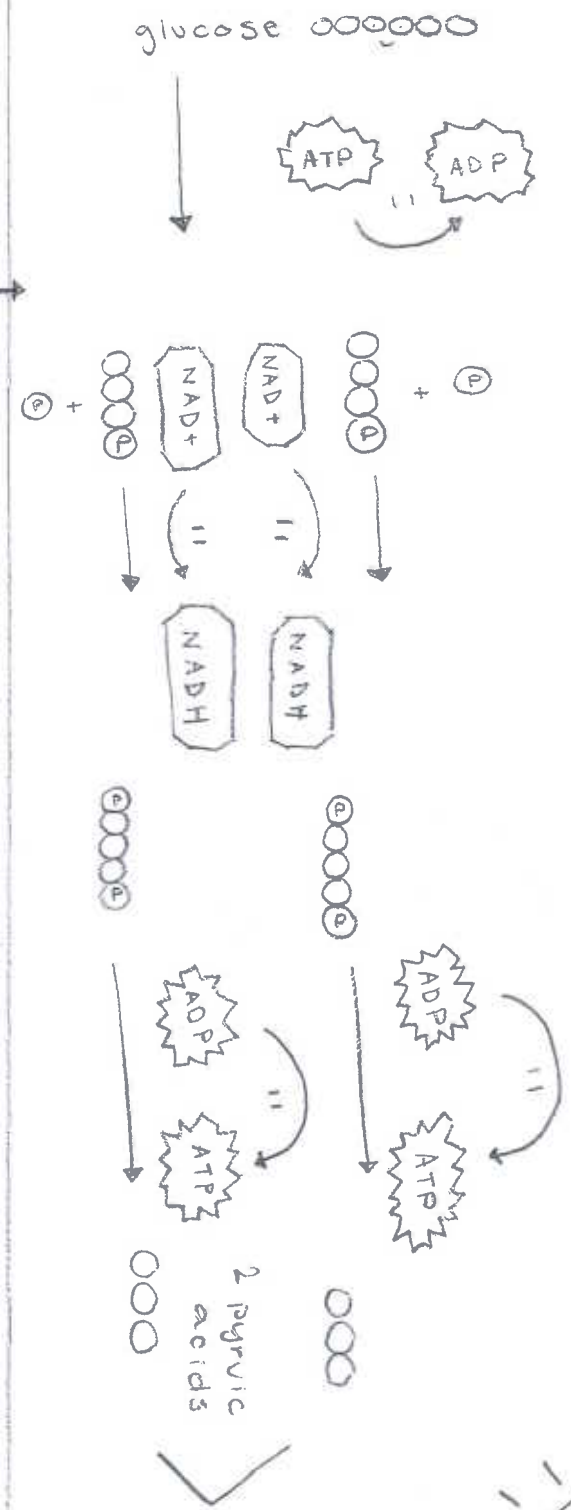
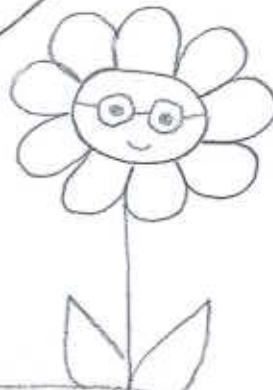
Then a phosphate is added to both molecules so it was 2 phosphates and 3 glucoses.

Finally a phosphate is taken from both molecules so ADP can turn back into ATP. It then becomes 2 pyruvic acids to move on to the krebs cycle.

Reactants:
glucose
and
ATP

wait I have a quick question, what kind of organisms even use respiration?

on that's easy, respiration occurs in many organisms including bacteria, plants, animals and fungi.



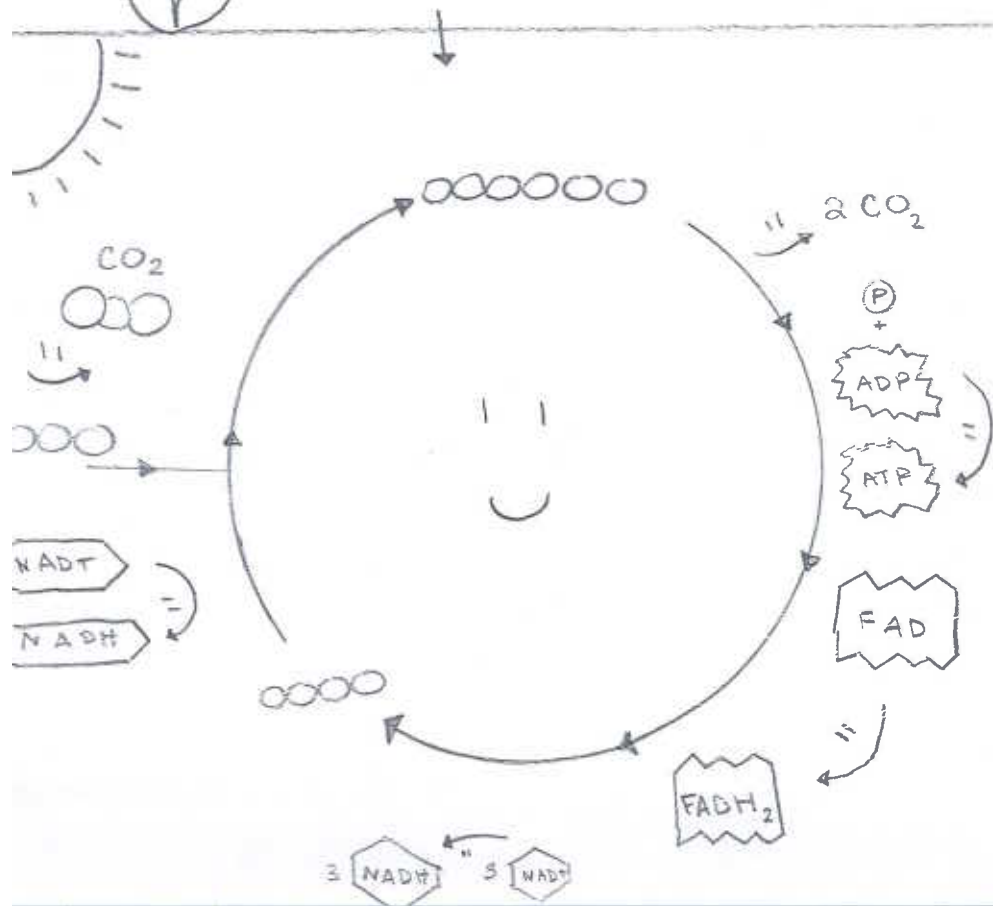
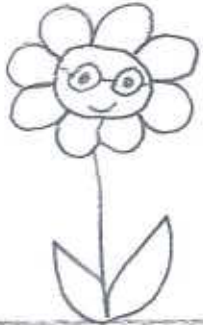
Our story continues: The Krebs cycle

Welcome to the second stage of cellular respiration. This stage only occurs if there is oxygen present since it is an aerobic process.

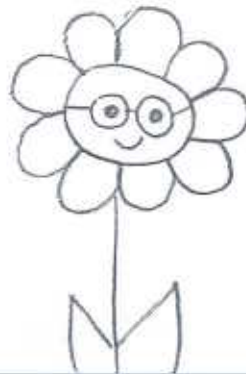
Oh sorry. This occurs in the mitochondrial matrix.

The reactants are the pyruvate molecules and the products are 4 NADH, 1 ATP, 1 FADH₂ and 3 CO₂

Wait a minute. you never said where the Krebs cycle happens.



The 2 pyruvate molecules are chemically converted to make 2 ATP. This cycle happens twice. Carbon dioxide is released as a waste product.



The Electron Transport Chain

RECAP:

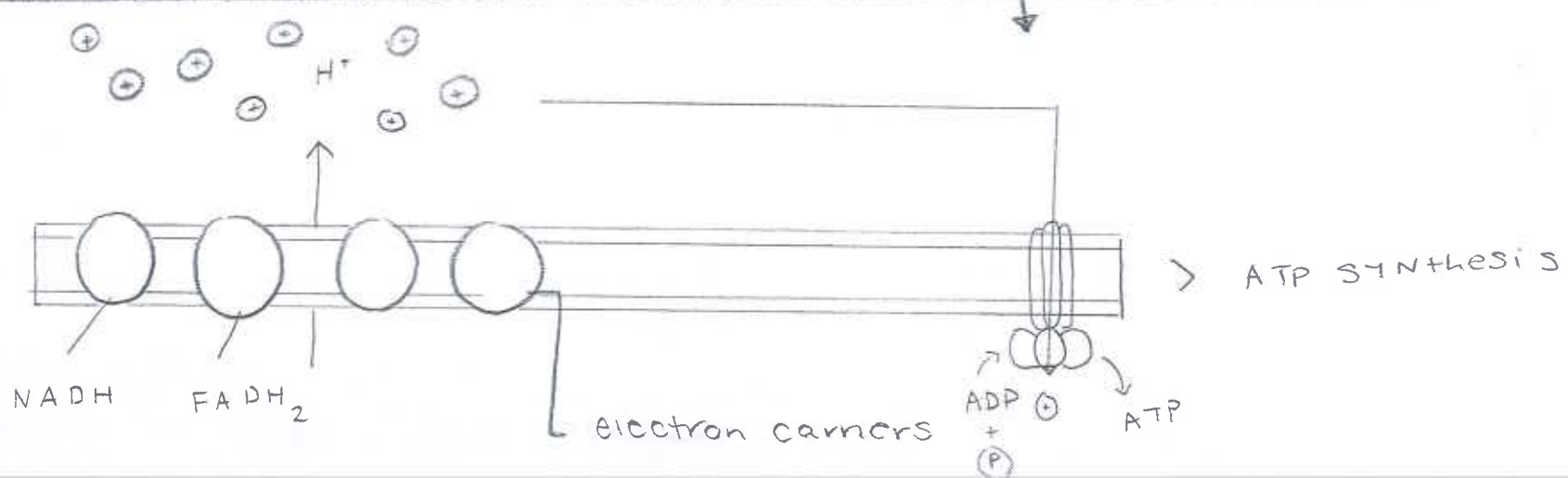
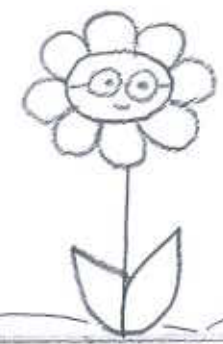
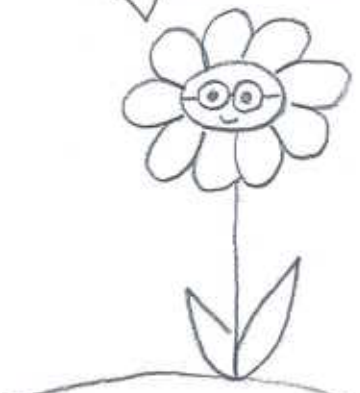
It occurs in the inner membrane of the mitochondria. This is the final stage of cellular respiration. The electron transport chain has 2 stages, oxidative phosphorylation, and chemiosmosis.

The reactants are H^+ ions and oxygen and electrons. ATP and water is produced.

Hey so this is just a recap since there are ALOT of words.

1. Glycolysis breaks glucose
2. Krebs cycle moves e^- carriers (NADH and $FADH_2$) to the electron transport chain.
3. electron transport chain makes water and 34 ATP. (36 in total of respiration)

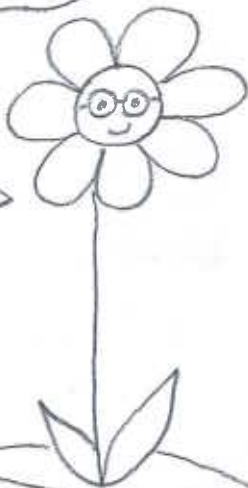
The electron transport chain is where ADP is turned into ATP.



I have 2 more questions. What is the connection between photosynthesis and cellular respiration?

You can see on the next box to the right.

Cellular respiration and photosynthesis are opposites. What photosynthesis uses as reactants, cellular respiration produces and vice versa.



Cellular respiration:



\downarrow \downarrow
 reactants products
 (glucose and oxygen) (water and carbon dioxide)



\downarrow \downarrow
 reactants products
 (carbon dioxide and water) (glucose and oxygen)

photosynthesis: \uparrow

The End... Or is it?

Last thing. After glycolysis if there is no oxygen, then the cell will go through anaerobic respiration, or fermentation. That's it, goodbye.

