

Our Topics

By 5th and 6th Hours

Overview of Photosynthesis & Cellular Respiration

(can include structures of chloroplast/mitochondria)

What's the difference between the stroma and stomata?

Stroma is a fluid in chloroplasts whereas stomata are openings in leaves that let CO₂ in and O₂ out.



What is the main objective of photosynthesis and cellular respiration? to make food

Where does the Krebs cycle take place?

What are the phases of cellular respiration?

Where are the thylakoids located?
In the little stacks like pancakes a.k.a granum

That's not a structure of chloroplast?

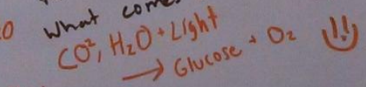
What are stacks of thylakoids called?

Where in the mitochondria does aerobic respiration take place?
-matrix

What do we call a stack of thylakoids? Granum

H₂O is broken down and the H⁺ goes to the thylakoid membrane

What is the photosynthesis equation?



What is the cellular respiration equation?

In photosynthesis, what is the role of water? It donates electrons

Where is the stroma?

inside chloroplast outside thylakoids

What happens in thylakoids? LIGHT REACTION

What are granums? stacks of thylakoids

What do the guard cells do? open/close stomata

What accepts the electron in photosynthesis?

What is the purpose of the guard cells? to open/close the stomata

What are the green ovals called? Thylakoids

What is the difference between aerobic and anaerobic respiration? aerobic requires oxygen and anaerobic doesn't

What is the relationship between reactants and products? you put in the reactants and get out the products

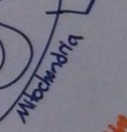
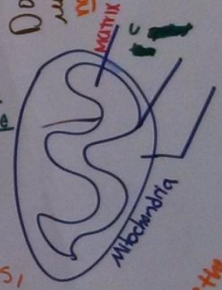
What is a thylakoid? It does photosynthesis

Does cellular respiration use oxygen? YES

Where is chlorophyll located? in the chloroplast? PHOTOSYSTEM I & II

What is the space in the chloroplast outside the thylakoids? Stroma

What is a granum? stack of thylakoids



Anaerobic Respiration - no

What are the products of aerobic respiration?
ATP
 CO_2

Which forms of anaerobic respiration do humans undergo?
 - Lactic Acid

Does this process require oxygen? Yes or no.

Is anaerobic respiration in Calvin cycle? **NO**

What does anaerobic mean?
 no need for oxygen!
 Where does this happen?
 Cytoplasm

ANTIBREATHES

What types of AR are there?
 - Lactic acid fermentation
 - alcohol fermentation

What is produced?
 Lactic Acid

What is put in?
 What is produced?

Out - 2 ATP, Lactic Acid / Ethanol
 In - 2 ADP, 2 Pyruvic Acids

What undergoes alcoholic fermentation?
 Unicellular organisms
 - some plants

Is this in photosynthesis?
NO

What is the difference between Anaerobic and Aerobic Respiration??

with O_2

which organisms undergo this?
 - Heterotrophs?

with E_2O

Anaerobe

NH_4OH

Is fermentation a type of anaerobic respiration?
 Yes!!! R u kidding me?

What are the 2 types of Fermentation?
 Lactic Acid and Alcoholic Fermentation

Is Glycolysis part of this process?
Yes

Yoghurt
 Pickles
 H₂O
 What is this?

Where does this take place? Mitochondria
 Cytoplasm

Does anaerobic respiration produce a lot of ATP?
 More than aerobic respiration? Yes or no.
only 2!

When do you undergo lactic acid?
 - Do animals
 - muscles
 - bacteria

Glycolysis

What happens after glycolysis?
either for mitochondria or aerobic respiration

Where does this take place?
cytoplasm
outside the mitochondria

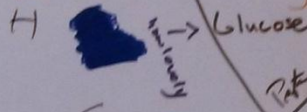
What is that called?
Cyttoplasm

What is the end product of glycolysis used for?
Krebs Cycle

Does glycolysis make glucose?
No

What is put into taken out of glycolysis?
glucose - pyruvic acid

What goes in?



Does glycolysis need CO_2 ?
No

How much ATP is produced during glycolysis?
1051

What put in?
Glucose

What comes out?
Pyruvic Acid
Pyruvic Acid

Is this for respiration?
Yes

What question!!!
Do you answer your own question!!!

What is the product?
Pyruvic acid
Glucose, 2 ATP

What is the purpose of glycolysis?
make pyruvic acid

How many carbons are in pyruvic acid?
3C

Is glucose needed?
Yes

What are the products that come out of glycolysis?
2 pyruvic acids

Is glycolysis part of photosynthesis or cellular respiration?
CR

What is produced in glycolysis?
same as

is the junction phase part of glycolysis?
No

Junction Phase
Krebs Cycle

Does glycolysis require CO_2 ?
No

Is glycolysis efficient?
didn't learn

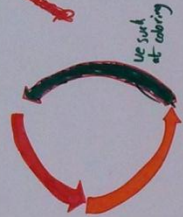
When does glycolysis happen?
cell respiration

before: glycolysis after: junction phase

Is this part of anaerobic?

What happens after Krebs?

ETC



Krebs' Cycle

What happens before Krebs?
JUNCTION PHASE

How many times does the Krebs Cycle cycle per glucose

How many steps are in the Krebs cycle?
A LOT!!!

What is the other name for the Krebs cycle?
Citric Acid Cycle

What type of carbon molecule does it end up as at the end of the cycle?

Does the Krebs cycle occur in the mitochondria?
- yes it does

What molecule enters the Krebs cycle?
Acetyl CoA

Does Krebs cycle need oxygen?
No

What is the other name for the Krebs cycle?
Citric Acid Cycle

Who came up with the Krebs Cycle?
HANS KREB

When did he win his nobel prize?

What is the other name for the Krebs Cycle?
Citric cycle

What else is the Krebs cycle called?
- Citric Acid

How many carbon atoms are in the complete cycle?

And for Physiology

Where does the Krebs cycle occur?
In the matrix

Does the Krebs cycle need CO₂?
Yes, 4 CO₂ in all

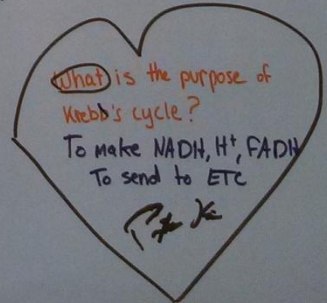
What goes in/comes out of the Krebs cycle?

CO₂ goes in from junction phase

What is given off in the Krebs cycle?
NADH, FADH₂, ATP, CO₂

How many of each?

What is put into/taken out of the Krebs cycle?
In: Out:



E.T.C.

What is an electron source?
Water on some

Photosynthesis:

How are more e⁻ given to photosystem II?
H₂O becomes a bro
rhymes

Where does the light reaction happen?
It happens in the thylakoid

When is a good idea...

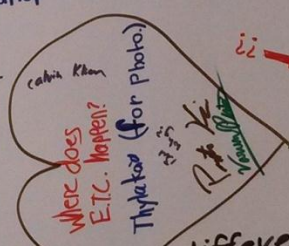
What is the equation of photosynthesis?

What molecule "gets excited" electrons

What does E.T.C. stand for? electron transport chains

What accepts the electrons?
Photosystem II electron acceptors
Oxygen bubbles
What combines with H ions & e⁻ to make H₂O or H₂O₂?

Cellular Respiration
Where is the most ATP produced?
cabin room



BECAUSE STABILISE
Why?
for +
spreads proteins

Cell Respiration:

What is put/carried to the E.T.C. in cell respiration?

What is the difference between the ETC in cell. Resp. VS. Photo synthesis

WHAT DOES ETC STAND FOR?
electron transport chain

What is the equation of cell respiration?
 $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

Is oxygen required in ETC

Photosynthesis uses light energy

What does H₂O do absolutely
Makes H₂O - Absolutely Nothing

What happens in electrons... maybe...

C. Respiration use O₂ as a carrier for electrons
Bobby Chris
NADPH is produced
ATP is produced

What isn't present in the ETC of CR that is present in photosynthesis?

Is this in photosynthesis or cellular respiration?
BOTH



How many photosystems are there and what are they called?
photosystem 2
photosystem 1

What is the E.T.C. Electron Transport Chain

What does the E.T.C. need to function?
-light energy
-electrons

Where does the ATP come from for this stage? the light reaction

Who is the Calvin cycle named after?
Melvin Calvin

Calvin Cycle

What is the Calvin cycle?
The cycle makes glucose
A cycle that uses light energy
that occurs in plants/animals

Where does this occur? STROMA

What enzyme combines photosynthesis (RuBisCo)?

What enzyme can you find here? RuBisCo

Don't answer your own question!!!

Is Acetyl CoA produced in this cycle? No... maybe...

What are the products of the Calvin cycle? Glucose

Does the Calvin cycle require O₂? yes

Plant books

How many cycles? $3 \times 2 = 6$

LaTeX

Why is the Calvin cycle named after Melvin Calvin?

What are the compounds made in this cycle? Glucose & G₃P

What goes in/out? CO₂, H₂O, ATP, NADPH, etc. How much? May be...

Can it function in both the dark & the light?

Teak (it's a word, you can check)

What is the goal of the Calvin cycle? to make 3GP

What is the Calvin cycle? makes glucose from plants

Who is this named after? Melvin Calvin

What is put into/taken out of the Calvin cycle?

In: CO₂ Out: Glucose

Does the Calvin cycle produce glucose, ATP or both, or neither? produce glucose, ATP or both, or neither?

What are the building blocks of glucose?

S. Kim

Does the Calvin cycle require / use or need oxygen? no

Does the Calvin cycle make ATP? No

How many glucose does it make? 1 per cycle

What is the actual product of the Calvin? G3P

Definition:

biological catalyst

ENZYMES

Do we use enzymes in hydrolysis & dehydration synthesis?
yes

Coenzyme?

What is a Helper Enzyme

Are enzymes catalysts?

What is the most common enzyme in the world?



What is the lock & key theory?

Do they make bonds/break bonds?

stomach enzymes: amylase, pepsin, trypsin, lipase, lactase, maltase, sucrase, cellulase, etc.

What is a catalyst?

How does temperature & pH affect enzymes?
low temperature will slow down enzymes. High temperature and acidic pH denature.

What is the induced-fit model?
Sigmoidal change. Think in pH.

What letters do they end in?
-ase

What are inhibitors? Things that prevent enzymes from working properly.

What is the difference between catabolic and anabolic reactions?
Catabolic: exergonic. Anabolic: endergonic.

How do we name enzymes?

After their substrates end in -ase

What is competitive inhibition?
Inhibitor binds to active site.

What is noncompetitive inhibition?

What is lock and key? Substrate fits into enzyme.

Do enzymes require oxygen?
maybe

What is the definition of enzyme? Makes a reaction possible.

What is the lock and key theorem?
- substrate fits into enzyme perfectly

When do they denature? When it gets too hot

What is induced fit?
When a substrate attaches to an enzyme that's almost perfectly shaped for it & the enzyme

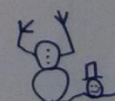
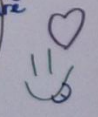
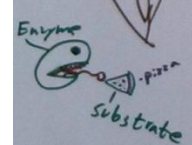
What is the most abundant enzyme on earth?
Rubisco

Which cycle(s) involve enzymes?
All of them

What is the difference between lock & key and induced fit?
Lock & key fits perfectly and induced fit has to mold around the substrate.

What happens to enzyme if the pH changes?
It denatures

What happens to enzymes when the temperature is too low? they are unable to work. once they are heated, they can work again.



What is rubisco used for?
photosynthesis

Are enzymes nice?
no

What do enzymes make?
maybe

Are enzymes used in cellular respiration?
yes

What affects all they do? Speed up chemical reactions

ENZYMES

What is a catalyst? It speeds up a reaction.

Do we use enzymes in use enzymes in catalyze synthesis

Yes!!!
What is the role of an inhibitor? To prevent chemical reaction

Function of enzymes? Speed up a reaction

What is an enzyme?

A protein that speeds up chemical reactions!

Is an enzyme a catalyst? Yes!

How can you tell if something's an enzyme? (from the name)

-ASE

What does -ase mean? It shows that something is an enzyme

What's the difference between a coenzyme and a cofactor?

No organic

Organic

Give an example of an enzyme in cellular respiration! ATP synthase

What is the molecule that attaches to the enzyme substrate?

What enzyme is present in the Calvin cycle? Rubisco

Are enzymes proteins or lipids? Proteins!

What is the lock and key hypothesis? perfectly it fits

What do catalysts and enzymes have in common? They both speed up chemical reactions

What effects does an enzyme work? Temp, pH level

What is the name of the enzyme that makes ATP? ATP synthase

All the ones on the test

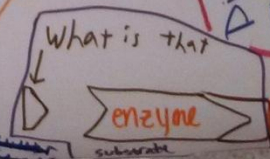
What is Rubisco used for? To speed up reactions and catalyze RuBP

What is the induced-fit model? enzyme changes shape to fit substrate

Are enzymes in plants and animals? Yes

What is the enzyme naming rule? Starts with the substrate, ends in ase

What is the most abundant enzyme? Rubisco!



Different between competitive and noncompetitive inhibition? Competitive - inhibitor binds to active site. Noncompetitive - inhibitor binds to a different site.

Glycolysis

Where does glycolysis occur? In the cytoplasm

What are the products of GLYCOLYSIS? Pyruvic acid

What comes after glycolysis? Aerobic or anaerobic respiration
think your energy source here!!!

What step is the most important in glycolysis?

All of them!

How many ATPs are used in glycolysis?

2 ATP

What is glucose used for? make energy + food for plants!
Humans

What do you get from Glycolysis? *energy*

Put in 4 ATP Glucose

get out Pyruvic acid 2 ATP

How many ATPs are produced (overall net)? 4

What do you get out of glycolysis? Pyruvic acid

What is the purpose of glycolysis? to make pyruvic acid

How much CO₂ do you get out of glycolysis? 2

What comes before it? Calvin cycle? *good!*

What is put into glycolysis? Glucose 2 ATP

Where does glycolysis take place?

What happens after glycolysis? junction Krebs anaerobic resp.

What is the investment/payoff phase? ~~investment~~ Uses 2 ATP to split glycolysis but ends up with 4

What is broken down in glycolysis? Glucose

Sorry! Thank you! You're welcome!

Kreb's Cycle

Is the Krebs Cycle in Photosynthesis or Cellular respiration?
Cellular Respiration

What goes into the Krebs cycle?
pyruvic acid

How many molecules of each molecule is produced?

What do you get out of the Krebs cycle?

What happens next? ATP, NADH, FADH, etc.

How many ATP are produced?



Where does the Krebs cycle occur?
Matrix

What is a junction?

What do you get out of ATP?

What is the other name for the Krebs cycle?
Citric acid cycle

What is sent from the Krebs cycle to the ETC?
NADH, FADH

What is required for the Krebs cycle?
pyruvic acid

Why do you need ATP?
for energy

Where are the pyruvic acids used in the Krebs cycle obtained from?

How many carbon molecules are in the cycle?

What molecule does Krebs start with?
pyruvic acid.

Who is the Krebs Cycle named after?
Hans Krebs (his German)

What is Krebs's first name?
Hans

Another name for the Krebs Cycle: Citric Acid Cycle

What is the purpose of Acetyl CoA?
it binds with CoA

What is acetyl CoA?
It's a coenzyme

Pyruvic attached to CoA

What year did Krebs win the Nobel prize?

What substance starts Krebs?

Acetyl

1953

ETC - stands for: ~~electron transport chain~~ et. cetera

What does it stand for? - electron transport chain

Photosynthesis

Which comes first: photosystem I or II?

What is put in? where do you get the electrons for ETC from?

What excites the chlorophyll? Light

Where do the electrons come from? water

What comes out of the ETC? ATP + NADPH

How does H+ enter the thylakoid?



Cellular Respiration

What do you get out of the ETC in cellular respiration? 34 ATP

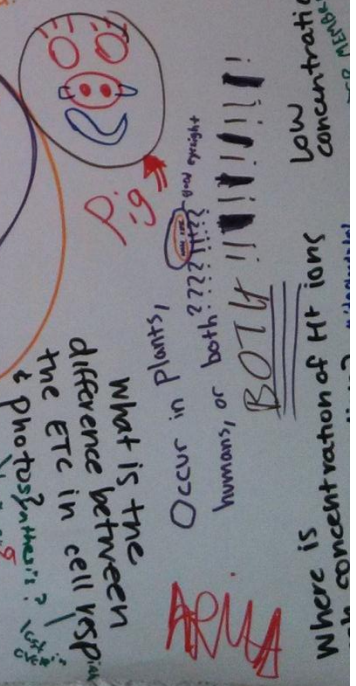
Which organelle does this take place in? - MITOCHONDRIA

What pumps the H+ ions out? - ATP SYNTHASE

How many ATPs are made? 34

What is the first enzyme in the E.T.C called?

What does H2O do in the E.T.C? provides electrons + H+ ions



What does the sunlight do? (to electron)

EXCITES IT!

Havereschid, Mordan Faulkner, Corey Schultz, & Tom

in Photo. it is in the Thylakoid and in Cell resp. it is in the mitochondria

What is the difference between the ETC in cell resp. & photosynthesis?

Occur in Plants, humans, or both?

ATP

Where is the concentration of H+ ions?

Calvin Cycle

What do you put into the Calvin Cycle?
ATP

In what year was the Calvin Cycle discovered?

1961
1961

Who discovered the Calvin cycle?
Melvin Calvin

What are the G3Ps made into?
Glucose

Who is Melvin Calvin?

1961

Where does the ATP go in?
Where to phosphoglycerate

What process precedes the Calvin cycle?
Light reaction

Where does it happen?

Stroma

What do G3Ps do?
make glucose

How many G3Ps are produced in the cycle?

6 G3Ps
2.2
-2
-6
-4
-1

Does the Calvin cycle require light?

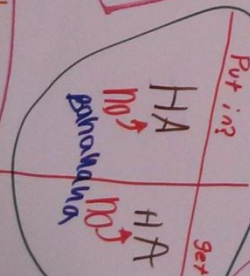
NO

What are the main outputs?
G3P

What is RUBISCO? It is an enzyme that speeds up reactions with CO₂ to make sugar

Who is the Calvin cycle named after?
Melvin Calvin

Why does the RubP + CO₂ split?



Is 3-PGA the main output?
NO

What happens before + after the Calvin cycle?
Light reactions

Who discovered the Calvin cycle?
Melvin Calvin

Is the Calvin cycle in photosynthesis or aerobic respiration?

What is Calvin's first name?
Melvin

How many times the cycle need to go to make one glucose?

How many times? too MANY!
Not a good answer!!!!

Where do the products of the Calvin cycle go?
To the rest of the plant

orange team!

Where does carbon fixation occur?
Calvin cycle!!!!

them.

Overview of Photosynthesis & Cellular Respiration (include structures of chloroplast & mitochondria)



Where in the leaf does photosynthesis take place?

Mesophyll

Does the stomata open in the morning?

What organelle is necessary for photosynthesis to occur?

Chloroplast

put in?	get out?
Light CO ₂	O ₂ NADH

Where does photosynthesis happen?

Stroma
Thylakoids

What is a heterotroph?

make their own food

What is the equation for photosynthesis?

$$6CO_2 + 6H_2O + \text{light} \rightarrow C_6H_{12}O_6 + 6O_2$$

Does the light dependent reaction require any gas?

no.

What is the orange family?

Chloroplast family

Why's cellular respiration in the mitochondria?

It's the orange that makes energy

What is a stack of thylakoids called?

granum

Which enzyme is present in glycolysis?

Rubisco!

What is Cellular Respiration?

Orange

Which step of photosynthesis need H₂O?

The E.T.C.

What is an autroph?

An organism that can produce energy without food (energy)

How much ATP Produced?

38

What is the stomata and what is the function of the guard cells?

opening

guard cells protect

Where does photosynthesis take place?

Stroma

Chloroplast

What is the equation of Cellular Respiration?

Where does cellular respiration happen?

mitochondria

matrix, inner membrane

How much ATP is made?

38

What color are chloroplasts?

green

Where does light dependent reactions get their electrons?

E.T.C.

Where does light dependent reactions get their electrons?



spill CHECK!!!

