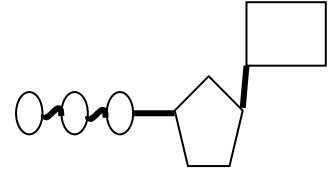


Cell Energy NOTES

Topic 1: ENERGY?

Energy is used by all cells to:



Organisms get energy through _____

They either make their own food or eat food

_____ (producers) make their own food, usually through _____

_____ (consumers) eat autotrophs or other heterotrophs

The main form (molecule) of energy accepted for cell use is _____

Outline the **nucleotide** above

Energy is stored in covalent bonds when 1 or 2 _____ join the nucleotide

Energy for cell use is released when these bonds are _____

Lets Review a couple "SUPERHERO" cell organelles

MITOCHONDRIA VS. CHLOROPLASTS

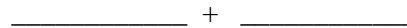


MITOCHONDRIA

CHLOROPLASTS

Found in _____ & _____ cells	Found only in _____ cells
Has own _____	Has own _____
Has _____	Has _____
Converts _____ into _____ ↓	Converts _____ into _____ (glucose) ↓

Topic 2: Photosynthesis

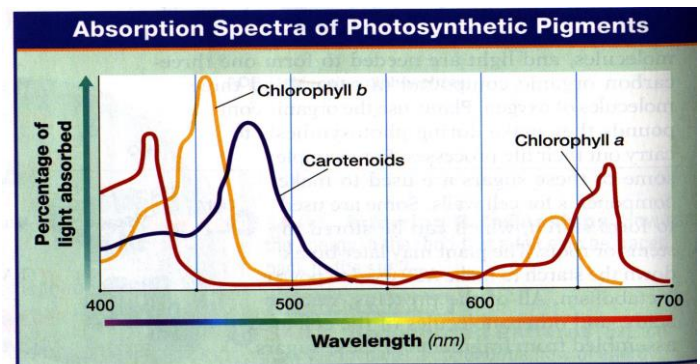


Photosynthesis occurs in 2 stages

Stage One: Light Reactions

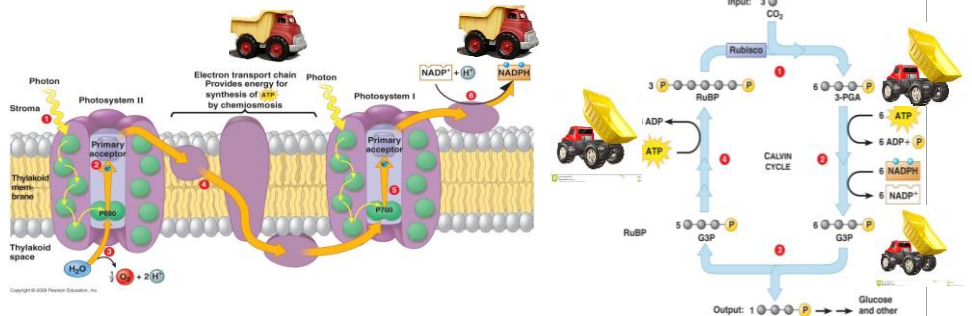
A. Light energy is captured

- Chlorophyll pigments capture _____ and _____ colors
- Carotenoid pigments add even more energy from _____ colors



- B. Energy plays “_____” or “_____” across the chlorophyll molecules until it lands on the photosystem reaction center where it causes an energized electron to _____.
- C. 2 photosystems linked by an electron transport chain (ETC) funnel energy and electrons into 2 types of “energized electron dumptrucks”

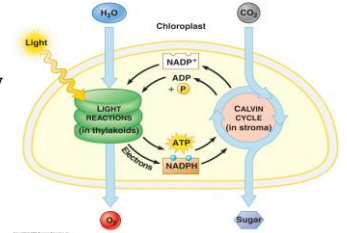
- _____
- _____



- D. H₂O is split apart to donate an _____ to replace the one energized and ejected by photosystem 2..
- _____ is the waste product released by the plant

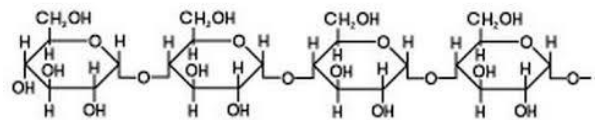
Stage Two: Calvin Cycle

- E. ATP and NADPH arrive to dump their energy and _____ into the Calvin Cycle (AKA _____) These materials supercharge each _____ that enters and several rounds of the Calvin cycle are needed to produce 1 _____ molecule
- Ultimately photosynthesis converts _____ energy into stored _____ energy



What do Plants do with the GLUCOSE that they make?

1. Glucose is converted by a mitochondria during cellular respiration into ATP for various cell jobs such as _____
2. Glucose energy is used to make a variety of plant products:
 - _____
 - _____
 - _____
3. Glucose that isn't used right away is stored as _____



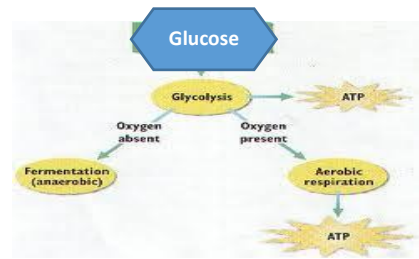
FACTORS THAT AFFECT PHOTOSYNTHESIS:

SPEED UP PHOTOSYNTHESIS	SLOW DOWN PHOTOSYNTHESIS
Increased _____	Decreased _____
Increased _____	Excessive _____ or
Increased _____	Low _____
Increased _____	Low _____
	Low _____

Topic 3: Respiration

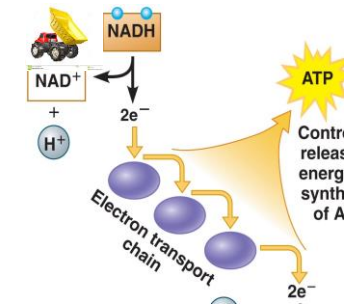
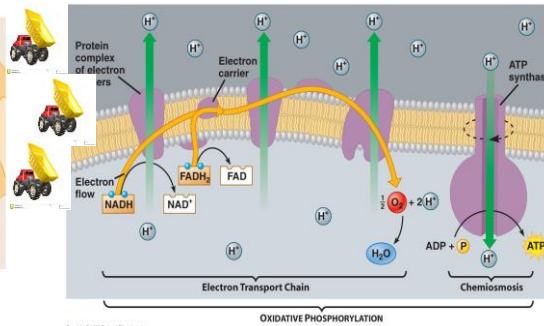
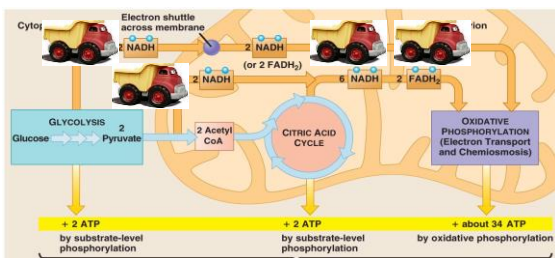
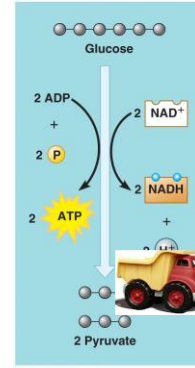
Cells can generate ATP energy from glucose in **2** different ways:

- _____ Respiration mixes glucose with _____ inside a **mitochondria** to release _____ ATP per glucose
 - Results in a _____, steady supply of energy
 - Glucose is completely broken down into _____ and _____



GLYCOLYSIS :

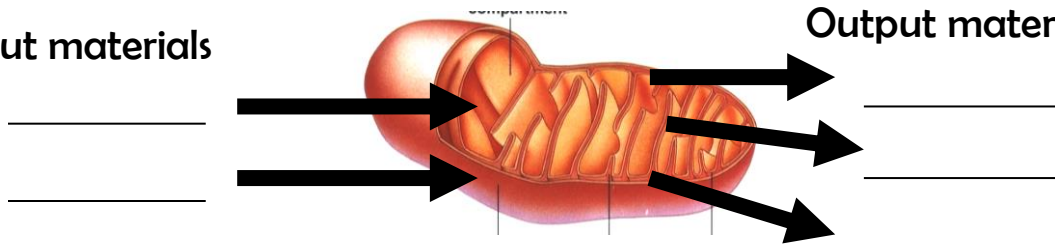
- happens in the _____
- “_____” a glucose in half
- Forms _____ 3-C Pyruvate molecules
- Recharges _____ ATP
- Loads _____ NADH energized electron “dumptrucks” that carry the energy to the _____



AEROBIC Respiration :

- happens in the _____
- Loads many more energized electron “dumptrucks” (_____, _____) with energy released from the _____ molecules during the _____ cycle
- _____ many energized electron “dumptrucks” (NADH & FADH₂) releasing _____ that fall down the _____ “stairway” of the mitochondria’s inner membrane
- _____ is needed to remove these electrons by forming _____ that can be used or removed from the cell. This keeps the ETC “stairway” _____ for the next electron
- Recharges _____ ATP in the Citric Acid cycle
- Recharges _____ ATP as energized electrons play “_____” down the ETC during the process of Oxidative Phosphorylation

Input materials



Output materials

2. _____ Respiration breaks down glucose without _____ in the **cytoplasm** to release _____ ATP per glucose
- Results in a quick, _____ burst of energy
 - Glucose is partially broken down into _____ which leads to sore and quickly fatigued muscles

FACTORS THAT AFFECT CELLULAR RESPIRATION:

SPEED UP CELLULAR RESPIRATION	SLOW DOWN CELLULAR RESPIRATION
Increased _____	Decreased _____
Increased _____	Decreased _____
Increased _____	Decreased _____
	Extreme _____ could spell _____!!!

Let's Compare Aerobic and Anaerobic Respiration

Topics	Aerobic Respiration	Anaerobic Respiration
1) INPUT material?		
2) OUTPUT material?		
3) Muscle Fiber Type?		
4) Cell Location?		
5) # ATP Produced?		
6) Energy is Delivered?		

Slow-fiber	glucose	CO ₂	Lactic Acid	low-n-steady
Fast-fiber	starch	O ₂	H ₂ O	high-n-quick
Chloroplast	Mitochondria	Cell Membrane	Cytoplasm	ribosome
1	2	12	24	36

Explore how **Photosynthesis** and **Cellular Respiration** are COMPLEMENTARY processes. Use the terms in the word bank below as needed to complete the comparison matrix.

TOPICS	Photosynthesis	Cellular Respiration
1) INPUT materials?		
2) OUTPUT materials?		
3) Energy direction?		
4) Energy TERM?		
5) Chemical bonds are?		
6) Organelle needed?		
7) Cell Type?		

Released	sunlight	mitochondria	endergonic	Plant ONLY
Absorbed	ATP	chloroplast	exergonic	Animal ONLY
Broken	kinetic	ribosome	H ₂ O	BOTH Plant/Animal
Formed	glucose	O ₂	CO ₂	