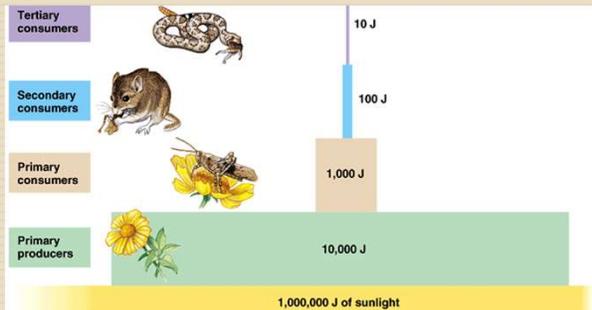


Energy Flow Through an Ecosystem

- Energy flows in 1 direction
- 10% of stored energy is transferred to the next trophic level



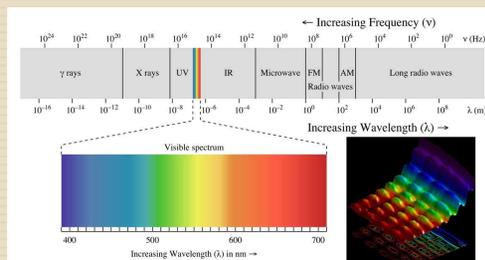
Capturing the Sun's Energy

- Plants capture the sun's energy through a process called _____.
- Why do plants capture energy?

- What is this "food" called? _____
- Chemical equation:
□ _____ + _____ + _____ → _____ + _____
- Which organelle does this process take place in?

Capturing the Sun's Energy

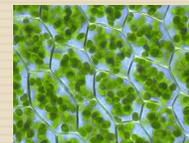
- Light is absorbed by green pigments inside the _____ called _____.
- _____ absorbs wavelengths in the visible light spectrum, especially the blue and red region.



Capturing the Sun's Energy

- Chlorophyll does not absorb green wavelengths.
- Why is chlorophyll green?

- Why do plants appear green?



How can leaves be different colors?

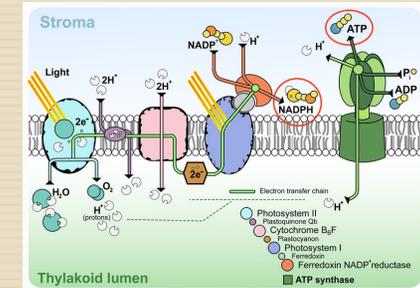
Capturing the Sun's Energy

- What else do plants need?
 - ▣ _____ & _____
- _____ diffuses through the _____.
- _____ is absorbed by the _____.



Light Energy Converted into Glucose

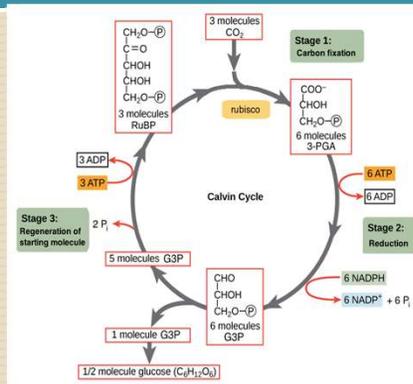
- **Photosystem II (aka. Light reactions)**
 - ▣ Series of reactions that use H₂O and light to make ATP and NADPH



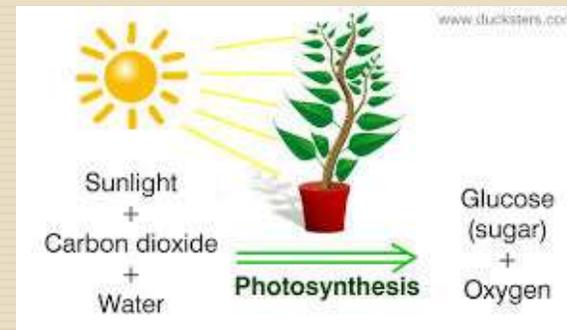
ATP: Adenosine Triphosphate
 NADPH: Nicotinamide adenine dinucleotide phosphate

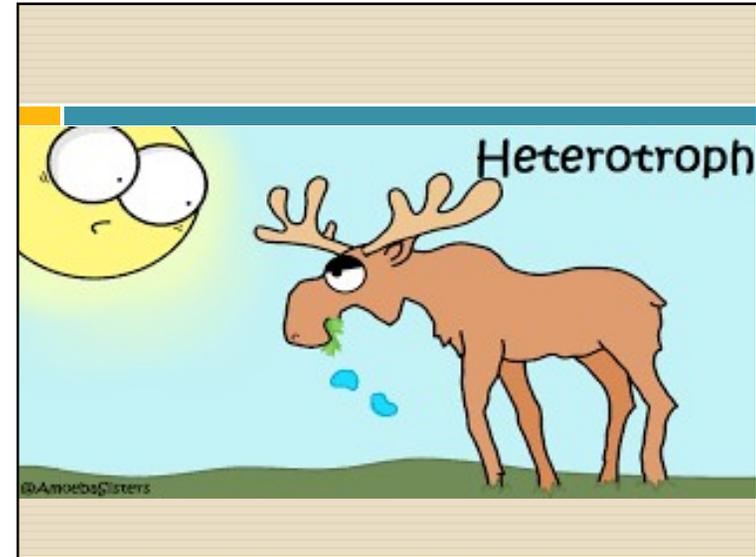
Light Energy Converted into Glucose

- **Photosystem I (aka. Calvin Cycle or Dark Reactions)**
 - ▣ Series of reactions that use CO₂ to make glucose



Photosynthesis – In a nutshell





Glucose Converted into ATP

- Why do heterotrophs eat other organisms?
 - _____
- How does the heterotroph convert the food into energy (aka. ATP)?
 - _____
- This process occurs in all cells. In what specific organelle does this process take place? _____
- Chemical equation:
 - _____ + _____ → _____ + _____ + _____

Glucose Converted into ATP

- **Glycolysis**
 - Reaction that breaks glucose into 2 pyruvate molecules, ATP, and NADH
 - Energy stored in _____ is released when bond is broken

NADH: Nicotinamide adenine dinucleotide

GLYCOLYSIS

Glucose

2 ATP → 2 ADP

ENERGY INVESTMENT

↓

ENERGY PAYOFF

NAD⁺ → NADH + H⁺ (x2)

2 ADP → 2 ATP (x2)

Pyruvate

NET

4 ATP formed - 2 ATP used = 2 ATP

Glucose → 2 Pyruvate + H₂O

2 NAD⁺ + 4e⁻ + 4H⁺ → 2 NADH + 2H⁺

Aerobic vs. Anaerobic

“In biology, aerobic means using oxygen.”

- In an **aerobic environment** (O₂ is present), pyruvate molecules enter the mitochondria and the process of **cellular respiration** begins.
- In an **anaerobic environment** (O₂ is NOT present), pyruvate molecules do NOT enter the mitochondria and the process of **fermentation** begins.

Glucose Converted into ATP

- **Krebs Cycle (aka. Citric Acid Cycle)**
 - Series of reactions that break down glucose and release energy and CO₂
 - Energy released is temporarily stored as ATP, NADH, and FADH₂

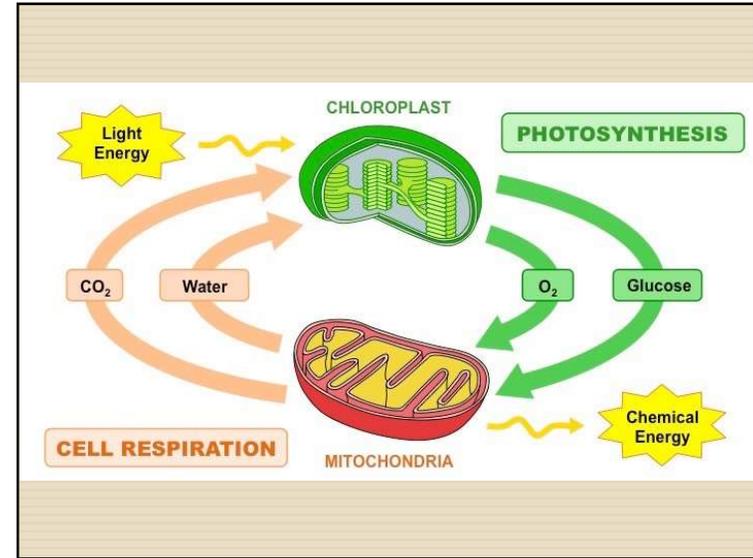
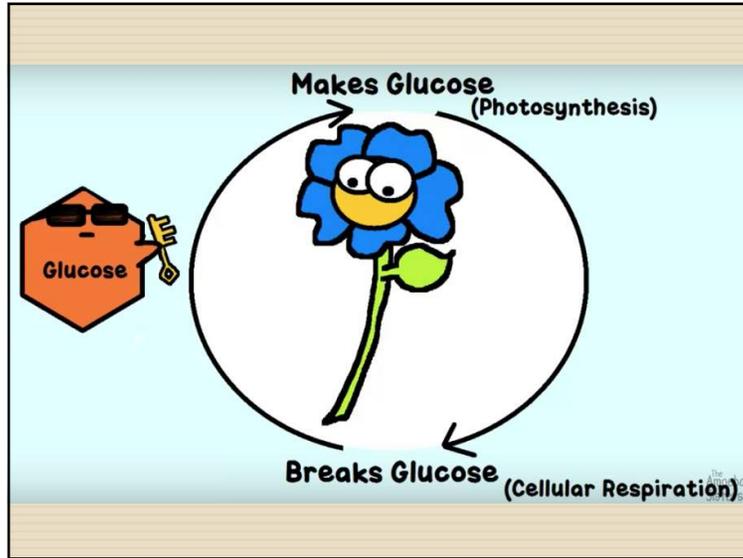
FADH₂: Flavin adenine dinucleotide

Glucose Converted into ATP

- **Electron Transport Chain**
 - Uses energy from NADH and FADH₂ from the Krebs Cycle to generate lots of ATP.
 - O₂ bond is broken and each oxygen combines with 2 hydrogens to form H₂O

Cellular Respiration – In a nutshell

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Fermentation

- **Fermentation:**
 - A process that produces ATP in an **anaerobic environment**.
- 2 types of Fermentation
 - **Alcoholic fermentation**
 - **Lactic Acid fermentation**

Fermentation

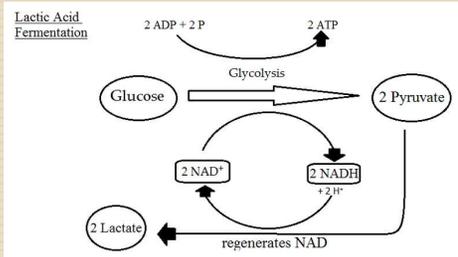
- **Alcoholic fermentation:** makes ethanol, CO₂, 2 ATP, & 2 NADH

- Bacteria, yeast, and other organisms
- Produce: Bread, kombucha, alcoholic beverages

SC1

Fermentation

- **Lactic Acid fermentation:** makes lactic acid, CO_2 , 2 ATP, & 2 NADH
- Glucose fermentation in muscles → muscle cramps



Bacteria break down lactose & produce variations of dairy products.

Fermentation

