

Photosynthesis & Respiration

S7L2d. Explain that tissues, organs, and organ systems serve the needs cells have for oxygen, food, and waste removal.



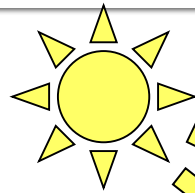
Photosynthesis



Photosynthesis Vocabulary

- **Photosynthesis**- A process by which plants convert sunlight, water, and carbon dioxide into food energy (sugar), oxygen and water.
- **Chloroplast**- An elongated cell organelle containing chlorophyll where photosynthesis takes place.
- **Chlorophyll**- A green molecule which uses light energy from sunlight to change water and carbon dioxide gas into sugar and oxygen

Four things are needed for photosynthesis:



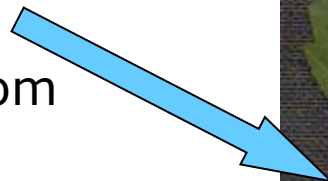
Gives the plant energy

CHLOROPHYLL

The green stuff where the chemical reactions happen

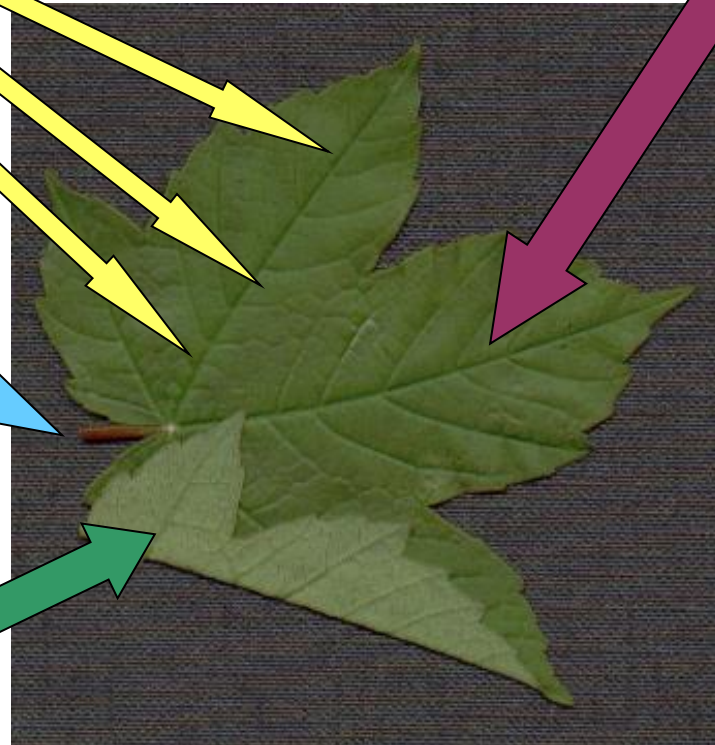
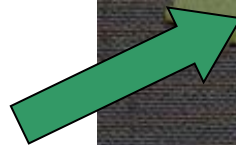
WATER

Travels up from the roots



CARBON DIOXIDE

Enters the leaf through small holes called stoma on the underneath

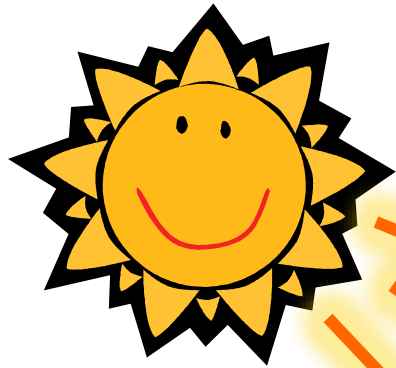


Photosynthesis Equation



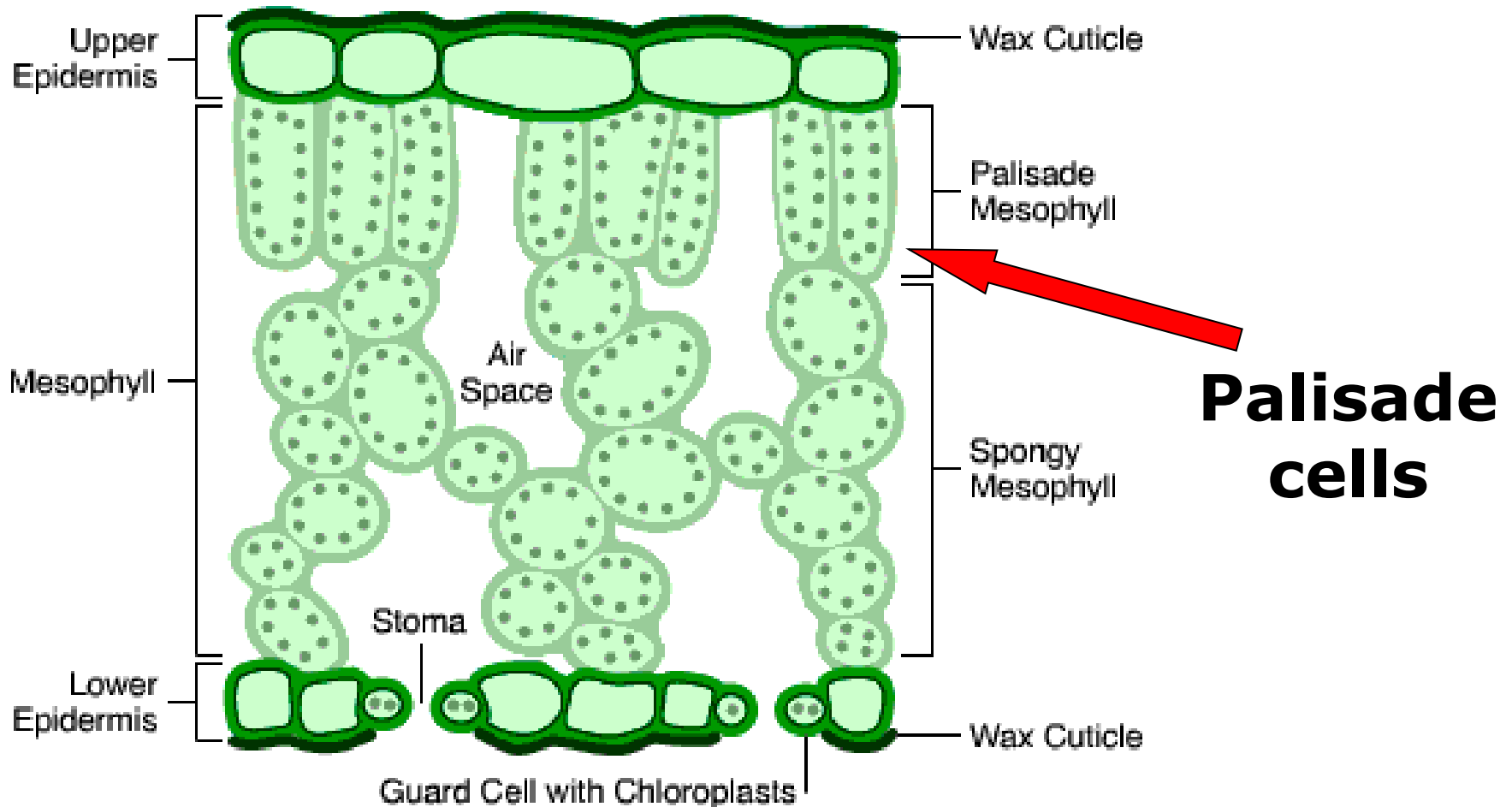
Water + Carbon + sun → Oxygen + glucose
Dioxide (sugar)

The chlorophyll absorbs the sunlight.

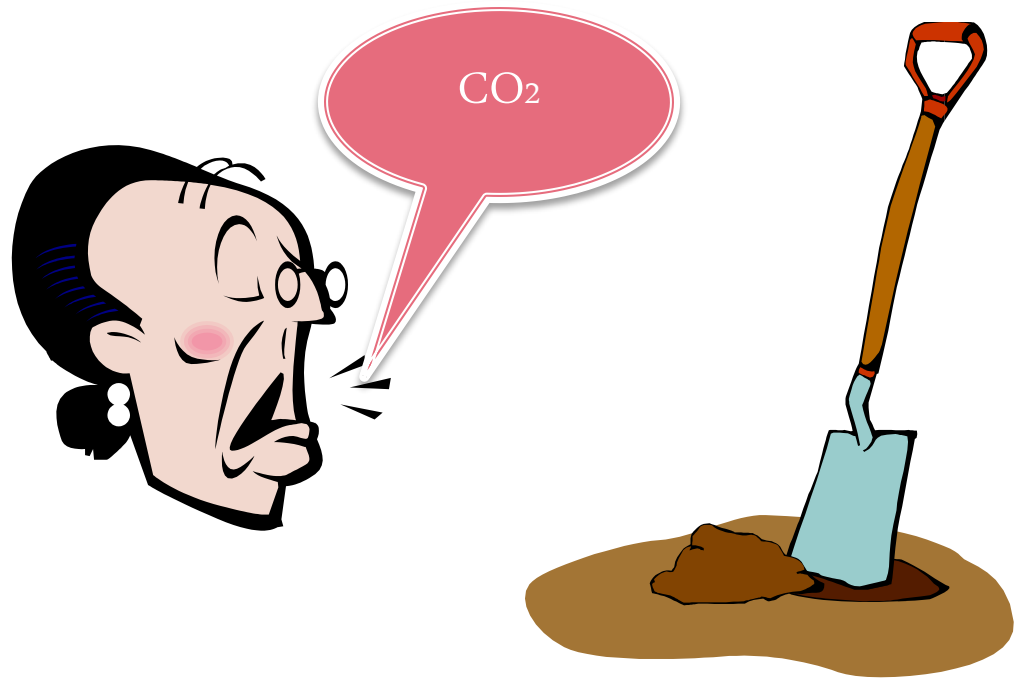


Chlorophyll is the green pigment inside the chloroplasts of plant cells that makes leaves green!

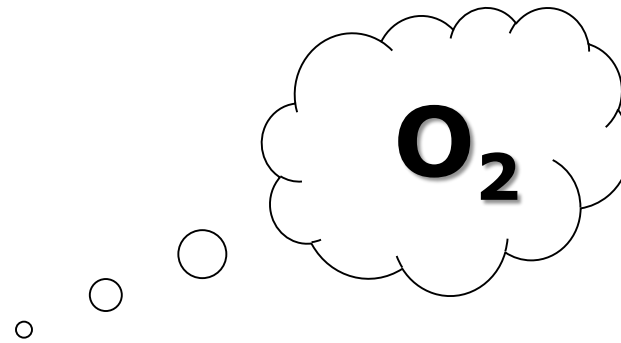
Photosynthesis happens in the "palisade" cells in the leaf:



Chlorophyll then uses sunlight to change water, carbon dioxide and, nutrients from the soil.



The chlorophyll processes the ingredients to make sugar (plant food) and oxygen.



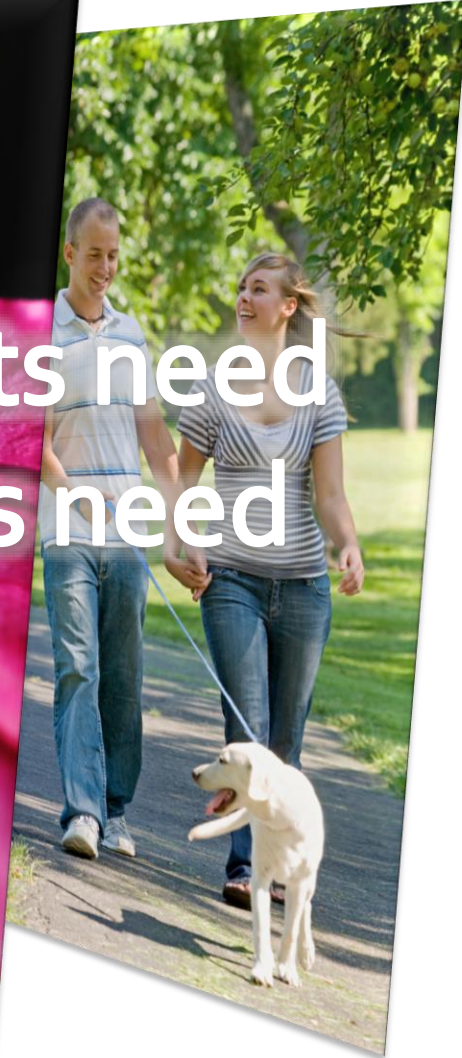
Sugar + O_2

Four factors affect photosynthesis:

1. *Light - if there is more light photosynthesis happens faster*
2. *Water - if there is not enough water photosynthesis slows down*
3. *Temperature - the best temperature is about 30°C - anything above 40°C will slow photosynthesis right down*
4. *CO₂ - if there is more carbon dioxide photosynthesis will happen quicker*

But, what about animals ?

Animals make the CO_2 plants need
Plants make the O_2 animals need



Cellular Respiration

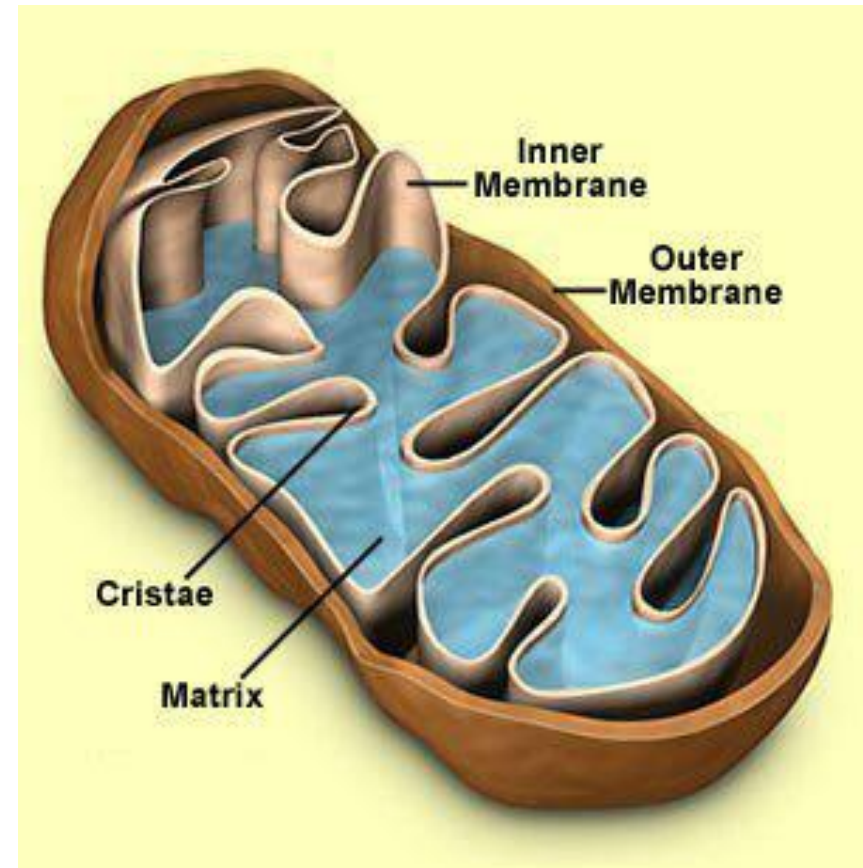


Cellular Respiration Vocabulary

- **Cellular Respiration**-The process by which the chemical energy of "food" molecules is released and changed into ATP.
- **Mitochondria**- Rod-shaped organelles with a double membrane which converts the energy stored in glucose into ATP for the cell.

The “Mighty” Mitochondria

- The mitochondria is the organelle where the final stages of cellular respiration occurs.
- Cells that use a lot of energy have high numbers of mitochondria.
 - Example: Muscle cells in the heart!!



Respiration Equation



Oxygen + glucose (sugar) → water + carbon dioxide + energy

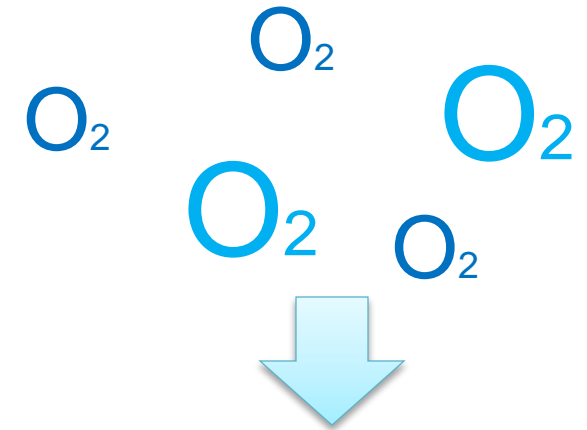
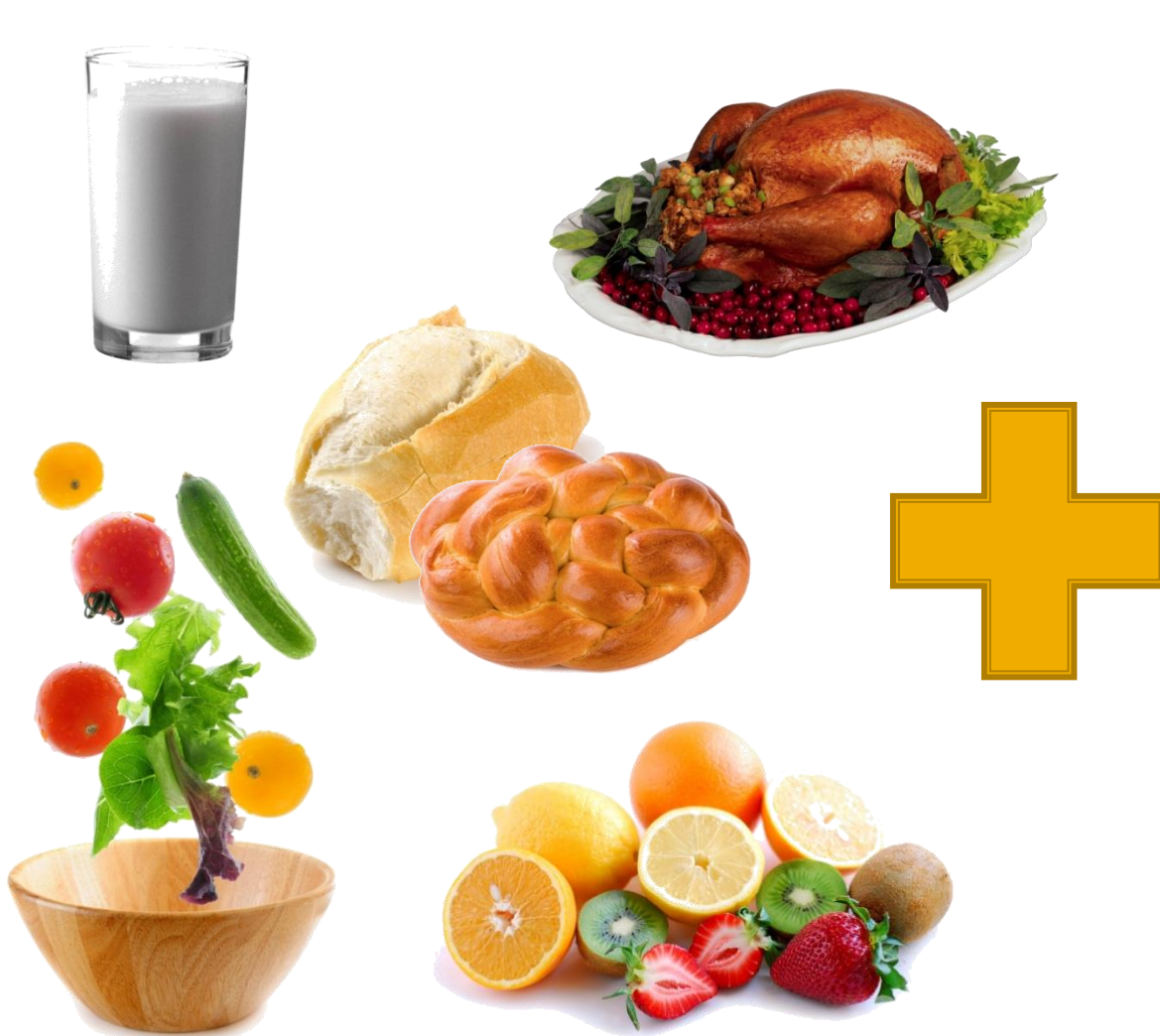
Do you notice something about this equation?

Animals & Plants Rely On Each Other

- Animals use:
 - Sugar (from producers/plants)
 - Oxygen (from producers/plants)
- Plants use:
 - Carbon dioxide (from animals)



The mitochondria change the O_2 and sugars (food)



Into CO_2 , H_2O , and ATP



ATP

Energy



What Is ATP?

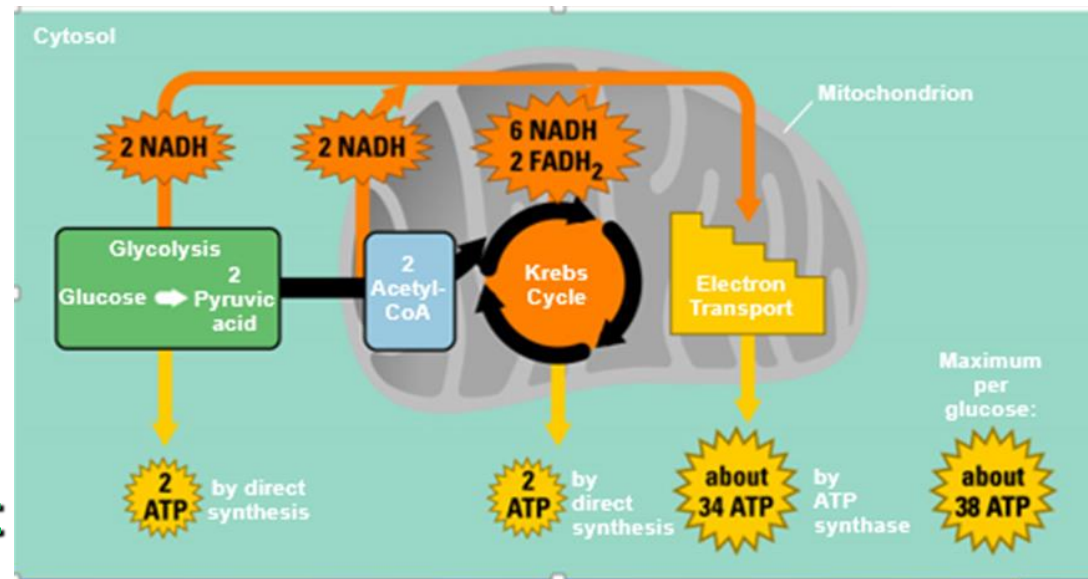
Energy used by all Cells

Adenosine Triphosphate

**Organic molecule containing
high-energy Phosphate bonds**

What are the Stages of Cellular Respiration?

- **Glycolysis**
 - In cytoplasm
 - Doesn't require oxygen (anaerobic)
 - Produces 2ATP
- **The Krebs Cycle**
 - In mitochondria matrix
 - Produces 2 ATP
- **The Electron Transport Chain**
 - In mitochondria across cristae
 - Produces 34 ATP



Comparing Equations

Photosynthesis Equation:



Respiration Equation:



They are opposites of each other!