

LESSON 4:

CELLS AND ENERGY

STANDARDS

- **7.LS1.9**

- **CONSTRUCT A SCIENTIFIC EXPLANATION BASED ON COMPILED EVIDENCE FOR THE PROCESSES OF PHOTOSYNTHESIS, CELLULAR RESPIRATION, AND ANAEROBIC RESPIRATION IN THE CYCLING OF MATTER AND FLOW OF ENERGY INTO AND OUT OF ORGANISMS.**

I CAN...

- **TELL HOW A CELL OBTAINS ENERGY.**

ESSENTIAL QUESTIONS

- **HOW DOES A CELL OBTAIN ENERGY?**
- **HOW DO SOME CELLS MAKE FOOD MOLECULES?**

PHENOMENON



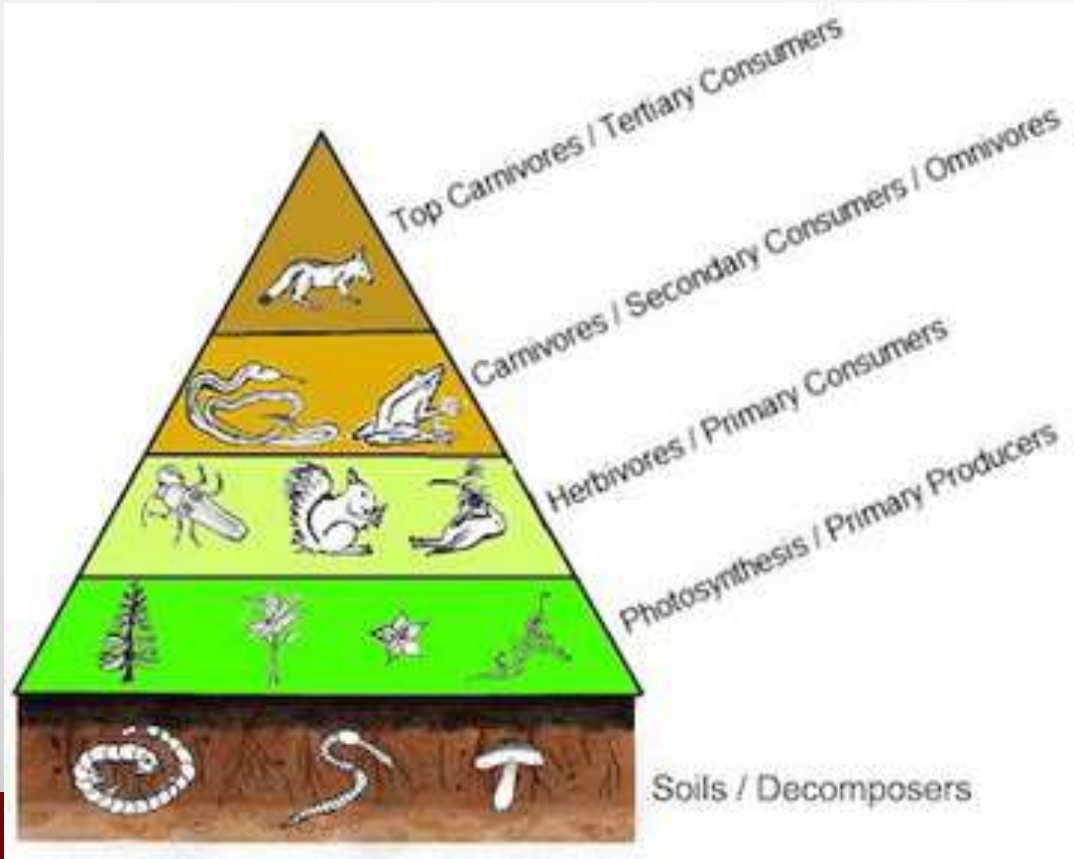
- **AN ATHLETE HAS A KNEE INJURY AND IS UNABLE TO GO TO PRACTICE FOR 6 WEEKS. WHEN THEY'RE ABLE TO PARTICIPATE IN PRACTICE AGAIN, THEY NOTICE THAT THEY BECOME OUT OF BREATH EASILY. WHAT'S GOING ON ON A CELLULAR LEVEL?**

METABOLISM



- **METABOLISM IS THE SUM OF ALL CHEMICAL REACTIONS IN YOUR BODY.**

CELLULAR RESPIRATION



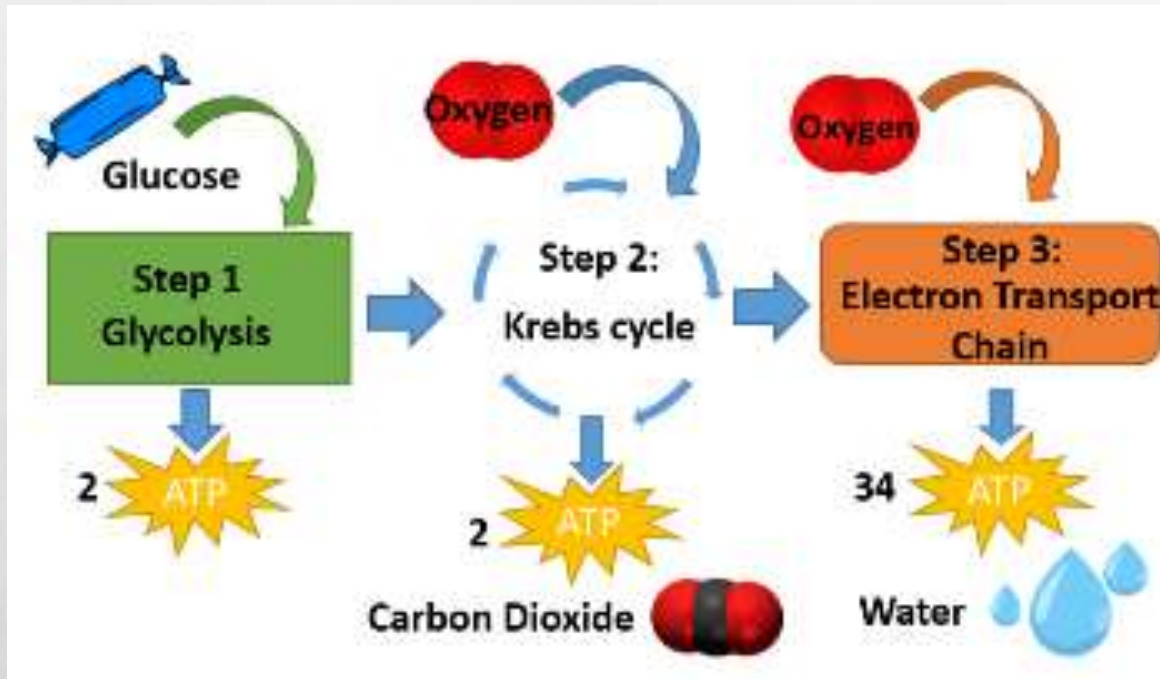
- **ALL LIVING THINGS NEED ENERGY TO SURVIVE.**

CELLULAR RESPIRATION



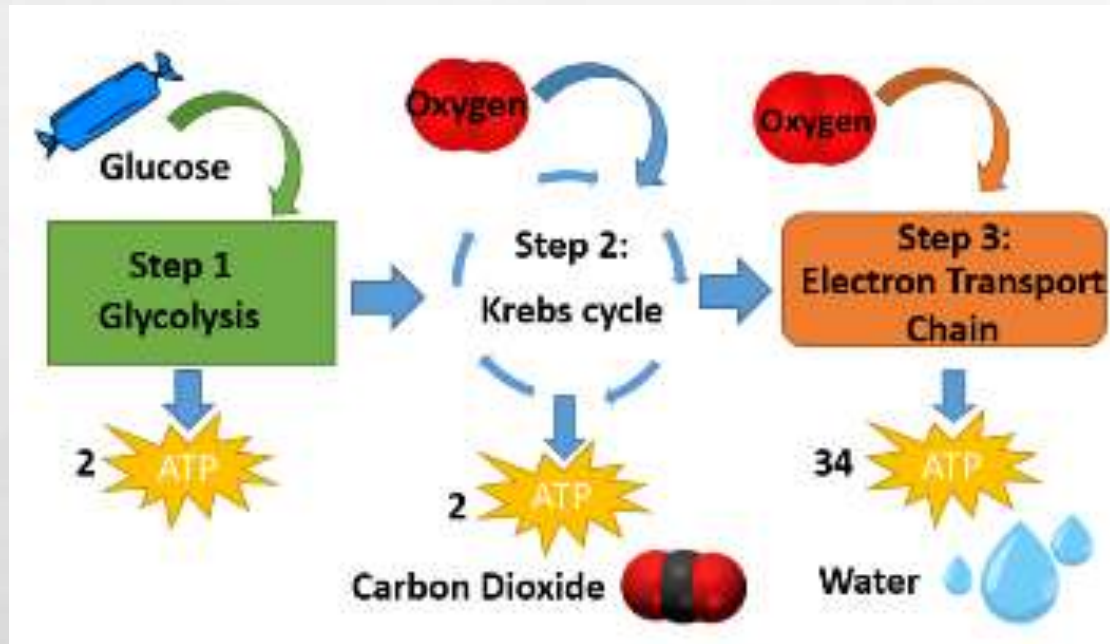
- **CELLULAR RESPIRATION IS A SERIES OF CHEMICAL REACTIONS THAT CONVERT THE ENERGY IN FOOD MOLECULES INTO A USABLE FORM OF ENERGY CALLED ATP.**

CELLULAR RESPIRATION



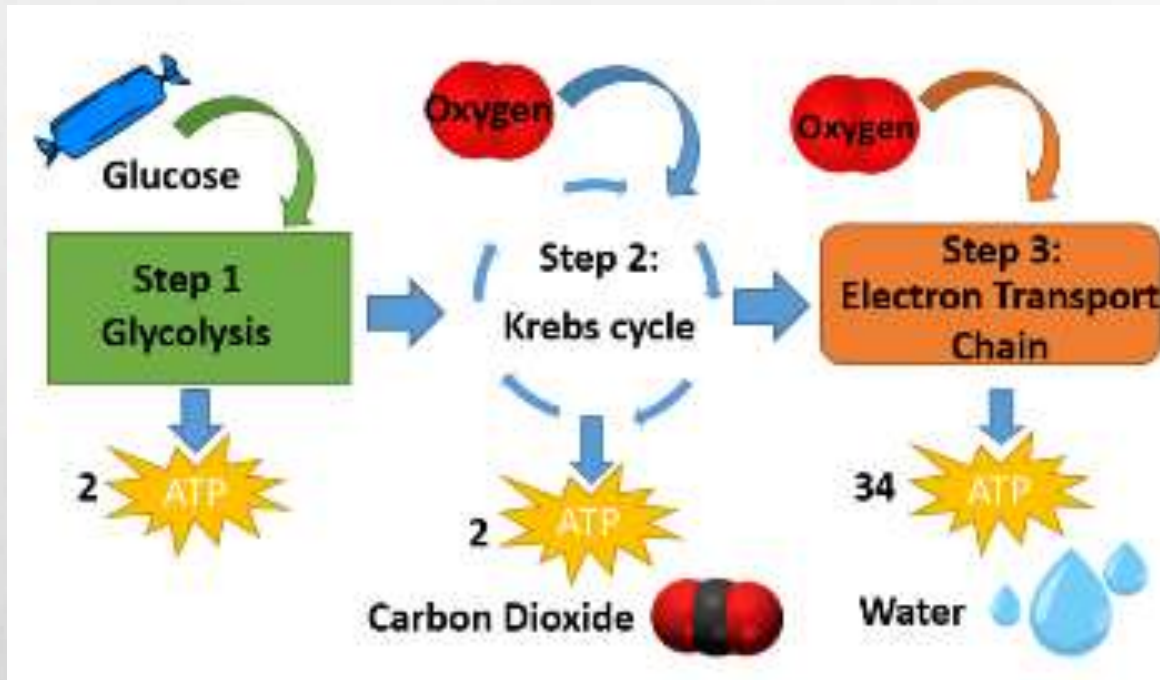
- **THE FIRST STEP OF CELLULAR RESPIRATION, CALLED GLYCOLYSIS, OCCURS IN THE CYTOPLASM OF ALL CELLS.**

CELLULAR RESPIRATION



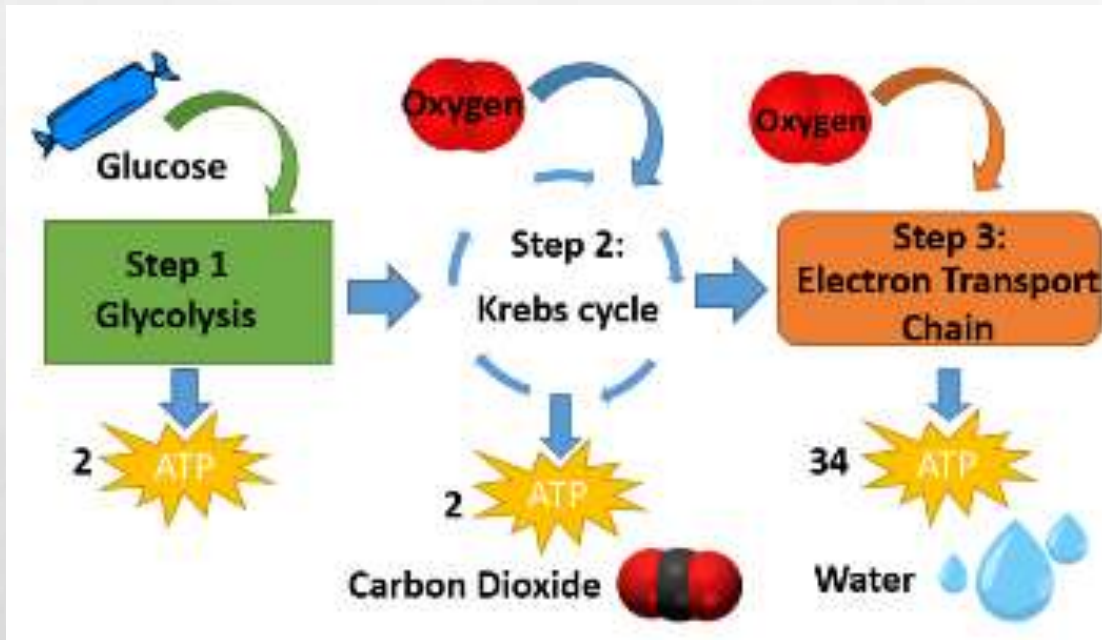
- **DURING GLYCOLYSIS GLUCOSE, A SUGAR, IS BROKEN INTO SMALLER MOLECULES.**

CELLULAR RESPIRATION



- **THE SECOND STEP OF CELLULAR RESPIRATION OCCURS IN THE MITOCHONDRIA OF EUKARYOTIC CELLS. THIS STEP REQUIRES OXYGEN.**

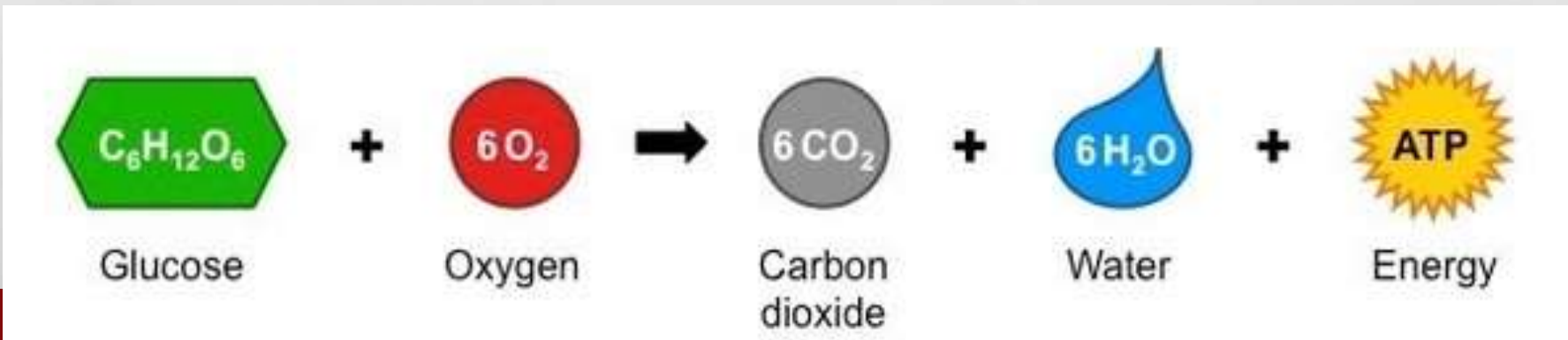
CELLULAR RESPIRATION



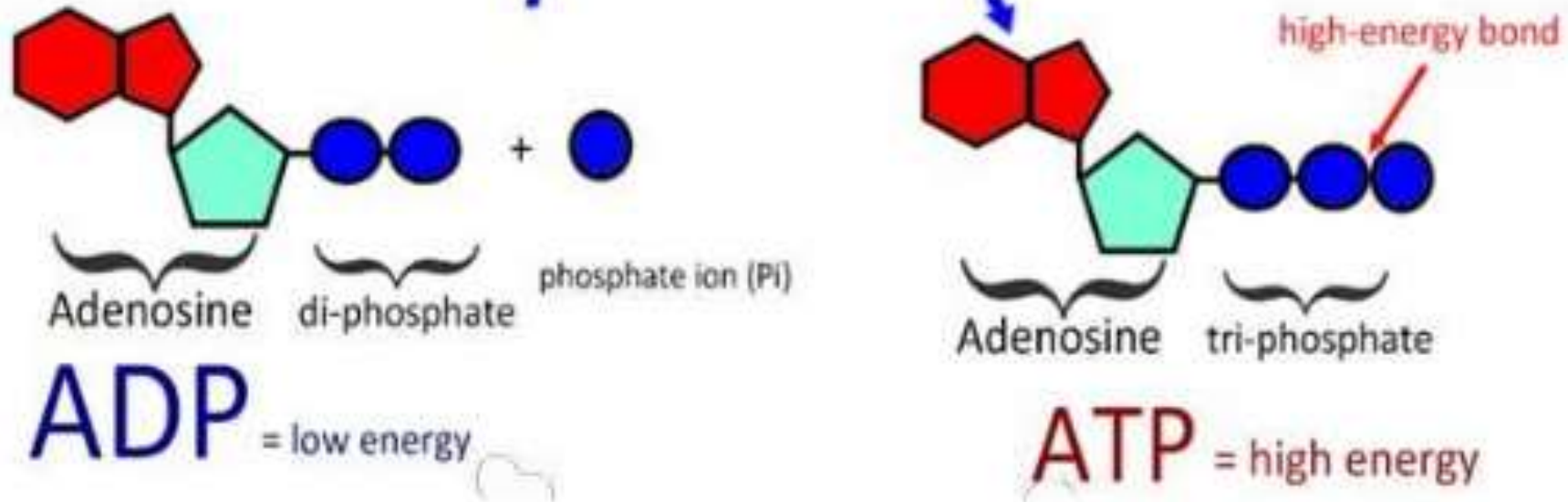
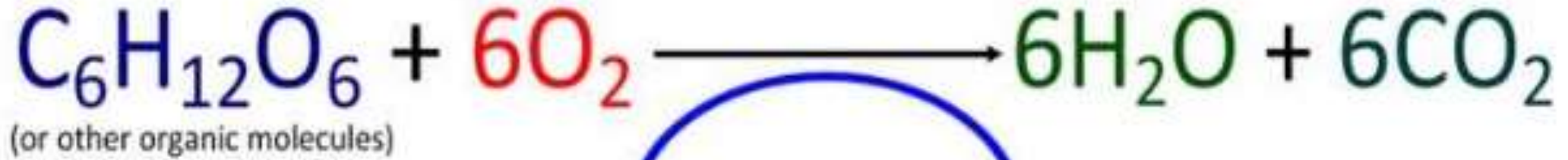
- **DURING THE SECOND STEP OF CELLULAR RESPIRATION, THE SMALLER MOLECULES MADE DURING GLYCOLYSIS ARE BROKEN DOWN. LARGE AMOUNTS OF USABLE ENERGY, CALLED ATP, ARE PRODUCED.**

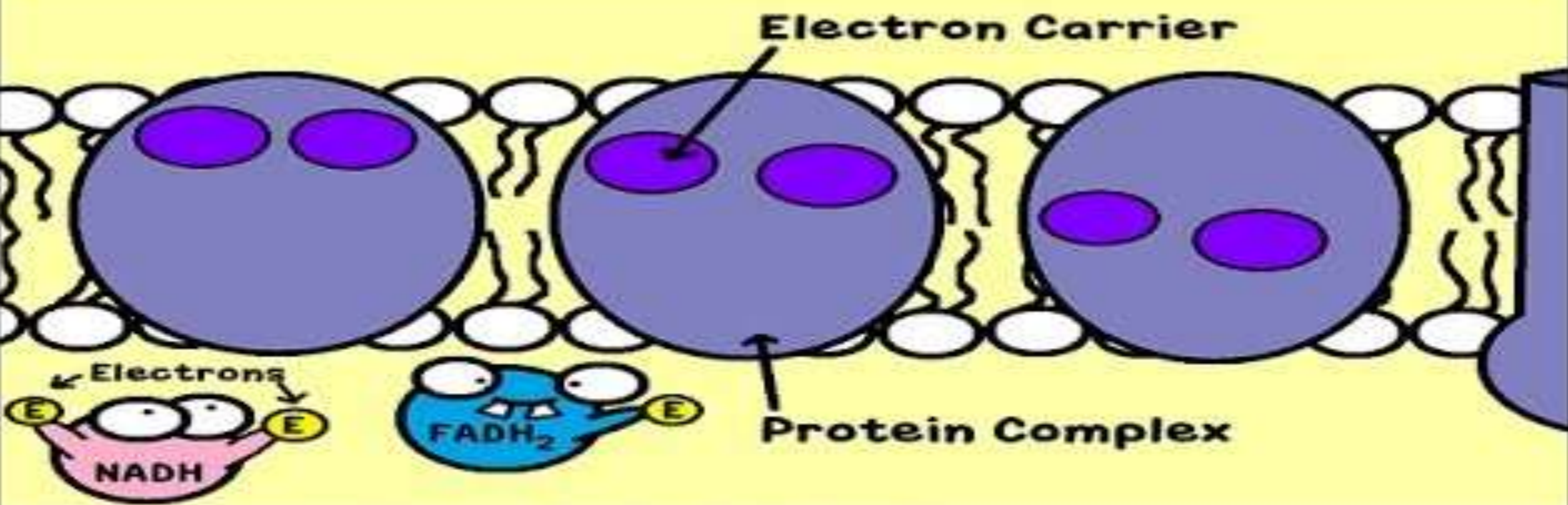
CELLULAR RESPIRATION

- **WATER AND CARBON DIOXIDE (CO₂) ARE TWO WASTE PRODUCTS THAT ARE GIVEN OFF DURING THE SECOND STEP OF CELLULAR RESPIRATION.**



Cell Respiration





Cellular Respiration

With the Amoeba Sisters

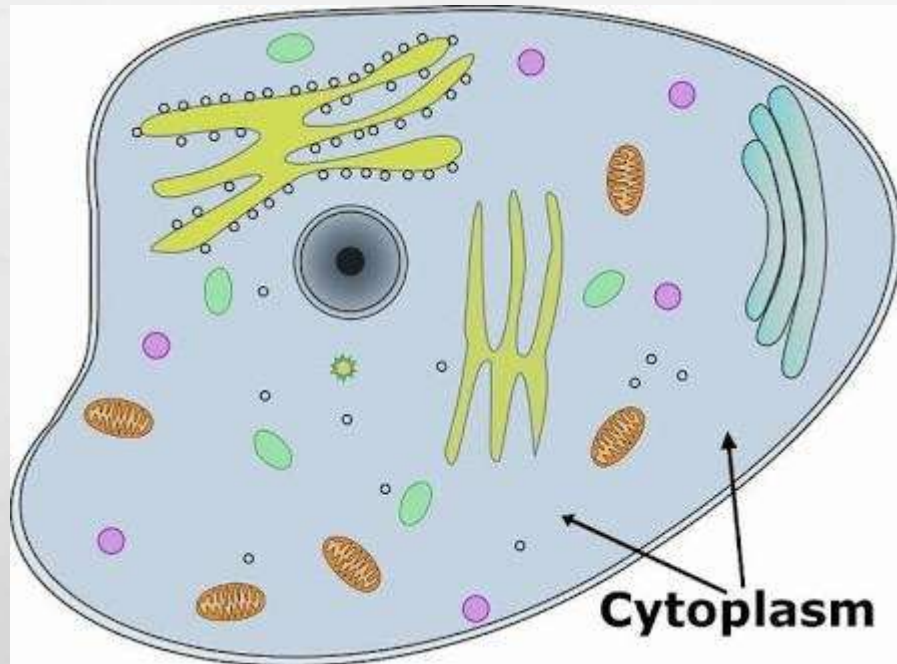
Yeast Cells



No oxygen?
NO PROBLEM!



FERMENTATION



- **FERMENTATION OCCURS IN A CELL'S CYTOPLASM.**

FERMENTATION



- **LACTIC-ACID
FERMENTATION
CONVERTS GLUCOSE
INTO ATP AND A WASTE
PRODUCT CALLED
LACTIC ACID.**

FERMENTATION



- **SOME TYPES OF BACTERIA AND YEASTS MAKE ATP DURING ALCOHOL FERMENTATION. THIS PROCESS PRODUCES ETHANOL AND CO₂.**



Fermentation

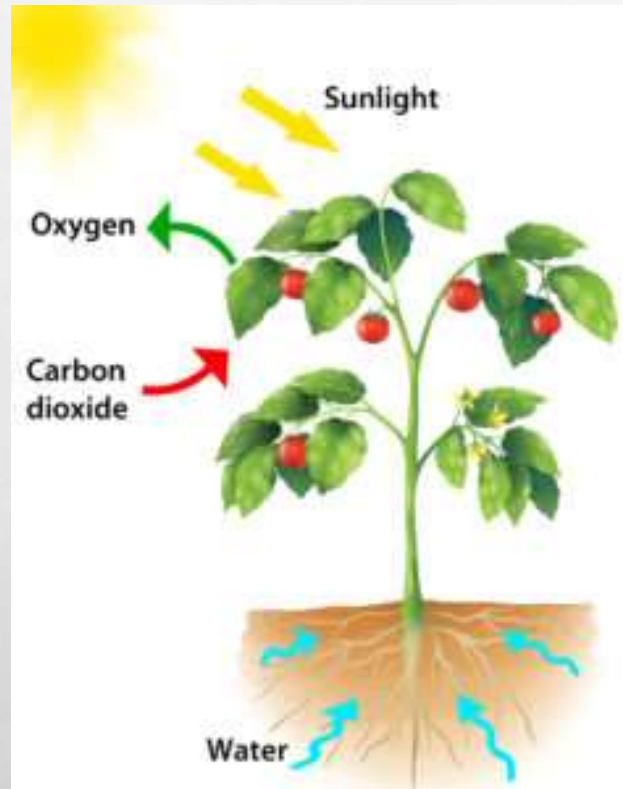
with the Amoeba Sisters

PHOTOSYNTHESIS



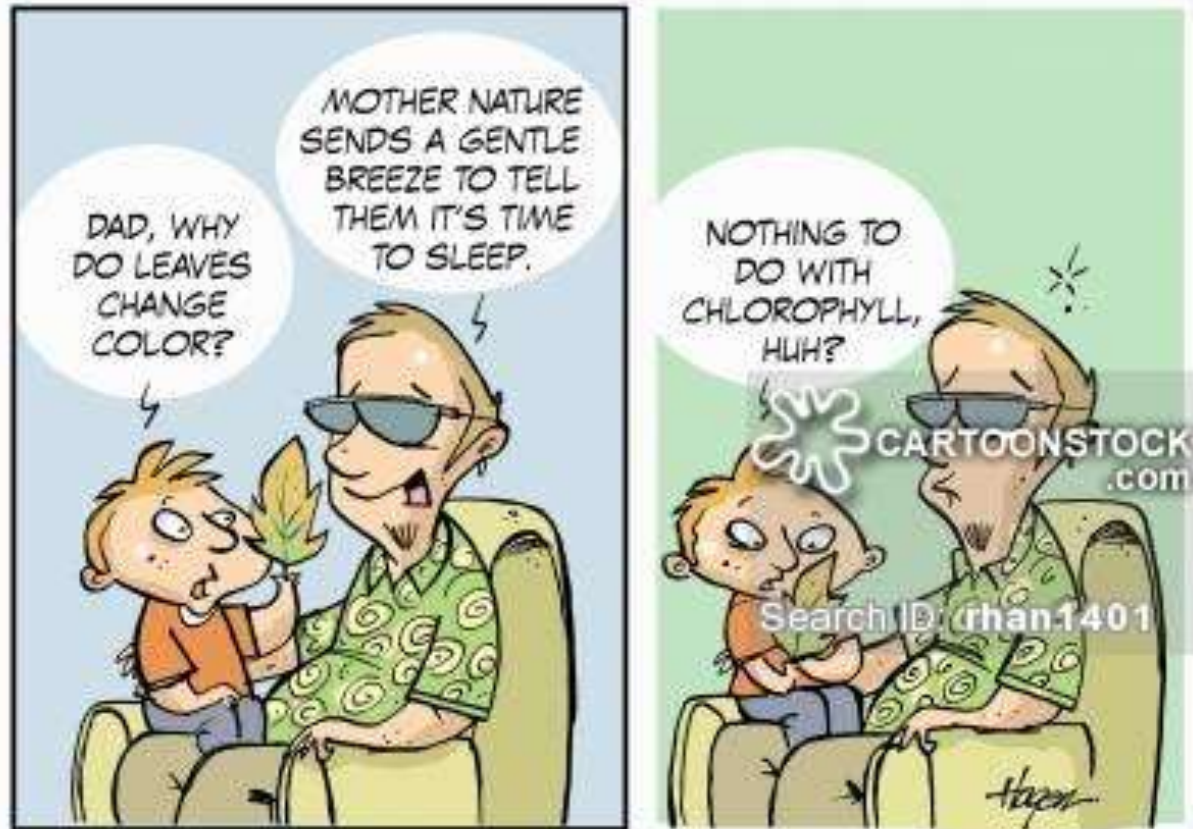
- **PLANTS AND SOME UNICELLULAR ORGANISMS OBTAIN ENERGY FROM LIGHT.**

PHOTOSYNTHESIS



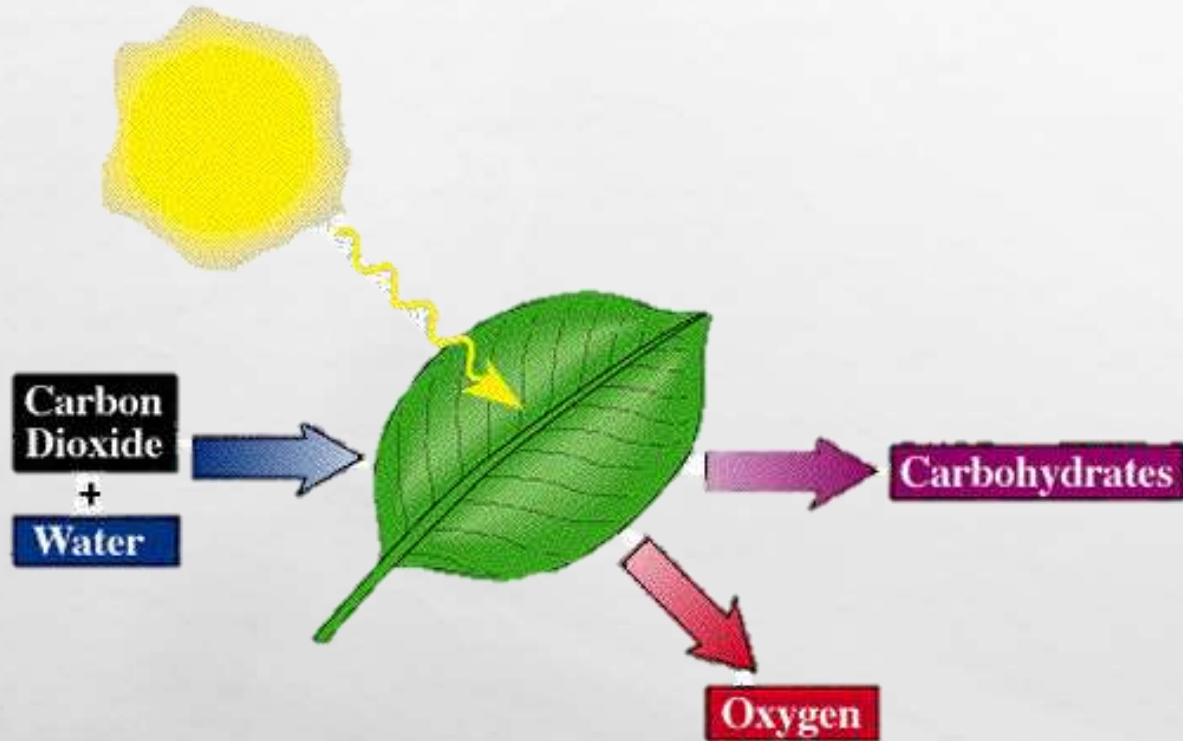
- **PHOTOSYNTHESIS IS A SERIES OF CHEMICAL REACTIONS THAT CONVERT LIGHT ENERGY, WATER, AND CO₂ INTO GLUCOSE AND OXYGEN.**

PHOTOSYNTHESIS



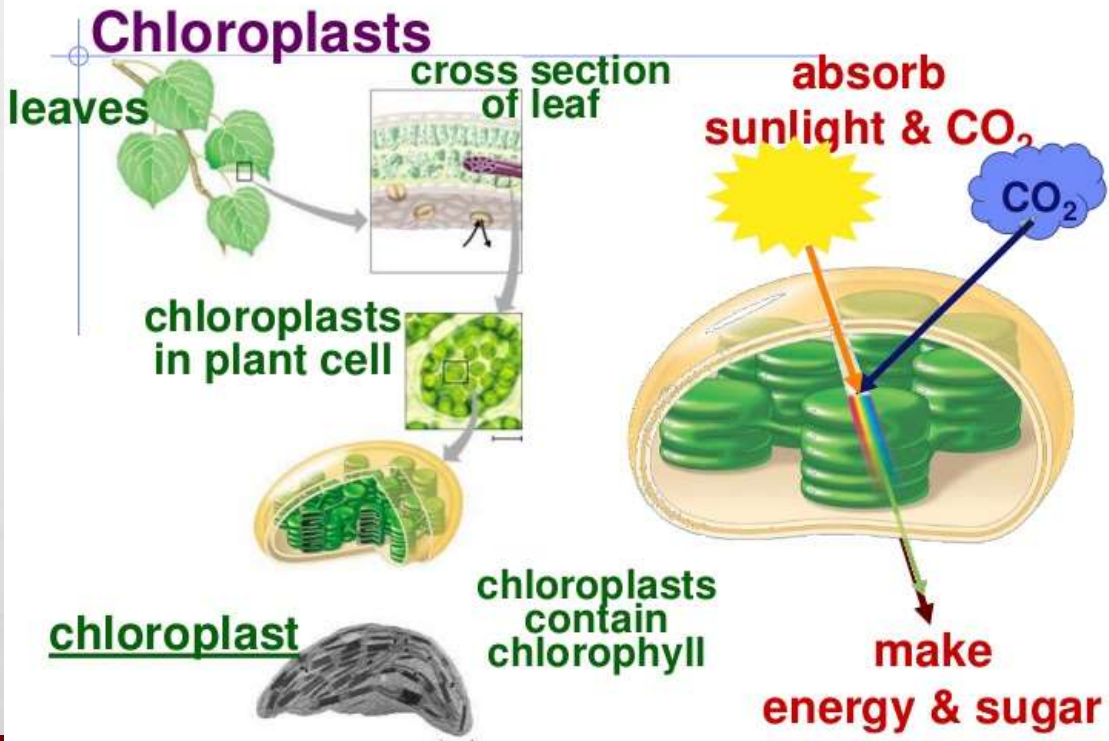
- **IN PLANTS, LIGHT ENERGY IS ABSORBED BY PIGMENTS SUCH AS CHLOROPHYLL.**

PHOTOSYNTHESIS



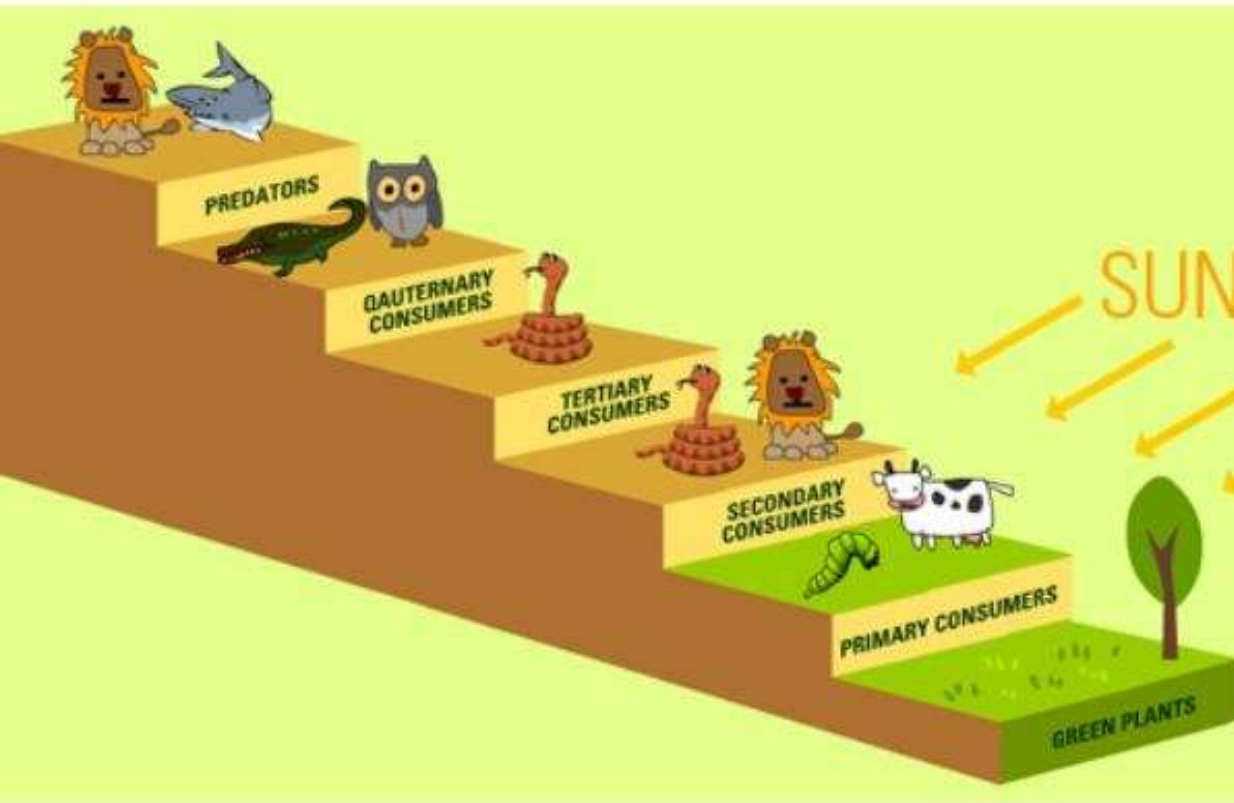
- **THE CHEMICAL REACTIONS OF PHOTOSYNTHESIS OCCUR IN CHLOROPLASTS, THE ORGANELLES IN PLANT CELLS THAT CONVERT LIGHT ENERGY INTO FOOD.**

PHOTOSYNTHESIS

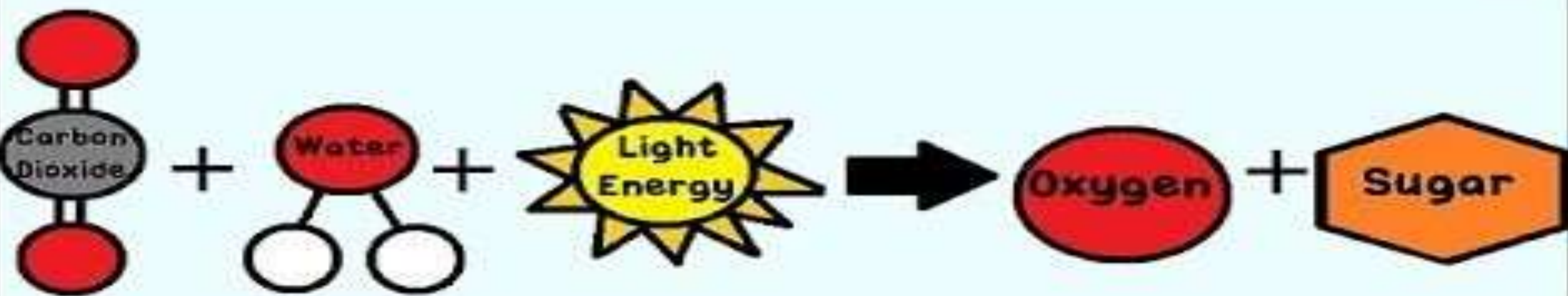


- **PHOTOSYNTHESIS USES CO₂ THAT IS RELEASED DURING CELLULAR RESPIRATION TO MAKE FOOD ENERGY AND RELEASE OXYGEN.**

PHOTOSYNTHESIS



- **WHEN AN ORGANISM EATS PLANT MATERIAL, IT TAKES IN FOOD ENERGY. AN ORGANISM'S CELLS USE OXYGEN RELEASED DURING PHOTOSYNTHESIS.**

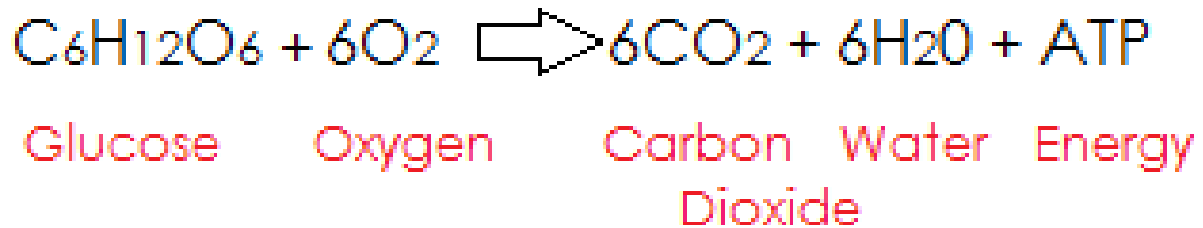


Photosynthesis

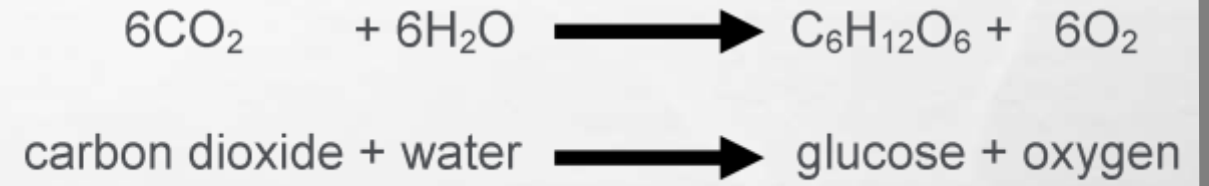
With the Amoeba Sisters



Cell Respiration Formula



Photosynthesis



Fermentation



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