

Study Guide: Cells and Diffusion and Photosynthesis / Cellular Respiration

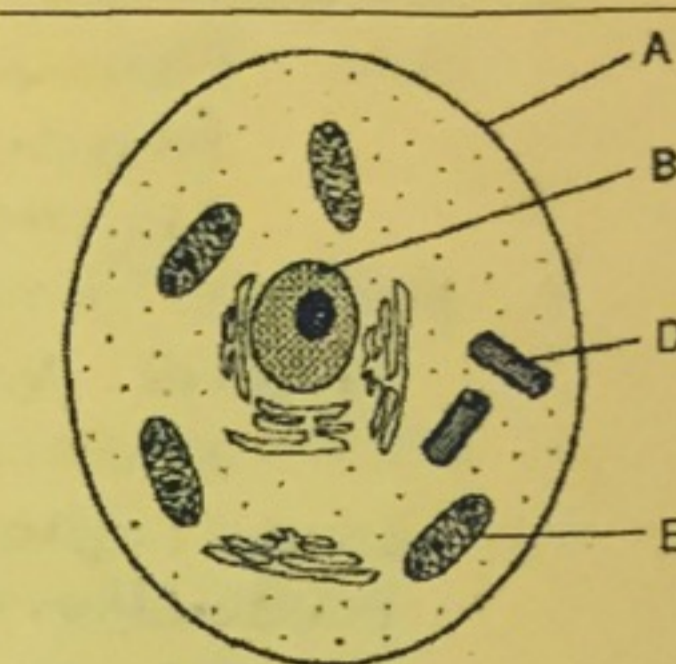
Cell: A Tour of the Cell

ORGANELLES

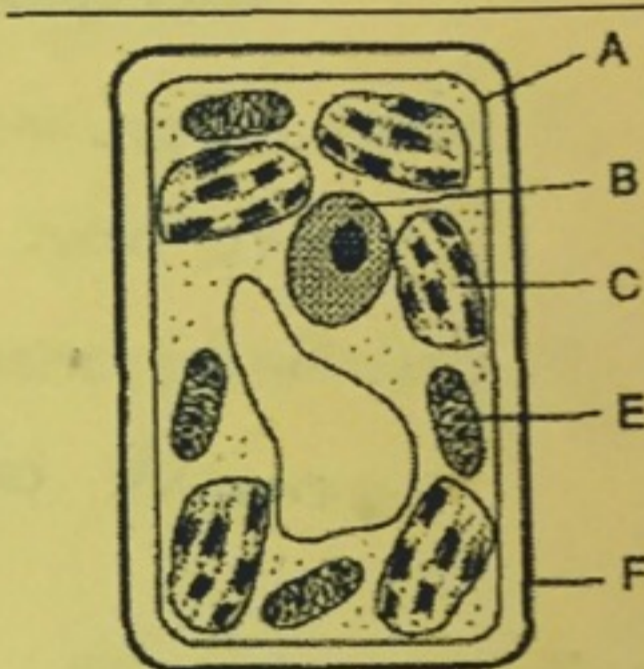
Name the following organelles

1. Nucleus
 - controls the cell, contains hereditary material (chromosomes, genes, DNA)
2. Cytosol
 - fluid/liquid in the cell – mostly water & salts, helps transport material around cell
3. Mitochondria
 - carries out cellular respiration, gives cell energy ("powerhouse of the cell").
4. Ribosome
 - reads mRNA & builds proteins from amino acids.
5. Vacuole
 - stores food, water and waste, food vacuoles may digest large molecules
 - waste vacuoles may excrete waste out the cell membrane
6. Chloroplast
 - carries out photosynthesis, only found in plant and algae cells
7. Cell Wall
 - gives **plant** cell shape, structure and protection, NEVER found in animal cells
8. Cell/Plasma Membrane
 - separates cell interior from environment, controls what enters and leaves the cell
 - material leaves & enters cells through protein channels
 - signals from other cells are received by proteins
 - has receptors which are proteins that identify the cell and prevent the cell from being attacked by its own immune system
9. ~~Golgi Apparatus~~ Rough ER
 - Modifies proteins and transports them to other parts of the cell. Especially important in modifying proteins that will be secreted out of the cell.
10. Golgi Apparatus
 - Receives proteins, lipids, and other cell products from the ER, and modifies and ships them to other locations within or outside the cell.
11. Smooth ER
 - Makes lipids (oils, steroid hormones, phospholipids), metabolizes carbs, and helps detoxify drugs, stores calcium ions
12. Lysosomes
 - Contain powerful hydrolytic enzymes to break down food, waste, or dead organelles within the cell.
13. Peroxisomes
 - Produces and breaks down hydrogen peroxide; breaks down fatty acids.
14. Cytoskeleton
 - Maintains shape, anchors organelles, helps move organelles
15. Extracellular Matrix
 - Support, regulates cells activities
16. Cell Junctions
 - Communication, binding cells together

What kind of cell?



What kind of cell?



Label the organelles above:

- A Membrane
- B Nucleus
- C Chloroplast
- D Centriole
- E Mitochondria
- F Cell Wall

1. What does the cell theory tell us about cells?
 - All living things are made of cells
 - new cells come from old cells
2. How are plant cells and animals similar? How are they different?

All other organelles are the same

Cell Wall
Chloroplast
Vacuole
3. How are prokaryotic and eukaryotic cells similar? How are they different? Use examples of each.

Plasma membrane
Ribosomes
Cytosol

Membrane Bound Organelles
+ Nucleus in Eukaryotic
4. What is the cell membrane made up of?

lipid bilayer
5. Which organelles contain DNA? How did this come about?

Chloroplast
Mitochondria
Nucleus

↳ Endosymbiotic Theory
- used to be bacteria
6. What happens to the surface-area-to-volume ratio as a cell becomes smaller?

increases
7. Why is cell size limited?

diffusion of nutrients/waste products needs to happen quickly
8. Describe the surface-area-to-volume phenomena.

small cells = $\uparrow \frac{SA}{V}$ ratio = faster diffusion

Ch. 5: The Working Cell

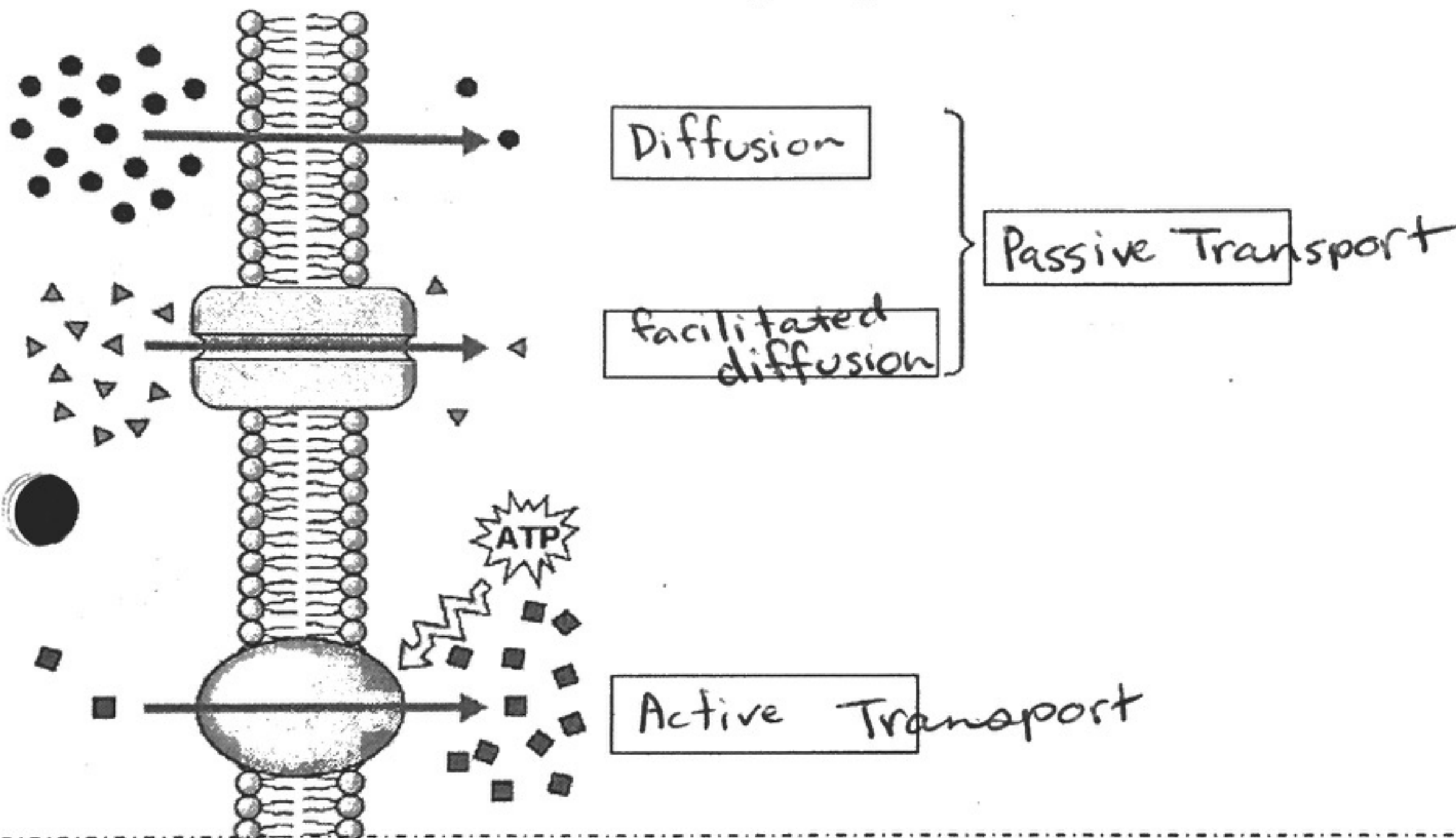
Passive Transport:

1. Diffusion: movement of particles from high conc. to low
2. Since the flow of materials is from high concentration to low concentration, diffusion requires no energy.
3. Lipids move directly through the membrane, so we call that process **simple diffusion**
4. Other small molecules (like glucose) cannot flow directly across the lipid layer, so there must protein channels that allow them to diffuse through the cell membrane. We call this process facilitated diffusion (diffusion with help).
5. Osmosis: movement of water from high conc. to low
6. Since osmosis is just a special case of diffusion — the flow of water is still from high concentration of water to low concentration of water, osmosis requires no energy.

Active Transport

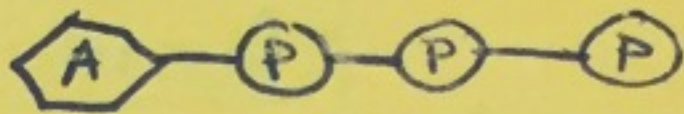
1. When cells need to move material in the opposite direction as diffusion, from low concentration to high concentration, they need to pump it, so this **requires energy**.
2. ATP is the molecule that all cells use as energy.
3. Proteins in the cell membrane act as the active transport pumps.

Fill in the table above using some of the terms describe in the sections above. Describe the movement of particles that is happening at each arrow.



1. What are the differences between hypotonic solutions, hypertonic solutions, and isotonic solutions?
 low in solute high in solute = in solute
2. Under what conditions would cells shrink? Swell? Or stay the same? Isotonic
 hypertonic Hypotonic
3. What is a concentration gradient? Be able to apply this definition.
Difference in concentration across a membrane

- What does selective permeability mean?
picky about what enters + leaves
- How is facilitated diffusion similar to active transport?
both use a protein channel
- What MUST be supplied in order for particles to cross the membrane from an area of lower concentration to higher concentration? **ATP**
- What cell processes do NOT require energy to pass in and out of the cell?
Diffusion, Osmosis, Facilitated Diffusion
- What is the difference between endergonic and exergonic reactions?
store energy release energy
- Explain why/how energy is stored in ATP. Draw a molecule of it below.
The energy is stored in the chemical bonds

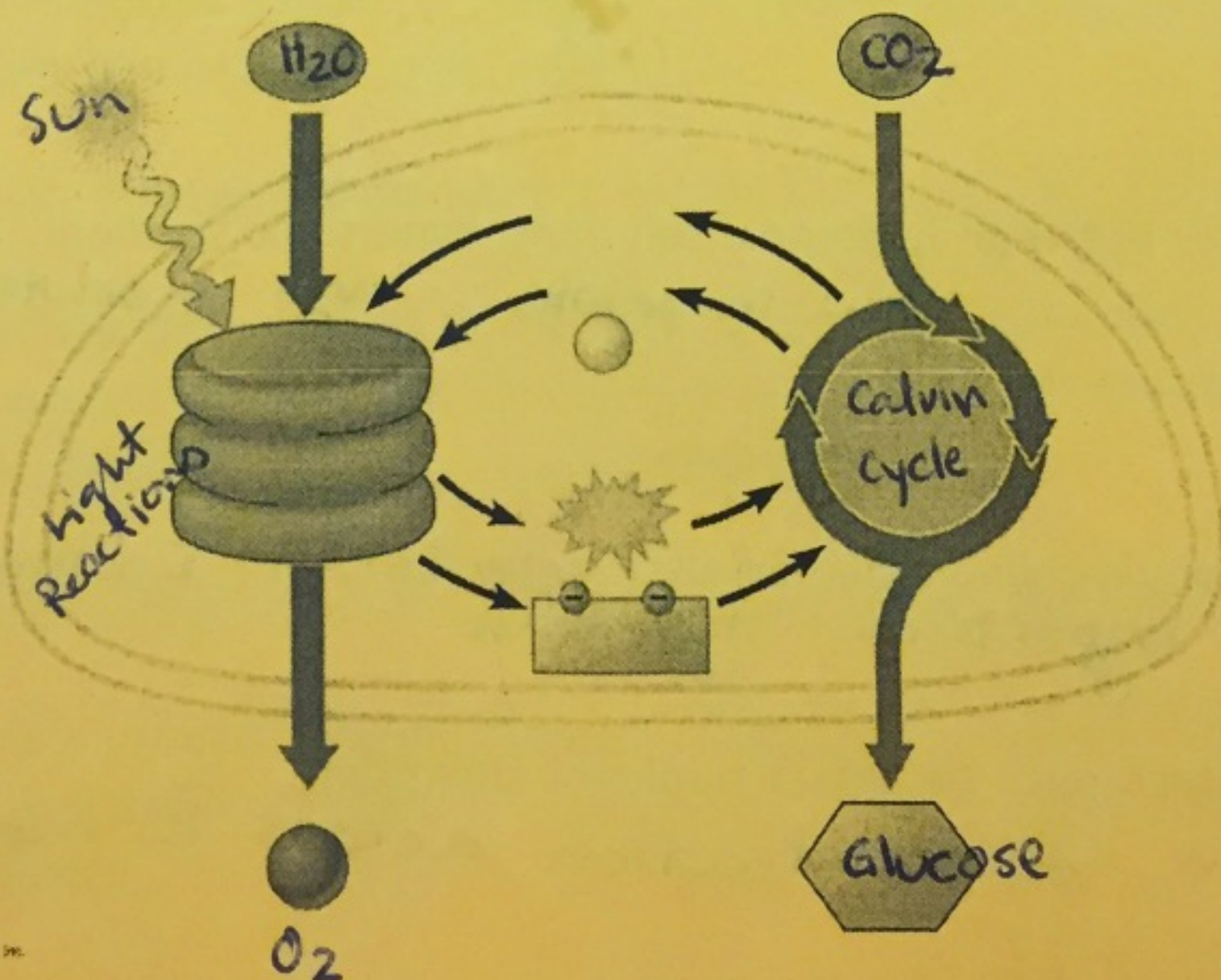
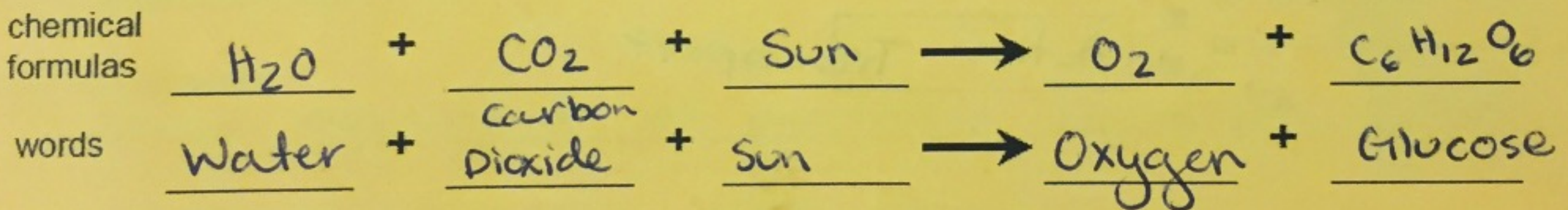


- Describe the relationship between enzymes and their substrates. What do enzymes do?
enzymes bond with substrates to cause a chemical reaction

Ch. 6 and 7 Photosynthesis and Cellular Respiration

Photosynthesis

Write the formula for photosynthesis:

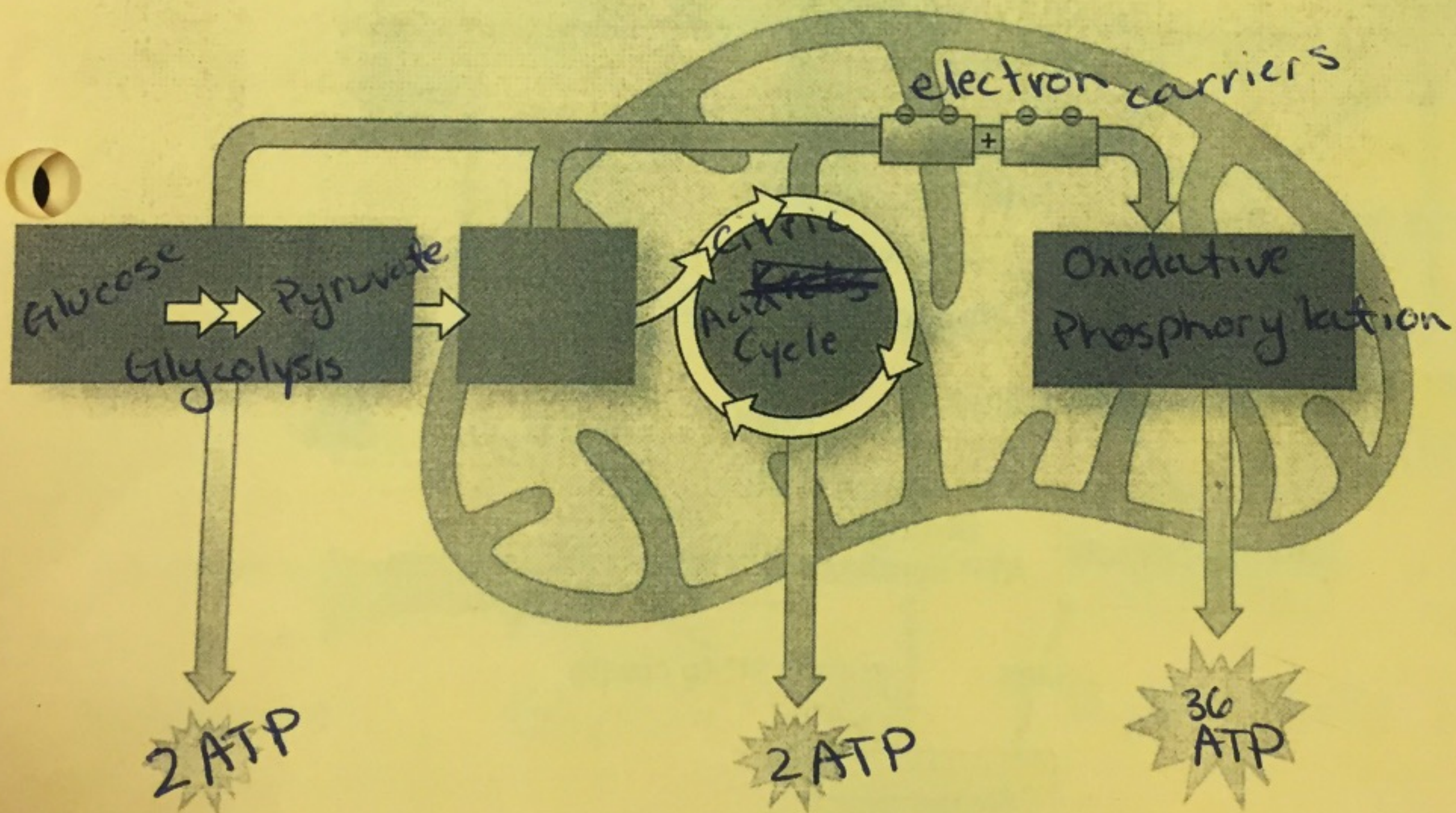
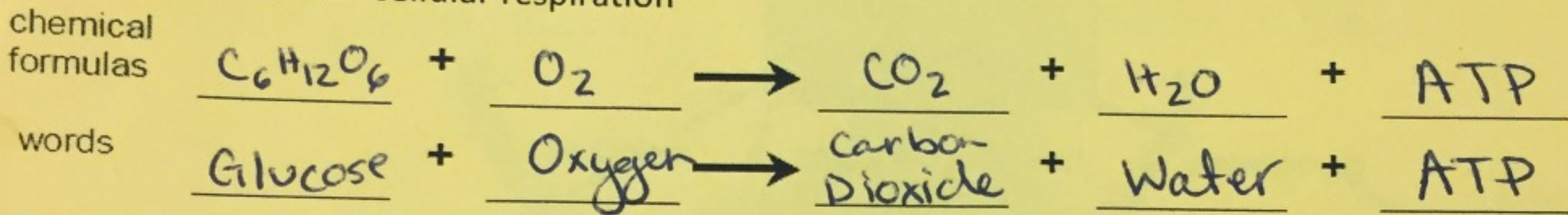


Photosynthesis is the process in which sun's energy is trapped in the chemical bonds of sugar.

1. Occurs in the Chloroplast (an organelle).
2. Requires H₂O, CO₂, and Sun.
3. Makes Glucose which is used as food in the plant.
4. Waste product produced is O₂.
5. Benefits:
 - a. Provides food for all plants and animals → the whole food chain.
 - b. Provides Oxygen to breathe.
 - c. Removes CO₂ from atmosphere.

Cellular Respiration

Write the formula for cellular respiration

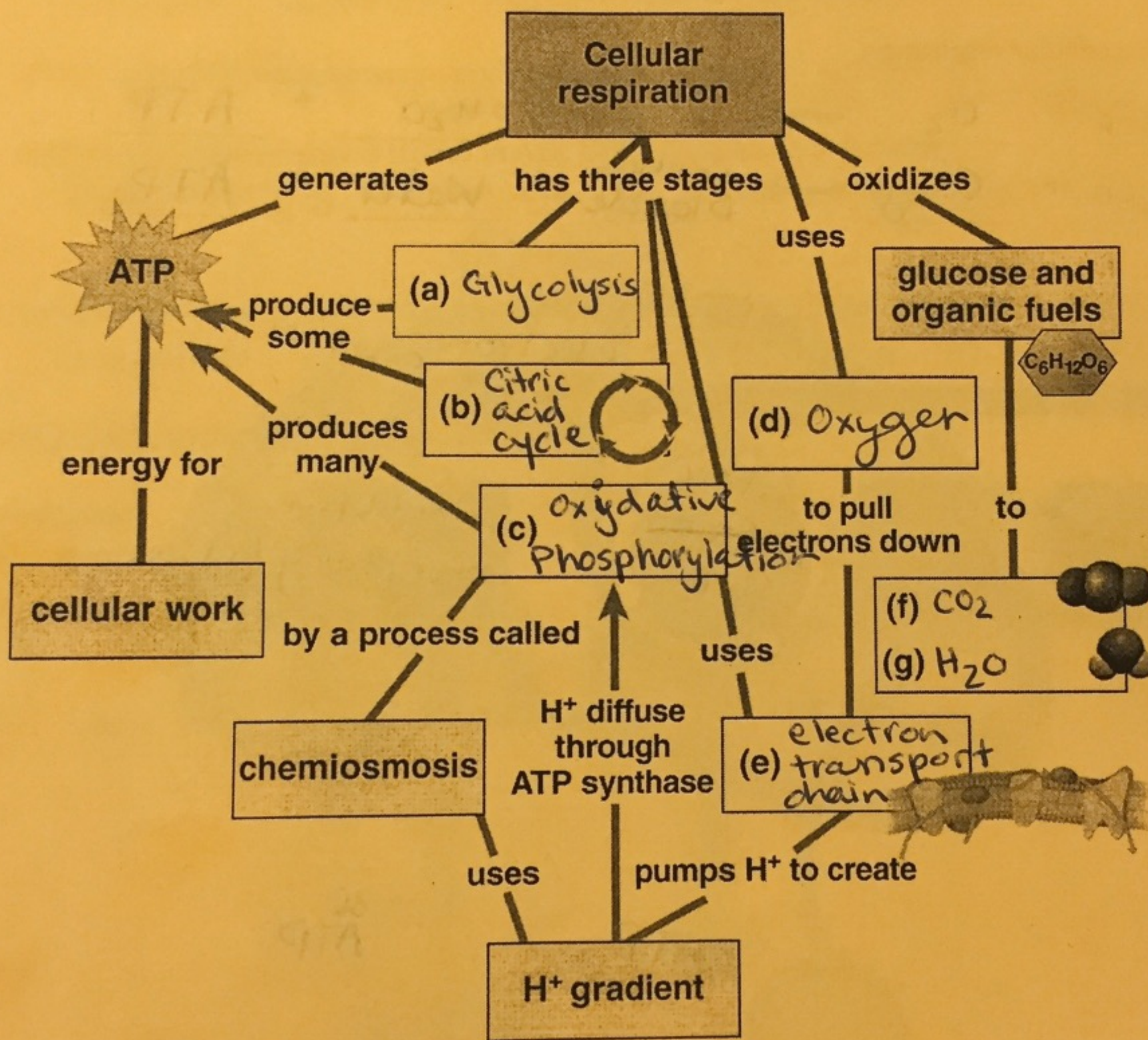


Cellular Respiration is the process that takes energy from sugar molecules and places it in molecules of ATP.

- a. ATP is the **molecule** all life uses for energy.
 - No organism can get energy from sunlight or sugar without first putting the energy into ATP.

- b. Requires Glucose and Oxygen.
- c. Waste products produced are CO₂ and H₂O.
- d. Most organisms carry out aerobic respiration (uses oxygen) in their mitochondria.
- e. anaerobic respiration does not require oxygen, but gives less ATP (energy) for each molecule of sugar. This process is also called fermentation.

- When exercise causes human muscles to run out of oxygen, their cells will do **anaerobic respiration**. The waste product, lactic acid, causes muscles to "burn" so that you will stop.
- When there is a lack of oxygen in most yeast and bacteria the waste product produced is alcohol. This process is used in making beer and wine.



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1. What are the major end products of glycolysis? What are the major end products of the citric acid cycle? What are the major end products of oxidative phosphorylation?

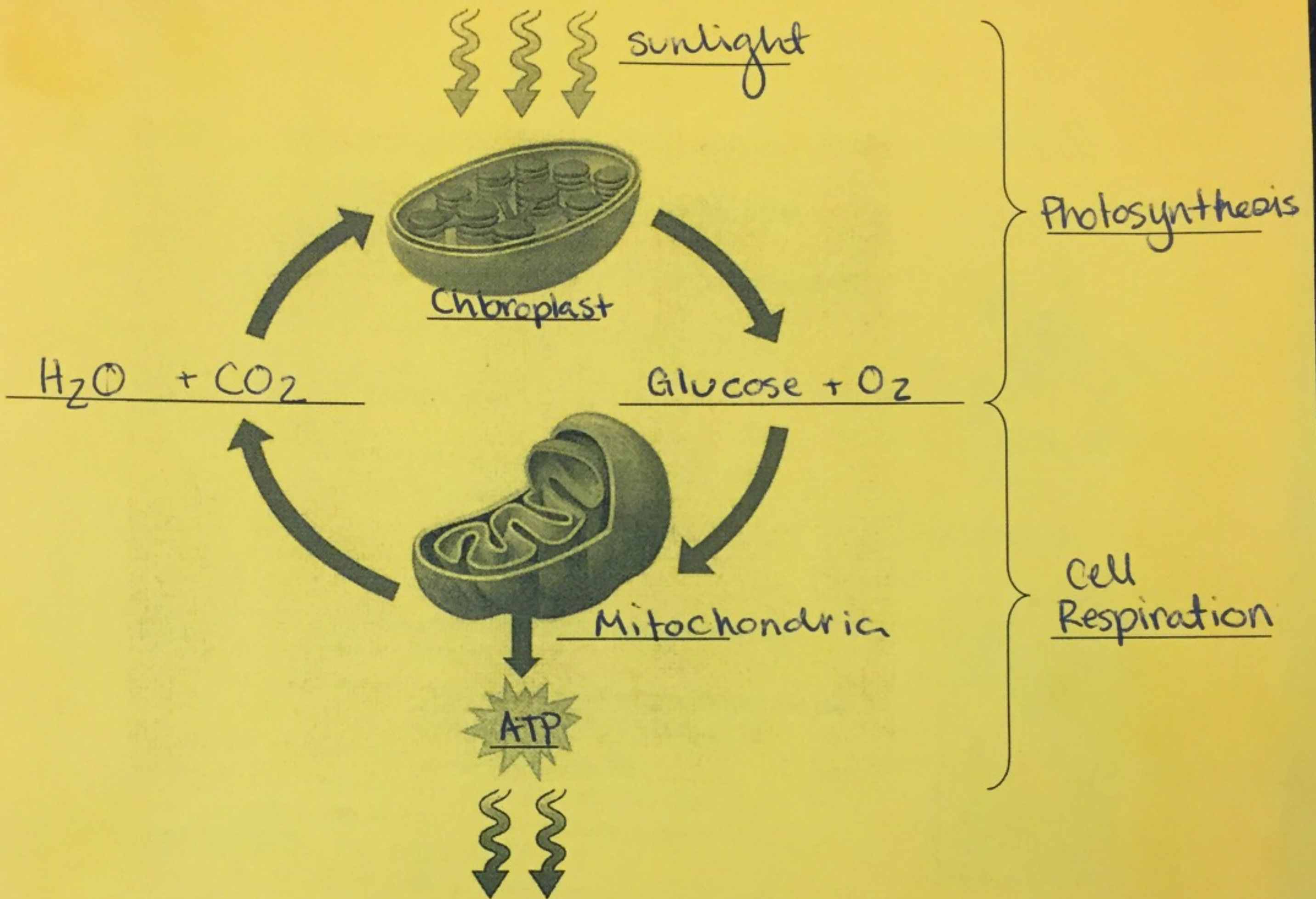
(G)
 • ATP
 • Pyruvate
 • e⁻ carriers

(CAC)

(OP)

2. Compare and contrast anaerobic respiration and aerobic respiration.

Fill in the blanks below with the appropriate terms:



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	Photosynthesis	Cellular Respiration
What goes in?	$H_2O + CO_2 + Sun$	$Glucose + O_2$
What comes out?	$Glucose + O_2$	$H_2O + CO_2 + ATP$
Purpose	make Glucose	make ATP

3. Describe the greenhouse effect.

$\uparrow CO_2$ in atmosphere traps more heat = \uparrow Global Warming

4. Describe the role of atmospheric ozone. How is it being damaged?

protect from UV \uparrow CFCs