

Essential Notes – for Checkpoint & Unit test

- Photosynthesis and Cellular Respiration

Photosynthesis: only takes place in organisms that have chlorophyll and/or chloroplasts which includes some bacteria, some protists and all plants.

- Light dependent reactions** (requires sunlight)
 - Includes photosystem 1 and 2 (made of chlorophyll) and an electron transport chain
 - Takes place in the thylakoid membrane of the chloroplast
 - Takes in sunlight and water to release oxygen into the air and NADPH and ATP for the Calvin cycle.
- Calvin Cycle** (does not require light)
 - Takes place in the stroma of the chloroplast
 - Takes carbon dioxide from the air and uses a lot of ATP and NADPH from the light dependent reactions to create glucose.
 - At the end of each cycle, carbon molecules are ready to combine with carbon dioxide to begin the cycle again.

Cellular Respiration – take place in all life (including bacteria, protists, plants and animals)

A. Anaerobic Processes (no oxygen needed or available)

Take place in the cytoplasm of the cell

- Glycolysis** – turns glucose (a product of photosynthesis and found in all plant products that we eat) into pyruvic acid (for the Krebs cycle) as well as NADH and ATP are formed.
- Alcoholic Fermentation** – follows glycolysis in yeast and other microorganisms, if no oxygen present, and turns pyruvic acid into carbon dioxide and alcohol
- Lactic Acid Fermentation** - follows glycolysis in both prokaryotes and eukaryotes (unicellular and multicellular), if no oxygen present, and turns pyruvic acid into lactic acid.

B. Aerobic Processes (oxygen needed and available)

- Krebs cycle** takes place in the matrix of the mitochondria and takes the pyruvic acid from glycolysis and creates 2 electron holding compounds (NADH and $FADH_2$), releases carbon dioxide and 1 energy holding compound (ATP). At the end of each cycle, a carbon molecule is made which can combine with pyruvic acid to form citric acid and start the cycle again.
- Electron transport** takes place in the inner membrane (cristae) of the mitochondria. The electrons from the Krebs cycle (found in NADH and $FADH_2$) are added to hydrogen ions and oxygen molecules to produce water and ATP.

