PHOTOSYNTHESIS

- An overview of photosynthesis

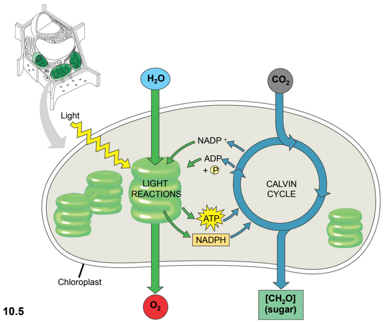


Figure 10.5

A Photosystem: A Reaction Center Associated with Light-Harvesting Complexes

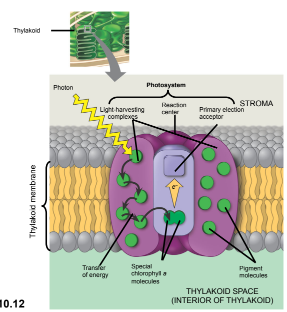


Figure 10.12

- The light-harvesting complexes
  - Consist of pigment molecules bound to particular proteins
  - Funnel the energy of photons of light to the reaction center

Light Reactions

- Produces **NADPH, ATP, and oxygen**

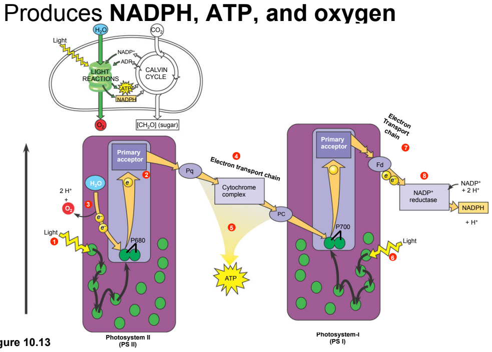


Figure 10.13

- A mechanical analogy for the light reactions

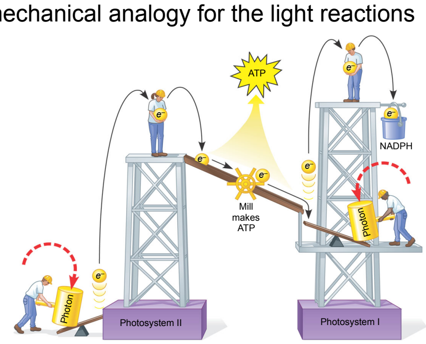


Figure 10.14

A different view: Animation

- This diagram is on your notes

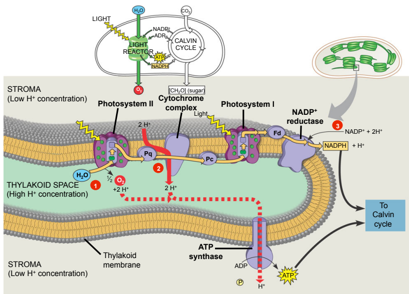


Figure 10.17

Watch video 1st and then draw the cycle!

- The Calvin cycle

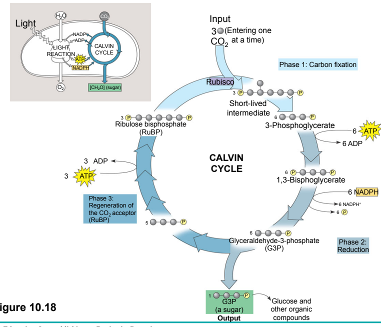


Figure 10.18

The Importance of Photosynthesis: *A Review*

- A review of photosynthesis

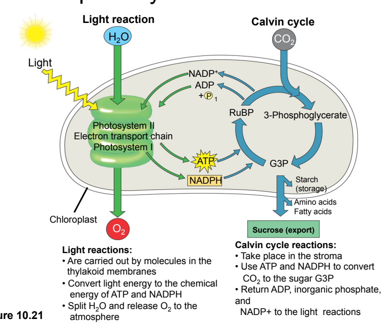


Figure 10.21

CELLULAR RESPIRATION

Cellular respiration- Big idea

- Cellular Respiration allows **ALL** organisms to use (release) energy stored in the **chemical bonds** of **glucose.**
- The energy in glucose is used to produce ATP.
- Cells use ATP to supply their energy needs.

- To keep working
  - Cells must regenerate ATP

Big Picture HANDOUT!

- There are three main processes in this metabolic enterprise

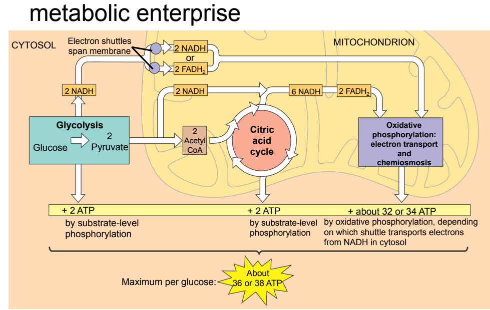


Figure 9.16

The Stages of Cellular Respiration: *A Preview*

Respiration is a cumulative function of three metabolic stages

1. Glycolysis
2. The Krebs cycle (citric acid cycle)
3. Oxidative phosphorylation (Electron Transport Chain)

Big Picture

1. Glycolysis

- Breaks down glucose into two molecules of pyruvate

2. Krebs cycle (citric acid cycle)

- Completes the breakdown of glucose

3. Electron Transport & Oxidative phosphorylation

- Is driven by the electron transport chain
- Generates ATP

HANDOUT

- **An overview of cellular respiration**

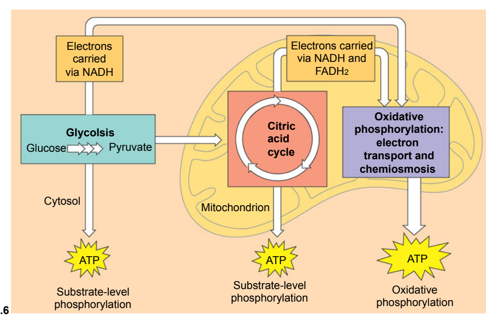


Figure 9.6

- Both glycolysis and the citric acid cycle
  - Can generate ATP by **substrate-level phosphorylation**

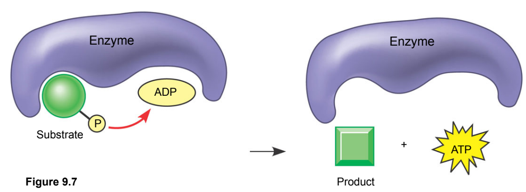


Figure 9.7

Big Picture!

- There are three main processes in this metabolic enterprise

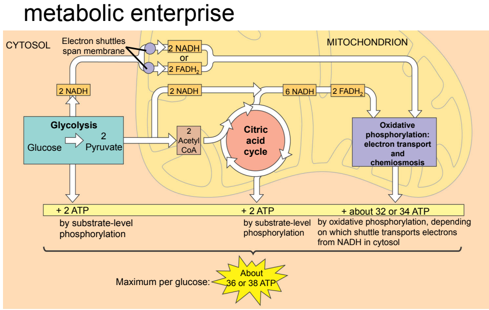
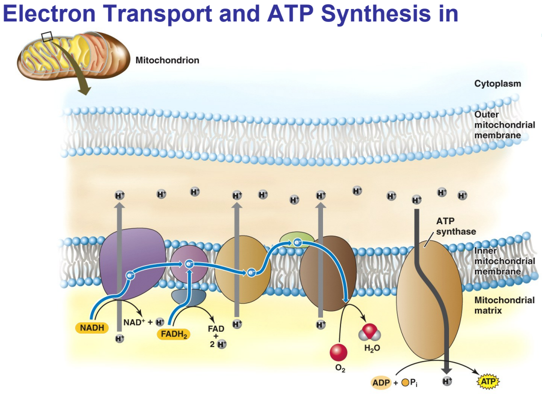


Figure 9.16

Electron Transport and ATP Synthesis in



PRINCIPLES OF LIFE, Figure 6.12

Chemiosmosis: The Energy-Coupling Mechanism

- **ATP synthase**: Big Picture
  - Is the **enzyme** that actually makes ATP

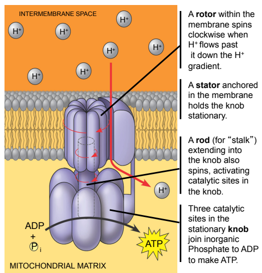


Figure 9.14

Big Picture

- The resulting H^+ gradient
  - Stores energy
  - Drives chemiosmosis in ATP synthase

(**chemiosmosis** = energy coupling mechanism that uses energy stored in the form of a H+ ion gradient across a membrane to drive cellular work, such as synthesis of ATP)

Big Picture!

- There are three main processes in this metabolic enterprise

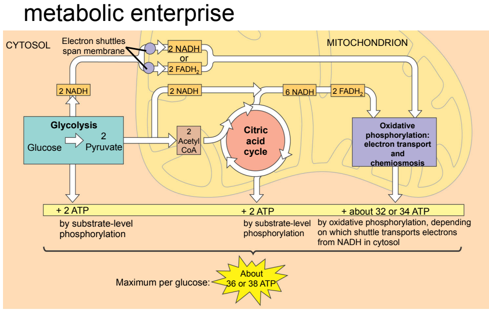


Figure 9.16

- About 40% of the energy in a glucose molecule
  - Is transferred to ATP during cellular respiration, making approximately 36 ATP

Fermentation

- **NO OXYGEN?**: Fermentation enables some cells to produce ATP without the use of oxygen
- Cellular respiration
  - Relies on oxygen to produce ATP
- In the **absence of oxygen**
  - Cells can still produce ATP through **fermentation**

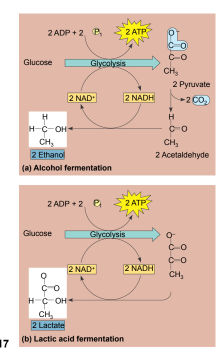


Figure 9.17

Big Picture

- Pyruvate is key!

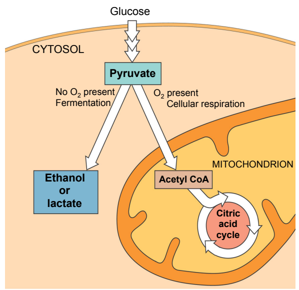


Figure 9.18

The Evolutionary Significance of Glycolysis

- Glycolysis
  - Occurs in nearly all organisms
  - Probably evolved in ancient prokaryotes before there was oxygen in the atmosphere

- The catabolism of various molecules from food

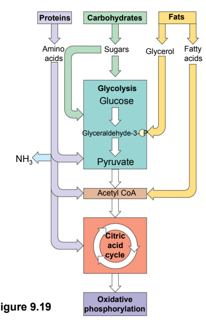


Figure 9.19

HOMEOSTASIS

Homeostasis

A condition in which the internal environment of the body remains relatively constant despite changes in the external environment.

Examples, in humans, would be…..?

1)maintenance of body temperature

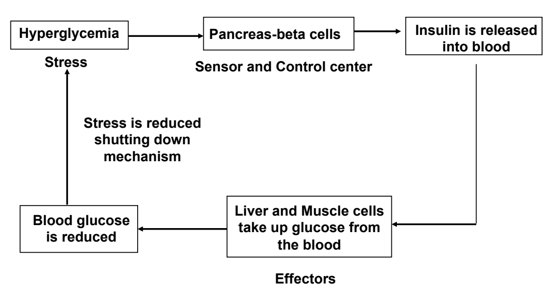
2)levels of glucose in the blood

3)Blood pH

4)O_2 and CO_2 levels

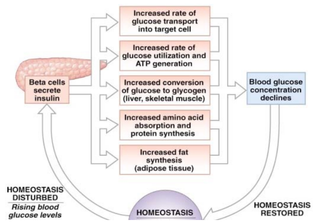
5)Blood pressure

Homeostatic Regulation of Blood Sugar through Negative Feedback

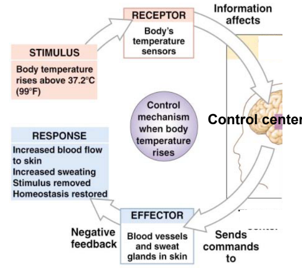


Negative Feedback Via a Hormonal Pathway
Regulation of Blood Sugar

Hormones play an important role in many homeostatic pathways. Hormones are produced by endocrine glands. They enter the blood after being produced and travel throughout the body. However, hormones have their effect on specific target tissues.



Homeostasis Using a Neural Pathway



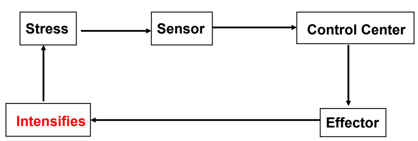
Many homeostatic mechanisms use a nerve pathway in which to produce their effects. These pathways involve an afferent path which brings sensory messages into the brain (often the hypothalamus) and an efferent path which carries outgoing nerve messages to effectors.

Positive Feedback Mechanisms- Mrs. Wayman covers

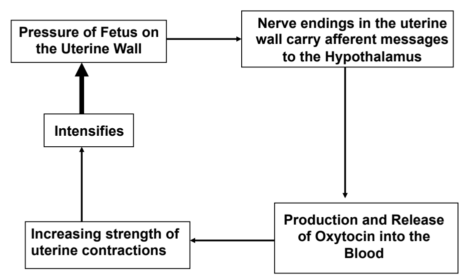
Homeostatic systems utilizing positive feedback exhibit two primary characteristics:

1. Time limitation – Processes in the body that must be completed within a constrained time frame are usually modified by positive feedback.
2. Intensification of stress – During a positive feedback process, the initial imbalance or stress is intensified rather than reduced as it is in negative feedback.

Typical Positive Feedback Process

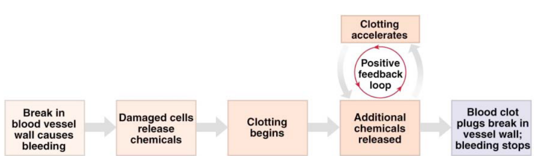


Homeostatic Regulation of Child Birth through Positive Feedback



The birth of the child will bring this process to a close. Other examples of positive feedback regulation occur during milk letdown and blood clotting.

Feedback in Coagulation



Positive feedback "mini-loops" are built into pathway to speed up production of chemicals needed to form the clot. Entire sequence of clotting is a negative feedback pathway:

Homeostatic Regulation of Body Temperature through Negative Feedback