**L2 Module 8: Metabolism**

**Respiration**



**Glycolysis**

* Glycolysis is the metabolic pathway that converts one molecule of **glucose into two molecules of pyruvate**.
* The free energy released in this process is used to form the high-energy molecules-2 molecules of **ATP** (adenosine triphosphate) and one molecule of **NADH** (reduced nicotinamide adenine dinucleotide).
* Glycolysis is an oxygen-independent metabolic pathway.
* In most organisms, glycolysis occurs in the cytosol.
* In Plant, source of glucose is sucrose and other stored carbohydrates. Sucrose is produce as a result of photosynthesis.



* In animals, glucose is present in the blood as a result of breakdown of dietary starch or glycogen present in liver. It can also synthesized from non-carbohydrate precursors by a process known as glucogenesis.
* The glycolysis pathway can be separated into two phases:

A. The Preparatory (or Investment) Phase – wherein 2 molecules of ATP is consumed.

B. The Pay Off Phase – wherein 2 molecules of ATP are produced.



Schematic diagram for two stages of glycolysis

**Fermentation/Anaerobic Respiration- in absence of oxygen**

* Fermentation is an anaerobic biological process by which cell extract energy from glucose.
* Under anaerobic conditions, pyruvic acid can be routed by the organism into one of three pathways: **lactic acid fermentation**, **alcohol fermentation** or cellular (anaerobic) respiration.
* Humans cannot ferment alcohol in their own bodies, we lack the genetic information to do so.
* Alcohol fermentation is the formation of alcohol from sugar. In Yeast, under anaerobic conditions, glucose is converted to pyruvic acid via the glycolysis pathways, then converting pyruvic acid into ethanol.



* Lactic acid fermentation- In some bacteria or in muscle of animals, under anaerobic condition, pyruvic acid is reduced to lactic acid.



