Glycolysis

Glucose + 2ATP + 2NAD⁺ + 2Pₐ → 2Pyruvate + 2NADH + 4ATP (2 net ATP)

5 Enzymes and Products to Memorize and 2 to understand. All Occurs intracellulary unless noted.

Irreversible Enzymes:
1) Hexokinase
2) PFK-1
3) Pyruvate Kinase
   • 2 Kinases use ATP, then 2 kinases give ATP
   • Dehydrogenases either reduce or oxidize NAD⁺ or NAD⁻

Steps to remember:
1) Hexokinase—(-ATP), Glucose trapped
2) PFK-1—(-ATP)
3) G3P DH (GAPDH)→NADH
4) PGK—(+ATP)
5) Pyruvate Kinase—(+ATP)

Mnemonic for the 5 Steps to Remember
Help Peter Get Pickled Peppers

- Hexokinase in all tissues, Glucokinase in Liver
- Glucose-6-Phosphate inhibits Hexokinase via feedback inhibition

In the absence of Oxygen, Fermentation will take place:
Pyruvate + NADH → Lactate + NAD⁺
- Via Lactate Dehydrogenase
- Allows NAD⁺ to be replenished for continued Glycolysis

Gluconeogenesis

Glycolysis in reverse: just remember the ‘inverse’ reactions to the three irreversible glycolysis reactions!
Best understood in context with metabolism—Upregulated by Glucagon, Epinephrine during Fasting.
Downregulated by Insulin during satiety (Mostly Liver, Kidney Cortex)

Substrates for Gluconeogenesis:
- Glycerol-3-phosphate (lipids)
- Lactate
- All AA except leucine and lysine