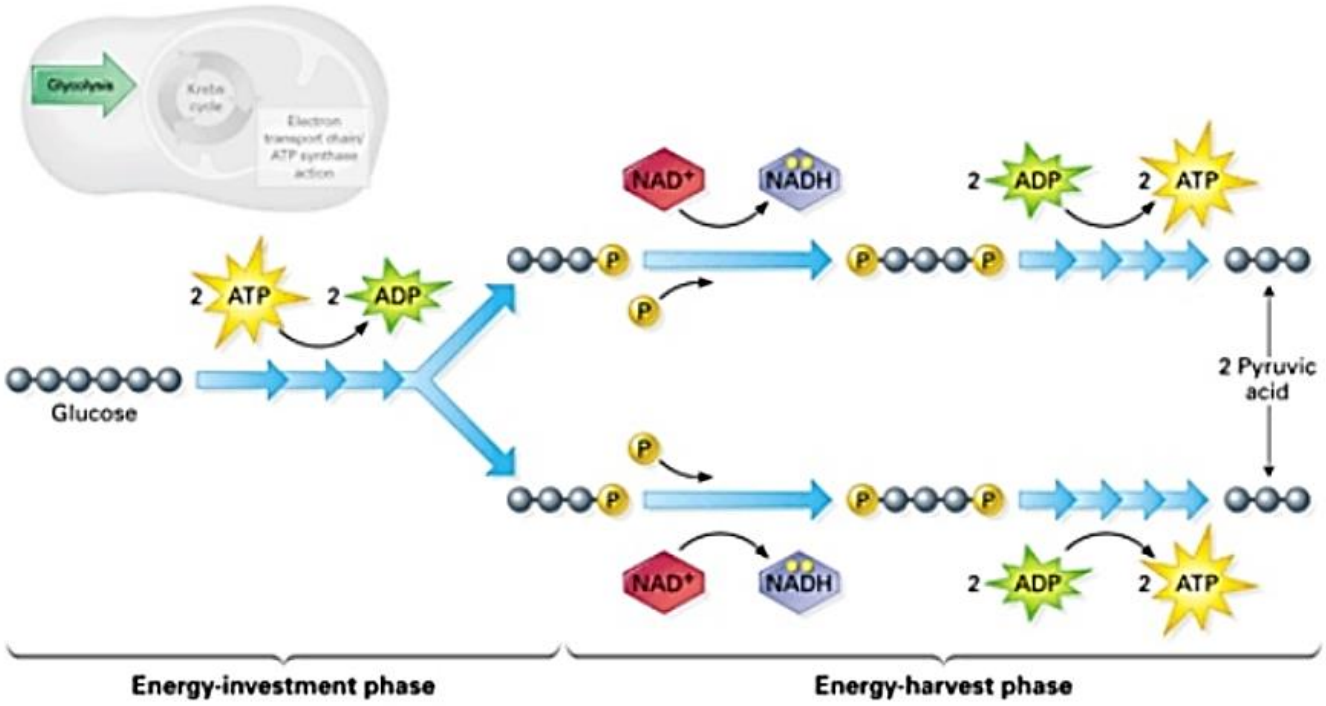
Imia (Belarusian) _____

Respiration without Oxygen (aka Anaerobic Respiration) = Fermentation

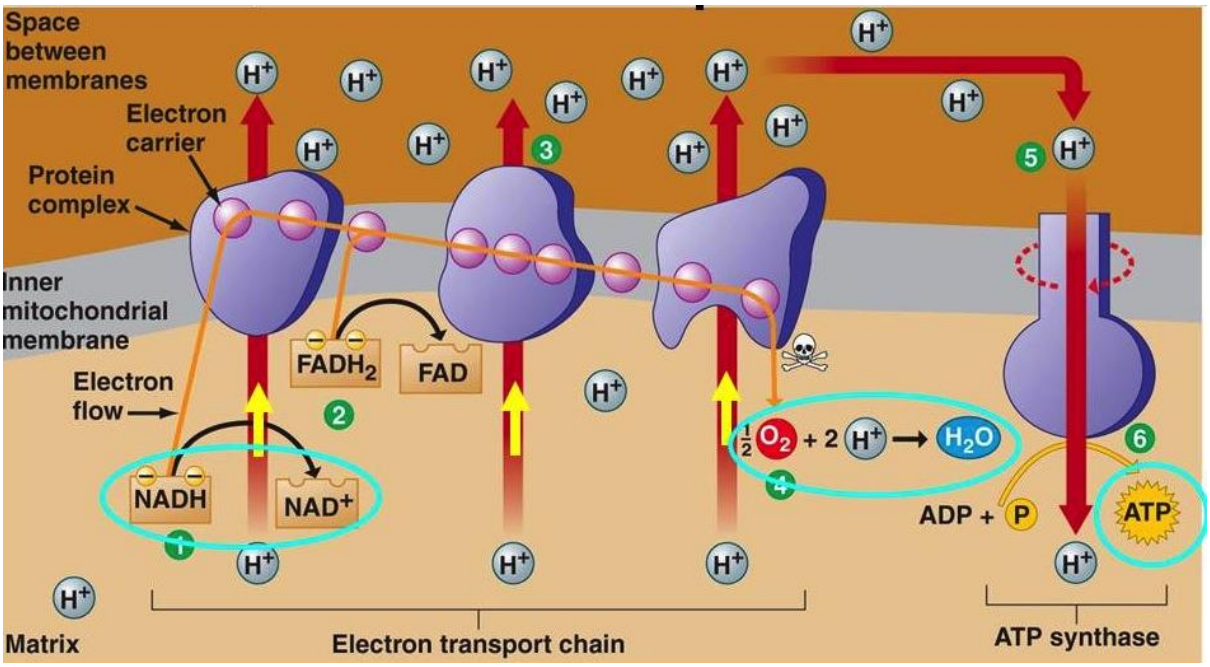
PART ONE. Below you see the process of _____ that converts _____ into _____ to begin the process of cellular respiration. This process occurs **without oxygen present**, called an _____ process.



The two phases of glycolysis are the _____ phase and the _____ phase. When analyzed, _____ ATP are spent in order to produce _____ ATP, which is why glycolysis produces a net quantity of _____ ATP. The electron carrier ("taxi service), _____, picks up a _____ atom and an _____ to deliver to the _____ _____ _____.

PART TWO. In the final step of cellular respiration, the _____ _____ _____, electron carriers ("the twins taxi service") deliver the high energy _____ atoms and _____ which are pumped into the area between the inner and outer membrane called the _____ _____. This creates a _____ _____ that gives this step all the potential energy to create _____ ATP.

The “big gun” protein that is needed to make use of all this potential energy is _____ _____ which converts _____ to _____. In step #4 below, oxygen is necessary which makes this an _____ process. The function of oxygen is to serve as a _____ _____ _____ (aka “clean up crew”) and bond to the “dead” hydrogen atom and electrons, forming _____ .



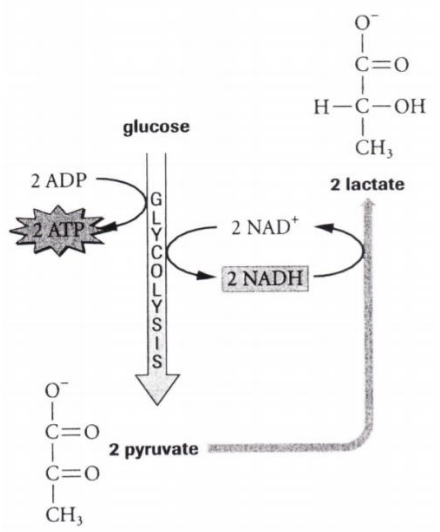
PART THREE. Brainstorming (solve the problem):

Predict what will happen if there is no, or low, oxygen levels present in the electron transport chain.

Where else did you see NAD+ and NADH in this process? _____

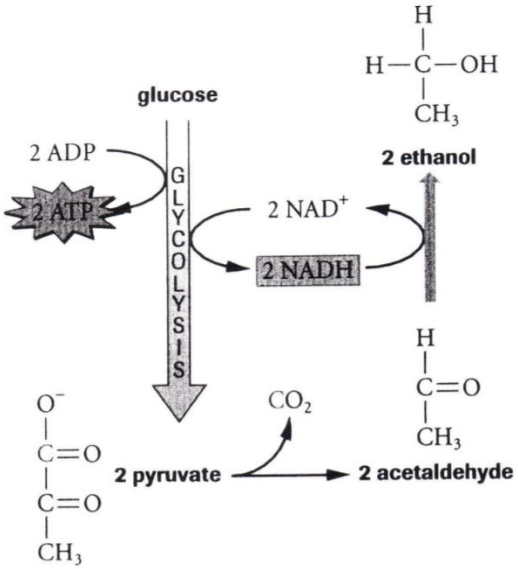
What do you call the processes that occur without oxygen present? _____

PART FOUR. Anaerobic Respiration (aka Lactic Acid/Alcoholic Fermentation)



Lactic acid fermentation in muscle cells

After glycolysis occurs, the two _____ molecules receive _____ atoms from _____, creating _____. _____ can be converted back into _____ in the liver. When oxygen is available again, the _____ can then enter _____ and cellular respiration can continue normally again.



Alcohol fermentation in yeast

After glycolysis occurs, the two _____ molecules lose a _____, creating acetaldehyde. The _____ combines with oxygen to create _____.

_____ receives a _____ atom from _____ resulting in the production of _____.

PART FIVE. Go to the video on the class website about making root beer to answer questions below.

Adding all the ginger root, sassafras root bark, birch bark, cinnamon sticks, wild cherry bark, and juniper berries for 45 minutes is supposed to do what?

The molasses and cane sugar added provides what resource for the yeast? _____

Why do you think the simmered root stock (dark liquid) needed to be cooled before adding the yeast?

What happens over the 3-4 days of placing the root stock/yeast on a cool/dark shelf?

Finally, why chill the mixture after those 3-4 days? What might happen if we leave it at room temperature for 3-4 weeks?

THE SCIENCE OF YOGURT

BY TEJAL RAO FEBRUARY 20, 2014

Illustration by Tina Zellmer

All yogurt starts as milk. With the addition of certain bacteria—also known as yogurt cultures—and under the right conditions, the milk transforms into a tangy, spoonable food. The added bacteria, usually *Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus salivarius* subsp. *thermophilus*, are thermophilic, which means they activate at warm temperatures (between 86 and 114 degrees). When in this sweet spot, the bacteria feed on the milk's sugars, known as lactose, creating a wholly new product within two to twelve hours. The by-product of this fermentation process is lactic acid, detectable to us as yogurt's signature sourness. It forces the milk's protein, or casein molecules, to break down and recombine, transforming milk from a liquid into a delicate, semisolid gel. Historically, yogurt makers all over the world fermented milk spontaneously, allowing the milk to interact with any number of ambient bacteria, which meant that yogurt varied tremendously from place to place. But in the early 20th century, Russian biologist Ilya Mechnikov isolated bacterial strains at the Pasteur Institute in Paris, creating the go-to starter—or culture used to begin each batch of yogurt fermentation—for almost all commercially and artisanally produced yogurts and changing the course of this homemade foodstuff.

PART SIX. What does it mean if a bacteria (or yogurt starter culture) is thermophilic?

When *S. thermophilus* and *L. bulgaricus* are between 86-114 degrees, what is it that they are consuming and what is it that they are producing?

Why does yogurt taste sour?

Why is the lactic acid so important to yogurt making?