

CELLULAR RESPIRATION

Why do living things need food?

- (1) _____
(2) _____
(3) _____

What types of food contain energy? _____

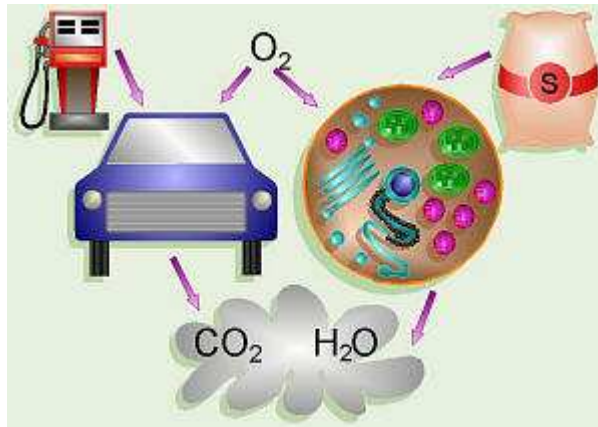
Do all foods contain the same amount of energy? _____

What's the difference between a *calorie* and a *Calorie*?

1. _____, a sugar, is the preferred fuel for most cells.

What would happen if you set a lit match to a sugar cube? _____

That process is called _____. This, obviously, is not what is happening in cells.



Cells _____ release the energy from glucose and other food compounds in a process called _____.

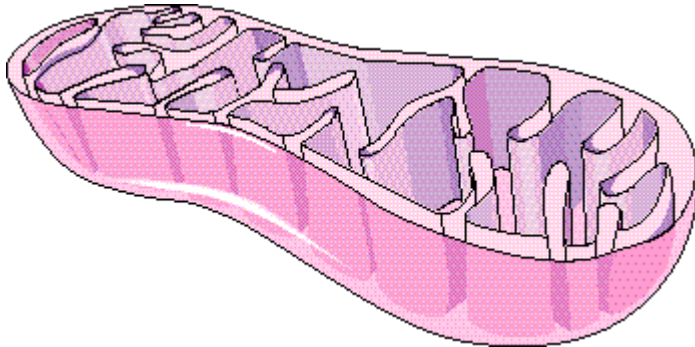
2. **Cellular respiration** in cells begins with a chemical pathway called _____. Glycolysis releases only a _____ amount of energy. If _____ is present, however, _____ is followed by a different pathway.

3. In the presence of _____, glycolysis is followed by the _____ and the _____.

All three processes; (1) _____, (2) _____ and (3) _____ make up what is known as _____.

The reactions known as the Krebs Cycle and the Electron Transport Chain occurs in _____.

Label the parts of the mitochondria below:



During these three processes, the chemical energy in glucose will be transferred to energy molecules that the cell can use. These energy molecules are _____.

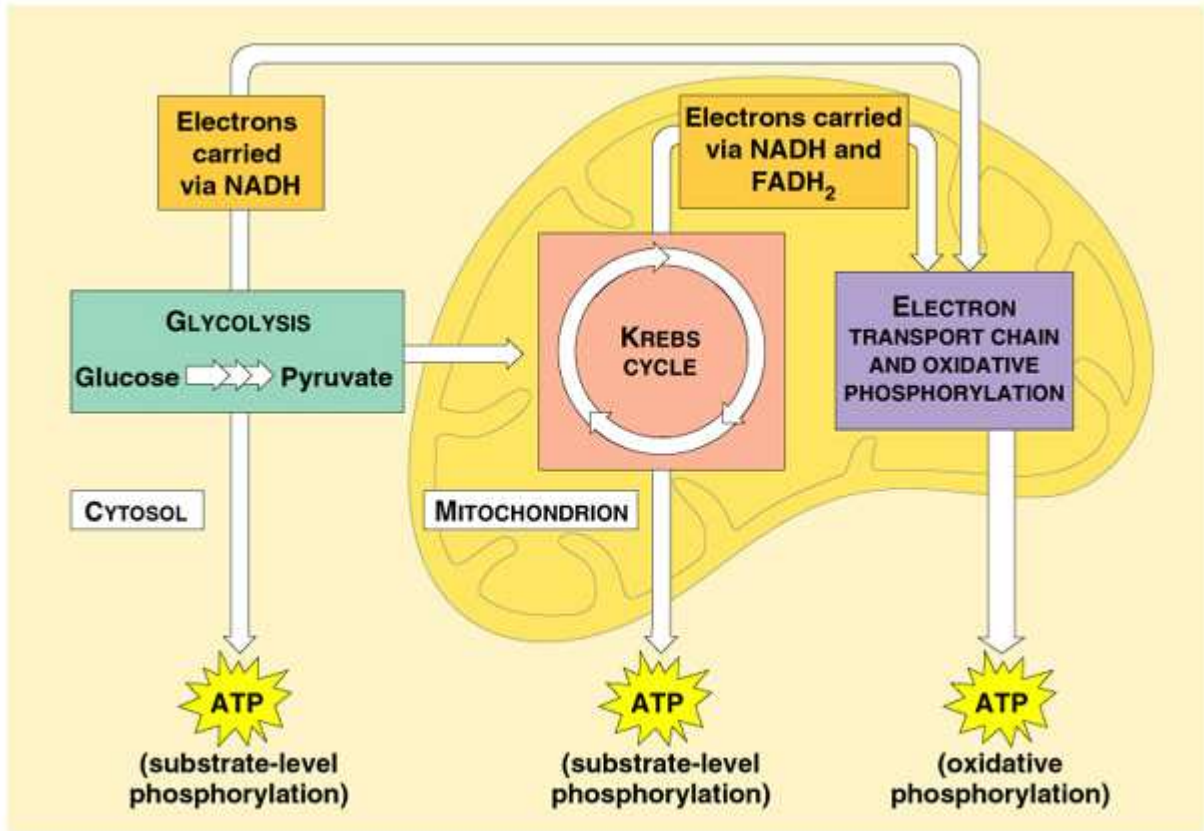
4. Write a balanced equation for cellular respiration.

The reactants are _____
The products are _____

5. The equation from #4 is really too simple. It appears as though cellular respiration occurs in one step. If that were so, then _____

The chemical energy in the glucose molecule must be released _____

6.

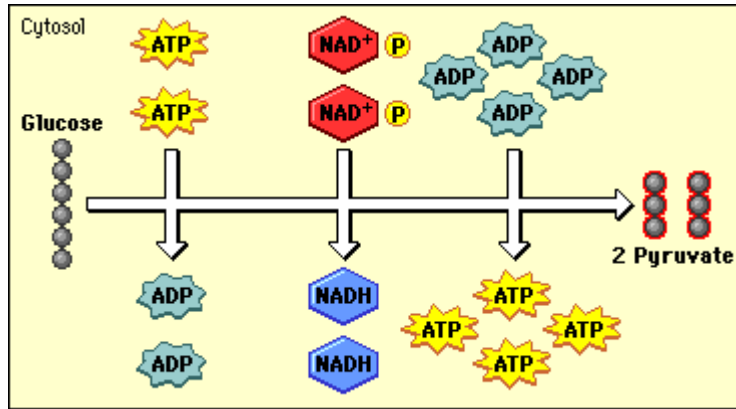


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The three main stages capture _____ and use it to produce _____.

7. The first set of reactions in cellular respiration is _____.

During glycolysis, one molecule of _____ is broken in _____ producing two molecules of _____, a 3-carbon compound.



Even though glycolysis is an energy-releasing process, the cell needs to put in a little energy to get things going (_____). Label the **activation energy** in the glycolysis diagram above.

How much energy is necessary to “get things going”? _____

Another thing happening during glycolysis is that **4 high-energy electrons** are removed and passed to an electron carrier called _____ which becomes _____. The **NADH** will hold onto the _____ until they can be transferred to other molecules. Label the part of the above diagram showing these high-energy electrons.

The splitting of glucose, a **6-carbon molecule**, into 2 pyruvate molecules, each with **3 carbons** has released enough energy to make _____. Circle and label these ATP in the above diagram.

How many ATP has the cell gained through glycolysis? _____

Where in the cell will glycolysis take place? _____

Although the energy yield from glycolysis is _____, the process is so _____ that _____ of ATP can be produced in a few milliseconds.

8. Is oxygen necessary for glycolysis? _____ Why might this be an advantage?

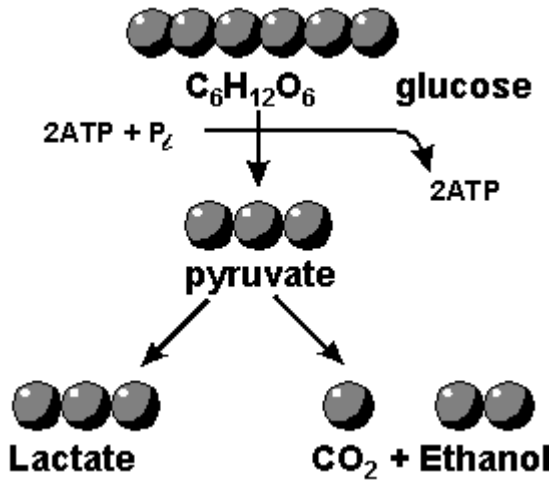
Even though oxygen is not used during fermentation its presence or absence determines what will happen to the pyruvic acid at the end of glycolysis.

If oxygen is **NOT** present the pyruvic acid will undergo _____

9. During **fermentation** cells convert _____ to _____. The **NAD⁺** will return to the glycolysis pathway so that the cell can continue to split glucose.

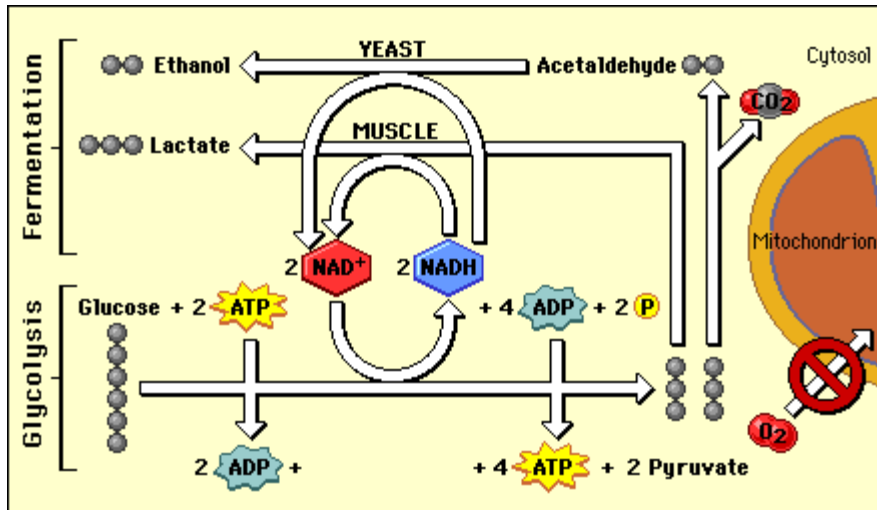
There are two types of fermentation.

- (1) _____ and
 (2) _____



In animals _____

In yeasts and a few microorganisms _____



Since oxygen plays no part in fermentation or glycolysis both pathways are described as being **anaerobic**.

Anaerobic _____

10. Describe the importance of fermentation to the following people:

Bakers:

Brewers:

Athletes:

Anyone who loves good food:

11. At the end of _____ about **90%** of the energy available in glucose is _____. To extract the rest of the energy, the cell turns to one of the world's most powerful electron acceptors:

_____.

Since these next pathways require oxygen they are called _____

Aerobic _____

If **oxygen is present** the _____ produced at the end of _____ passes on to the second stage of cellular respiration: _____.

12. **The Krebs Cycle**

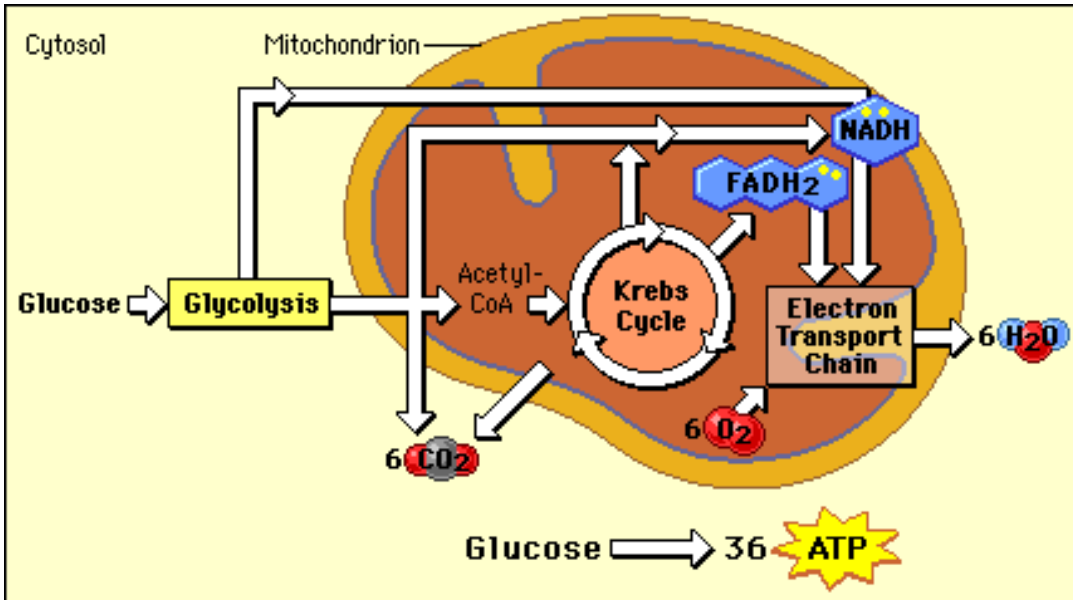
The cycle gets its catchy name from _____

In which part of the cell will the Krebs Cycle occur? _____

During the Krebs Cycle, pyruvic acid is broken down into _____

Electrons are also removed changing **NAD⁺** to _____ and **FAD** (another electron acceptor) to **FADH₂**.

ATPs are also being produced.



What happens to the products of the Krebs Cycle?

The carbon dioxide is _____

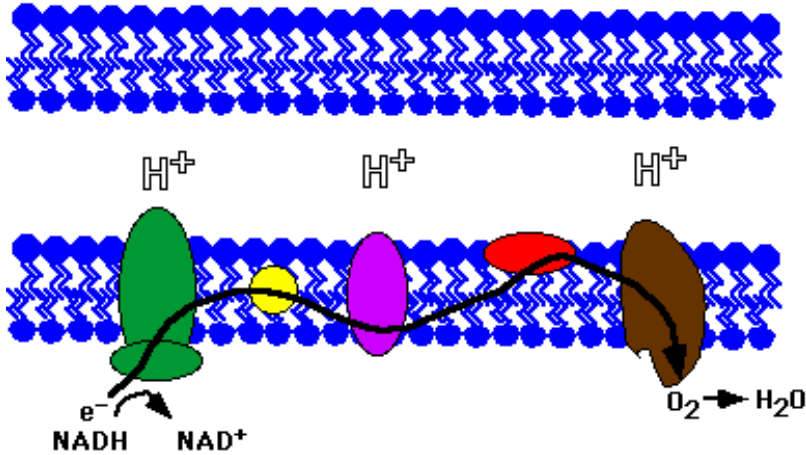
The ATP can be _____

The high-energy electron carriers _____

13. The Krebs Cycle generates high-energy electrons that have been passed to _____ and _____. The **Electron Transport Chain** uses these high-energy electrons to produce _____ from _____

The _____ are passed from one carrier protein to the next. The energy released from the electrons during this process will be transferred to _____

The **oxygen** serves as the _____ to get rid of the now low-energy electrons and hydrogen ions. **Water** will be a _____ of cellular respiration.



13. Each pair of high-energy electrons that move through the _____ chain provides enough energy to produce _____ molecules of _____ from _____.

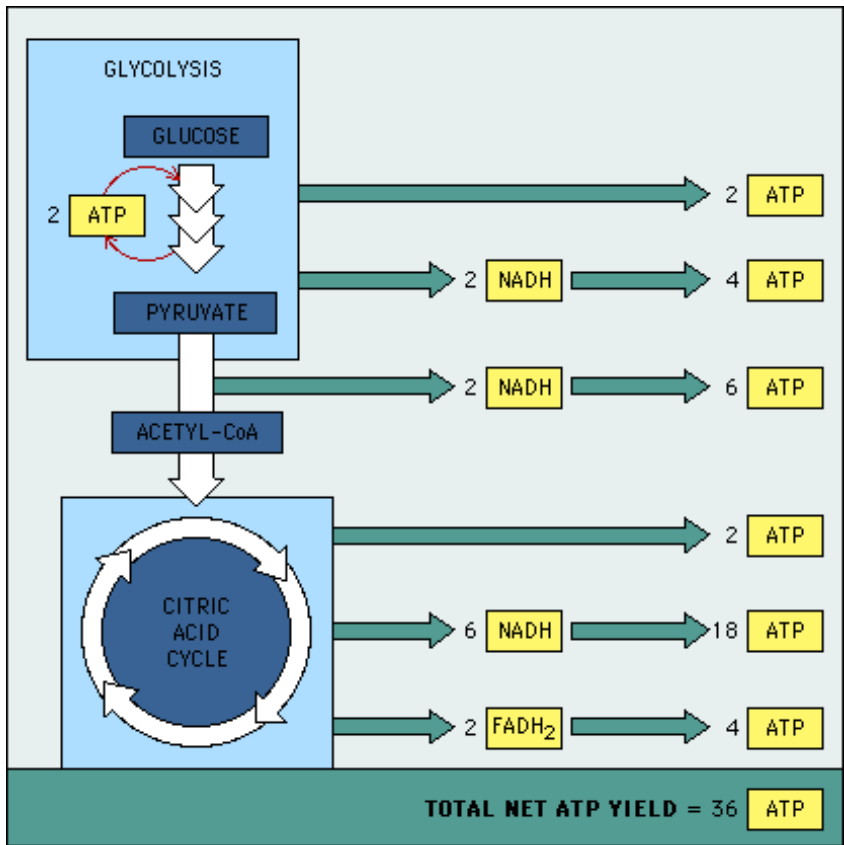
When oxygen is not present and cellular respiration is _____ only _____ ATP molecules are gained for each glucose molecule broken down.

With _____, everything changes. The Krebs Cycle and the Electron Transport Chain produce _____ ATP molecules per glucose.

_____ and _____ can also be broken down into molecules that can enter the Krebs cycle or glycolysis.

When glucose is broken down aerobically, _____ the cell gains _____ ATP per glucose.

Most cells produce 36-38 molecules of ATP per glucose molecule. The actual number of ATPs produced by aerobic respiration varies among cells.



14. What happens when your body needs lots of energy in a hurry?
 Cells normally contain _____ produced during _____
 _____ In a foot race, that amount of ATP is used up
 _____ and muscle cells must produce the needed ATPs through
 _____. This may produce ATPs for
 another _____ seconds.
 When the race is over, they'll be a period of heavy breathing. Why? _____

 What if the runner needs to run a longer race? _____

15. Compare photosynthesis and cellular respiration:

	Photosynthesis	Cellular Respiration
Function		
Location		
Reactants		
Products		
Equation		

