PEER Life Science Cells Are Us Meeting Cells’ Energy Needs Notes Outline

**Why It Matters**

* Energy is the capacity to do \_\_\_\_\_\_\_\_\_\_\_\_.
* Energy can be stored as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy, or as energy of motion, known as \_\_\_\_\_\_\_\_\_\_\_\_\_\_ energy.
  + Name two other forms of energy:
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Molecules are held together by \_\_\_\_\_\_\_\_\_\_\_\_\_\_ bonds with an energy force that is released when these bonds are \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The most readily available form of energy in the body is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are organelles that allow the energy in glucose to be released and captured in a usable form in a process called cellular \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**What We Know**

* Mitochondria use \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to liberate the chemical energy of food and trap it in storage compounds that cells can use.
* This process is called cellular respiration. The net chemical equation for it is:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The first step of cellular respiration is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and is where glucose is split and transformed into a molecule called pyruvic acid. This process does/does not require oxygen, or is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The next step is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Cycle which only occurs in \_\_\_\_\_\_\_\_\_\_\_\_\_ conditions (oxygen is present).
* The last step of cellular respiration is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + This step transforms adenosine diphosphate (ADP) to adenosine triphosphate (\_\_\_\_\_\_\_\_). The third phosphate bond \_\_\_\_\_\_\_\_\_\_\_ the energy released by the breakdown of glucose.

**How We Know**

* A mitochondrion is an oval bag filled with \_\_\_\_\_\_\_\_\_\_\_\_\_. They are so small that they are only visible with \_\_\_\_\_\_\_\_\_\_\_\_ microscopes.
* The large number of membrane folds in mitochondria allow for more \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for chemical reactions to occur.
* Mitochondria can be separated from broken up cells by centrifugation (spinning at high speed) which separates parts of the cell by \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_.
* Mitochondria have DNA that is different from the DNA found in the nucleus, and this DNA is only inherited from your \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* As mitochondria produce energy, they also produce a toxic by-product called \_\_\_\_\_\_\_\_\_\_\_\_\_\_. These highly reactive substances can damage nearby mitochondrial \_\_\_\_\_\_ and \_\_\_\_\_\_\_.
* In addition to creating energy for the cell to use, mitochondria also produce \_\_\_\_\_\_\_\_\_.

**Common Hazards**

* Mitochondrial toxins can act in three ways. They can:
  + \_\_\_\_\_\_\_\_\_\_\_ electron transport which interferes with the transport of electrons through the chain of proteins in the electron transport system.
  + \_\_\_\_\_\_\_\_\_\_\_\_ phosphate bonding which prevents the creation of ATP without affecting electron transport.
  + Have \_\_\_\_\_\_\_\_\_\_\_\_ action where they inhibit electron transport at high doses and uncouple phosphate bonding at low doses.