

## **Glycolysis, The Pre-Krebs Cycle, The Krebs Cycle, and the Electron Transport Chain**

1. The overall process by which cells convert the energy in the bonds of glucose into the energy of ATP with oxygen present is called \_\_\_\_\_.
2. The over all equation for cellular respiration is \_\_\_\_\_.

### **GLYCOLYSIS**

3. The first step in cellular respiration occurs in the cytoplasm of a cell and is called \_\_\_\_\_.
4. During this first step, which means "sugar splitting," one molecule of glucose is broken down into two molecules of \_\_\_\_\_, which has \_\_\_\_\_ atoms of carbon in it.
5. To get this reaction going, the cell has to invest \_\_\_\_\_ molecules of ATP.
6. Glycolysis eventually produces a total of \_\_\_\_\_ ATP molecules, for a net gain of \_\_\_\_\_ ATP.
7. In addition, glycolysis results in the production of \_\_\_\_\_ molecules of \_\_\_\_\_, an electron and proton carrier. Later energy will be harvested from NADH at the \_\_\_\_\_ chain.

### **THE PRE-KREBS CYCLE**

8. Whereas glycolysis happens in the cytoplasm, the pre-krebs and krebs cycle reactions occur in the \_\_\_\_\_.
9. Before the Krebs cycle begins, pyruvic acid is broken down by an enzyme and combined with a coenzyme to form \_\_\_\_\_. When this happens, a molecule of \_\_\_\_\_ is released and it is eventually exhaled (in humans). In addition, two molecules of \_\_\_\_\_ are transformed into NADH, H<sup>+</sup>.

### **THE KREBS CYCLE**

10. Acetyl-CoA then enters the actual Krebs cycle by combining with OAA. The Krebs cycle then completes a series of eight reactions in which three molecules of water are added. Additionally, one molecule of \_\_\_\_\_, three molecules of \_\_\_\_\_, one molecule of \_\_\_\_\_, and 2 molecules of \_\_\_\_\_ are produced.
11. At the end, OAA is left, and is then ready to once again combine with another molecule of Acetyl-CoA, starting the cycle again. That is why this is called the Krebs cycle: the starting compound (OAA) is also the ending compound.

### **SUMMARY OF THE KREBS CYCLE.**

12. \_\_\_\_\_ Carbons go into the Krebs cycle, and \_\_\_\_\_ carbons are given off in the form of carbon dioxide.
13. \_\_\_\_\_ total molecules of NADH, H<sup>+</sup> are produced by loading NAD<sup>+</sup>.
14. \_\_\_\_\_ total molecules of FADH<sub>2</sub> are produced by loading FAD.
15. \_\_\_\_\_ molecules of ATP are produced.
16. For each molecule of glucose broken down in glycolysis, which occurs in the \_\_\_\_\_, the Krebs cycle will run \_\_\_\_\_ times.

### **THE ELECTRON TRANSPORT CHAIN**

17. The electron transport chain, which is part of the \_\_\_\_\_ of the mitochondria, are fed electrons by unloading the \_\_\_\_\_, and \_\_\_\_\_ that were produced in \_\_\_\_\_ and the \_\_\_\_\_ cycle.
18. The NAD<sup>+</sup> and FAD that were unloaded are then free to return to the \_\_\_\_\_, where glycolysis occurs, or the \_\_\_\_\_, where the Krebs cycle happens, where they can load up on \_\_\_\_\_ and \_\_\_\_\_ again.
19. In the electron transport chain, electrons are passed from one member of the chain to another while at the same time, \_\_\_\_\_ are being pumped across the membrane using the energy of the electrons.
20. The electrons from the electron transport chain are eventually given to \_\_\_\_\_. At the same time oxygen picks up these electrons, it also picks up \_\_\_\_\_ hydrogens to form \_\_\_\_\_.
21. While all of this is happening, all of this proton pumping has caused a higher concentration of protons in the \_\_\_\_\_ - \_\_\_\_\_ space. There the protons "want" to diffuse down their concentration gradient.
22. However, the inner membrane is not permeable to protons so their only way across is to pass through a protein/enzyme channel called \_\_\_\_\_ Synthase (or Synthetase).
23. As the protons pass through this channel, the energy of their concentration gradient is used to create \_\_\_\_\_ from \_\_\_\_\_ and phosphate. This is the way most of the ATP is produced in cellular respiration.

### **Review (complete on another piece of paper)**

- a. Which phases of cellular respiration does not require oxygen?
- b. Which phases of cellular respiration produce NADH? Which phase of cellular respiration produces FADH<sub>2</sub>?
- c. In which part of the cell does the Krebs Cycle occur? Where does glycolysis occur?
- d. Which phase of cellular respiration produces the most ATP?
- e. When you exhale, carbon dioxide is produced. How is this produced?
- f. Do plants use cellular respiration to get energy from food?
- g. What is your favorite phase of cellular respiration and why?