**Cell Energy Modeling Assignment**

Directions: We will spend several class days modeling the various processes that the cell uses to obtain and use energy. You will do classwork assignments, then use that information to add more information to your model.

To set up the model: Your teacher will give you 2 sheets of 8.5x11 paper. You will need to tape these together so that your model minimally measure 8.5x 16 inches when put together. You will need to fold it so that it fits into your notebook and can be unfolded and used.

Part 1: ATP and the BIG Picture

1. Read the background information on ATP and do the ATP sheet given to you.
2. In the TOP, CENTER Position of your model, draw the *reversible* chemical reaction between ATP and ADP+P.
3. Label the arrow that shows energy being stored and the arrow that shows energy being released. Write how much energy is stored and released in kcal.
4. Draw the relationship between glucose and ATP on the model.
5. Label the point at which cellular respiration occurs.
6. Label the point at which photosynthesis occurs.

Part 2: Cellular respiration flow chart-After muscle fatigue lab

1. Begin by cutting out the animal cell model and pasting/taping it to the far-right of your model near the top.
2. Above the animal cell model, write “RESPIRATION”, and underneath that, write “WHO?”
3. Next to the animal cell model, create a flow chart that starts with glucose at the top and includes the following terms: Oxygen present, oxygen not present, aerobic respiration, anaerobic respiration, fermentation, Lactic acid, ethyl alcohol, CO2 (should be used more than once), Animals/Bacteria, and Plants/Yeasts, 36-38 ATP, 2 ATP
4. Label the most efficient and least efficient process on your flow chart.
5. Under the animal cell diagram, zoom in on a mitochondria (see example), then draw the mitochondria under the animal cell and label the inner membrane, outer membrane, and matrix.

Part 3: Photosynthesis

Watch the video at: <https://www.youtube.com/watch?v=uixA8ZXx0KU> then do the following:

1. Begin by cutting out the leaf structure diagram and pasting/taping it to the far-left of your model.
2. Above that diagram, write “PHOTOSYNTHESIS,” and underneath that, write “WHO?
3. List which organisms do photosynthesis next to “WHO?”
4. Under the diagram, zoom in on a chloroplast from one of the palisade cells and draw the chloroplast, just as you did with the mitochondria yesterday. Label the thylakoids, grana, and stroma. State where the chlorophyll is found in the chloroplast.
5. Do the photosynthesis card sort. As you do the activity, show the inputs to photosynthesis (reactants) entering the chloroplast, and the outputs (products) leaving the chloroplast. You may use pictures and words to help you remember.
6. Underneath the chloroplast, translate the inputs and outputs of photosynthesis into a chemical equation that shows reactants and products.
7. Go back and label the function of each of the parts of the leaf. Your descriptions should focus on how the leaf is adapted to bring together all of the necessary materials for photosynthesis.

Part 4: Transpiration and photosynthesis rate

1. Read the USGS article on transpiration given to you from: <https://water.usgs.gov/edu/watercycletranspiration.html>
2. In the middle of the model, under the BIG picture, zoom in on the leaf guard cells, and tape/paste the image of the guard cells.
3. Label which guard cells with the highest turgor pressure, and the ones with the lowest turgor pressure. Label the open and closed stomata.
4. Show what enters and leaves the stomata during transpiration. Describe what this has to do with photosynthesis.
5. State when transpiration would occur the most, and when it would occur the least.
6. Talk to the text with your photosynthesis graphs. In the center of your model, under the description that you just wrote, List the factors that impact the rate of photosynthesis, and draw the graph of how they influence the rate. Describe why the rates of these reactions reach equilibrium.

Part 5: Cellular respiration and comparing the processes

1. As a class, we’ll watch the amoeba sisters comparing photosynthesis and respiration videos. Complete the accompanying sheet as you watch.
2. Complete the comparing photosynthesis and respiration model.
3. On the right side of your model, show the inputs (reactants) of cellular respiration entering the mitochondria that you drew, and show the outputs (products) leaving the mitochondria.
4. Underneath the mitochondria, translate the inputs and outputs of cellular respiration into a chemical equation that shows reactants and products. Label this as either aerobic or anaerobic cellular respiration.
5. Draw arrows between your final photosynthesis and cellular respiration equations showing the relationships between the two.
6. In the center of the model, above your arrows, draw a graphic that shows the relationship between photosynthesis and cellular respiration.