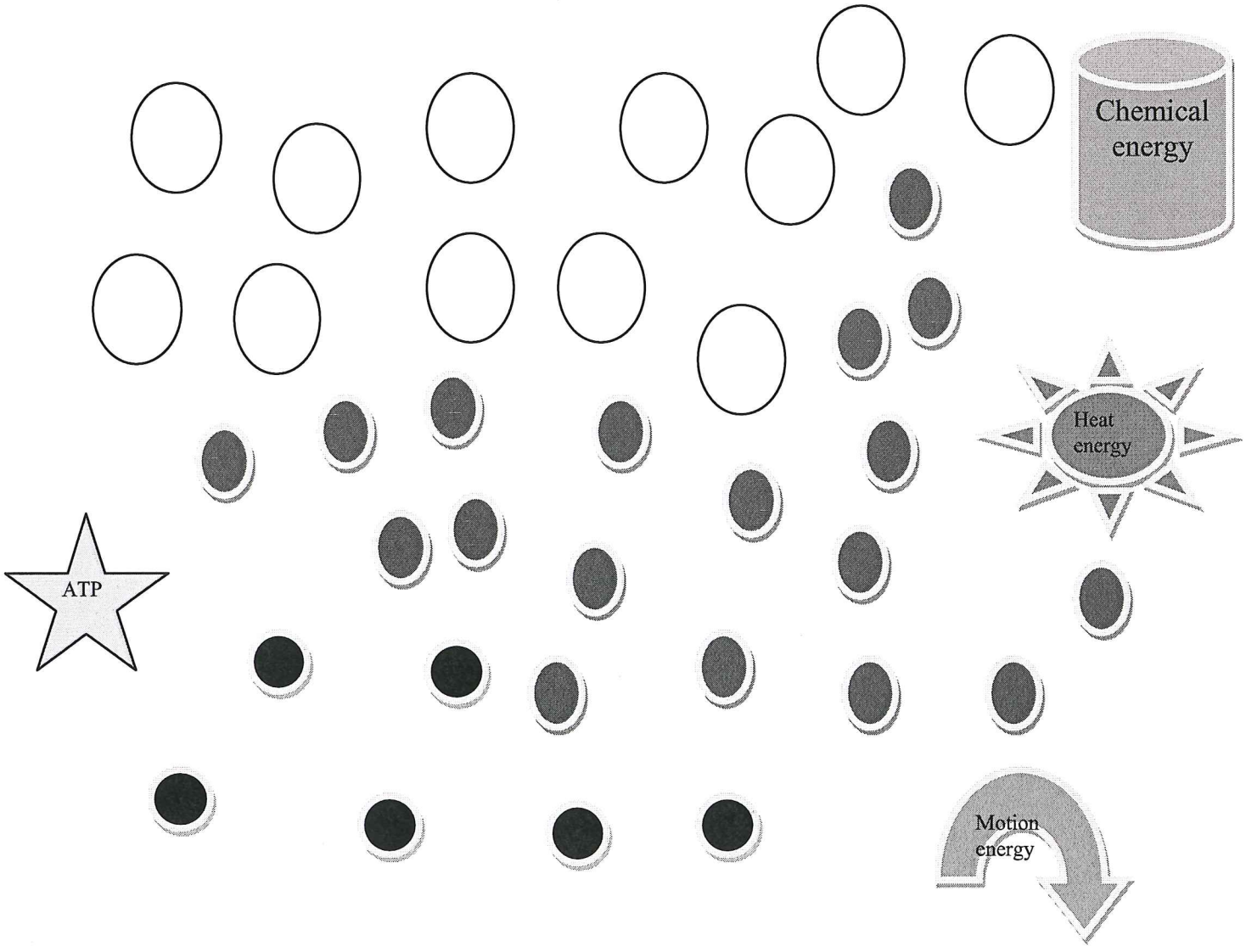
Work for 2-2

Cellular Respiration

Energy is defined as the ability to do work. The cells of both plants and animals require a continuous supply of energy for the performance of their life activities. Carbohydrates, especially glucose, generally provide this energy through the process of cellular respiration. The chemical reaction for cellular respiration is:
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy of ATP

Cut all of these out to assist you. If you do not have a colored printer, please color each circle.

6 black atoms = carbon (C)	Chemical energy
12 white atoms = hydrogen (H)	Motion energy
18 red atoms = oxygen (O)	Heat energy
1 diagram mitochondria	
1 ATP	



Part II Modeling Cellular Respiration

Both plant and animal cells contain organelles called mitochondria that are the principle site for cellular respiration. In cellular respiration 1 glucose molecule combines with 6 oxygen molecules to produce 6 water molecules, 6 carbon dioxide molecules, and energy stored in ATP molecules.

1. Place Diagram 2 (animal/plant cell with mitochondria) in front of you on the desktop.
   a. The organelle that is the principal site of cellular respiration is magnified.

      What is the name of this organelle? _____

   b. What types of organisms have cells with this organelle?

      _____

2. Place the glucose molecule and 6 oxygen molecules that you made during Part I on the diagram of the mitochondria. Without the raw materials (reactants) for cellular respiration, plants and animals cells could not convert the energy stored in food molecules into energy of ATP and they would die. What reactants are required for cellular respiration?

   _____

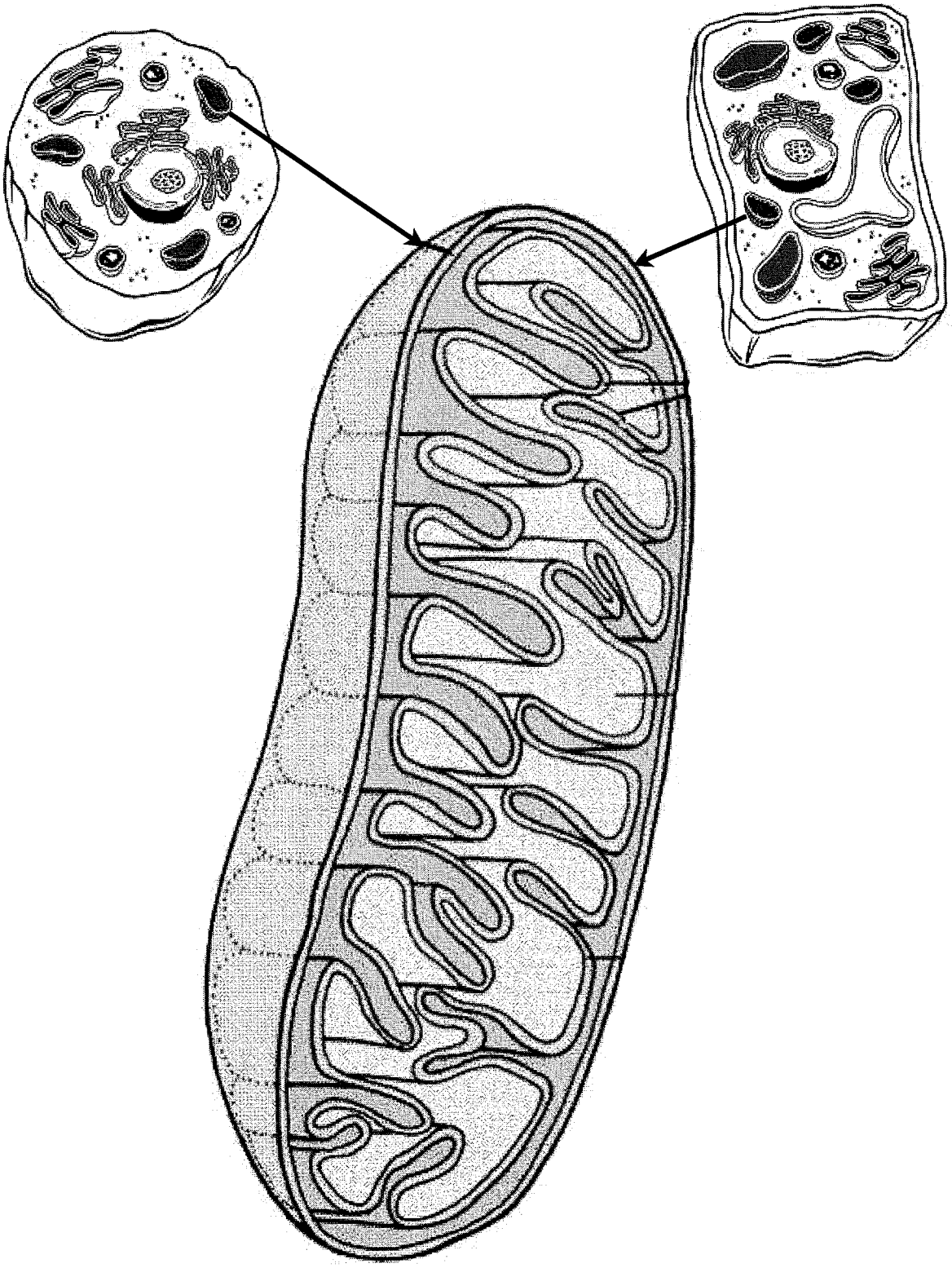
3. Complete Column 1 of Table 2 by counting the number of atom models for the reactants in cellular respiration.

Table 2

	Column 1	**Column 2**
Atoms	**Number of Atoms in the Reactants**	**Number of Atoms in the Products**
Black carbon atoms		
White hydrogen atoms		
Red oxygen atoms		

4. In cellular respiration, food molecules like glucose are converted through a series of chemical reactions into carbon dioxide, water, and chemical energy that is stored in ATP. **"Break"** the bonds in the glucose molecule and the 6 oxygen molecules. Using only these atoms, reassemble the atoms to make carbon dioxide and water molecules. Glue the products to one side of the mitochondria. Glue the energy pieces and ATP where they belong on the diagram as well.

Name _____
Date _____ Per ___



Name _____
Date _____ Per ___

1. Explain how the model you made illustrates cellular respiration. Be specific! Use the amount of atoms needed to assist you.

2. Does the number of carbon, hydrogen, and oxygen atoms in this diagram remain constant. Explain how this is possible.

Work for 2-2

Table 2: Bromothymol Blue Color Change Over Time for Pinto Bean Trial			
Time	Pre-Soaked Pinto Beans	Dry Pinto Beans	No Pinto Beans
0 min	blue	Blue	Blue
30 min	Slightly green	Blue	Blue
60 min	Light green	Blue	Blue
90 min	Light green	Blue	Blue
120 min	Light green	Blue	Blue
150 min	Light green	Blue	Blue
180 min	Light green	Blue	Blue
24 hours	Light green	Bluish green	Blue

Table 3: Bromothymol Blue Color Change Over Time for Kidney Bean Trial			
Time	Pre-Soaked Kidney Beans	Dry Kidney Beans	No Kidney Beans
0 min	Blue	Blue	Blue
30 min	Slightly green	Blue	Blue
60 min	Green	Blue	Blue
90 min	Green	Blue	Blue
120 min	Green	Blue	Blue
150 min	Green	Blue	Blue
180 min	Green	Blue	Blue
24 hours	Green	Bluish Green	Blue

2-2: I can describe how cellular respiration occurs in plants and animals to provide them with energy.

Lab Questions

1.How did the color of the bromothymol blue solution in each beaker change over time in each condition (Use Table 2 and Table 3)?

2.What is the mechanism driving the bromothymol blue solution color change?

3.What can be inferred from the color change of the bromothymol blue solution?

4.What evidence do you have to prove that cellular respiration occurred in the beans? Explain your answer.

5.What are the controls in this experiment, and what is the variable?

6. If this experiment were conducted at 0 °C, what difference would you see in the rate of respiration? Why?

7.Would you expect to find CO2 in your breath? Why?

more questions below

2-1: I can describe how cellular respiration occurs in plants and animals to provide them with energy.

8. Which type of bean conducted the most cellular respiration? What is your evidence?