**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** AP Biology Reading Guide Chapter 6A: An Introduction to Metabolism Fred and Theresa Holtzclaw

***Concept 6.1 An organism’s metabolism transforms matter and energy, subject to the laws of thermodynamics***

1. Define *metabolism*.

2. There are two types of reactions in metabolic pathways: *anabolic* and *catabolic*.

a. Which reactions release energy?

b. Which reactions consume energy?

c. Which reactions build up larger molecules?

d. Which reactions break down molecules?

e. Which reactions are considered “uphill”?

f. What type of reaction is photosynthesis?

g. What type of reaction is cellular respiration?

h. Which reactions require enzymes to catalyze reactions?

3. Contrast *kinetic energy* with *potential energy*.

4. Which type of energy does water behind a dam have? A mole of glucose?

***Concept 6.2 The free-energy change of a reaction tells us whether the reaction occurs spontaneously***

5. What is *free energy*? What is its symbol?

6. For an exergonic reaction, is ΔG negative or positive?

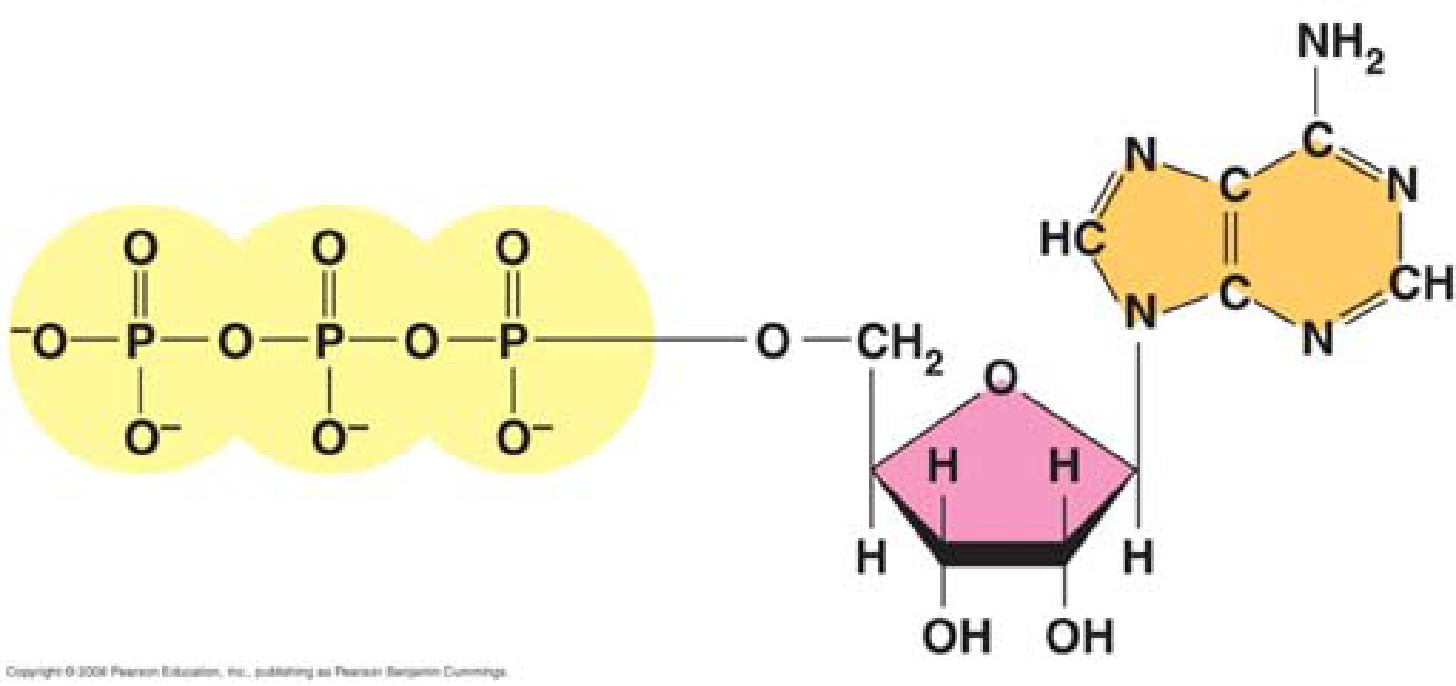
7. Is cellular respiration an endergonic or an exergonic reaction? What is ΔG for this reaction?

8. Is photosynthesis endergonic or exergonic? What is the energy source that drives it?

9. To summarize, if energy is released, ΔG must be what?

***6.3 ATP powers cellular work by coupling exergonic reactions to endergonic reactions***

11. Here is a molecule of ATP. Label it. Use an *arrow* to show which bond is likely to break.



a. By what process will that bond break?

b. Explain the name *ATP* by listing all the molecules that make it up.

12. When the terminal phosphate bond is broken, a molecule of inorganic phosphate P i is formed, and energy is

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_?

For this reaction: ATP → ADP + Pi, ΔG = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Is this reaction endergonic or exergonic?

13. What is *energy coupling*?