WLHS / AP Bio / Monson

Name_____
Date_____Per_____

UNIT 4 STUDY GUIDE: Energetics (Ch 8, 9, 10)

***STUDY HINTS:**

1) Review all study questions.
2) Review all notes.
3) Review text and diagrams (especially those topics that are most challenging for you!).
4) Practice **EXPLAINING** the processes of cellular respiration and photosynthesis to someone else…preferably someone who is not familiar with the material! If you can teach it, you know it! (because ALL of the multiple choice answers look good…)

Vocabulary to review:

Chapter 8	**Chapter 9 (continued)**	**Chapter 10 (continued)**
metabolism	pyruvate	stomata
catabolism	acetyl CoA	thylakoid membrane; lumen
anabolism	$FADH_2$	grana (granum)
energy (kinetic vs potential)	cytochromes	stroma
free energy (ΔG)	chemiosmosis	light reactions
entropy	ATP synthase	Calvin cycle
exergonic / endergonic	proton-motive force	$NADP^+$ / NADPH
energy coupling	alcohol fermentation	photophosphorylation
ATP / ADP	lactic acid fermentation	carbon fixation
phosphorylation	facultative anaerobe	wavelength; photon
	obligate anaerobe / aerobe	chlorophyll a & b; carotenoids
	mitochondrion	photosystems II & I (P680 & P700)
Chapter 9	cristae	reaction center
oxidation / reduction	matrix	primary electron acceptor
NAD^+ / NADH	inner membrane	Noncyclic ("linear") / cyclic electron flow
glycolysis	oxaloacetate ☺	RuBP
Krebs cycle	electronegativity	G3P
electron transport chain		C_3, C_4, CAM plants
oxidative phosphorylation	**Chapter 10**	photorespiration
substrate-level phosphorylation	autotroph / photoautotroph	mesohpyll / bundle-sheath cells
glucose	heterotroph / decomposer	rubisco ☺
	chloroplast	PEP carboxylase

Review Questions: Answer these questions on a separate piece of paper.

1) Draw and label the ATP cycle.

2) Write a balanced chemical equation for cellular respiration and for photosynthesis.

3) Sketch and label a mitochondrion.

4) Create a summary chart to describe the events of: glycolysis, oxidation of pyruvate to acetyl CoA, Krebs cycle, and the electron transport chain of cellular respiration. Include: a description of the "main events" of each phase; the energy inputs and outputs; the initial reactants and the final chemical products; the location of each phase (be specific!).

5) Why does the energy carrier $FADH_2$ produce fewer ATP during oxidative phosphorylation than the energy carrier NADH?

6) What is the proton-motive force? How does it result in the formation of ATP?

7) During respiration, in what pathway does most energy flow?

8) Describe three ways in which fermentation differs from respiration.

9) Sketch and label a chloroplast.

10) Where do the light reactions take place? Where does the Calvin cycle take place?

11) Summarize the "main events" of the light reactions. (HINT: your summary should include 7-10 details or steps!...in other words more explanation than: "light goes in, ATP and NADPH come out")

12) What is the difference between cyclic and noncyclic electron flow?

13) The Calvin Cycle is a series of processes that has been broken down into 3 phases. How would you describe the **main function** of each of these phases? (approx. 1 sentence per phase)

14) How are C_4 plants and CAM plants similar in how they have adapted to hot, dry climates? How are they different?

15) Living things can be classified as either AUTOTROPHS or HETEROTROPHS. What does this mean? Provide the main difference and main similarity between these two types of organisms in terms of energetics. (HINT: Use the words anabolism and catabolism)

16) Complete the following chart.

	Photosynthesis	**Respiration**
Where (organisms)		
Where (organelle)		
When (i.e. under what conditions?)		
Input (reactants)	Light: Calvin cycle:	
Output (products)	Light: Calvin cycle:	
Energy Source		
Energy Result		
Chemical Reaction		
Energy "Carriers" used		

Electron Transport	**Photosynthesis**	**Respiration**
ETC (Input)	Water, $NADP^+$, ADP, light	O_2, NADH, $FADH_2$, ADP
ETC (Output, including energy molecules…i.e. ATP, etc.)		
ETC pumps H^+ ions (y or n)		
H+ gradient drives ATP Production (y or n)		
ATP Synthase (y or n)		