Focus Questions
Cellular Form and Function
Chapters 6-12
AP Biology

Focus Questions

Chapter 6

- Compare the structure and function of prokaryotic cells and eukaryotic cells. Provide examples of each. (6.2)
- Explain the relationship between surface area and volume in cells. What condition is seen as ideal? Why? What problems can be created when this is out of balance? (6.2)
- Explain the importance of internal membranes in eukaryotic cells. (6.2)
- Describe specific functions of the nuclear envelope and explain how its form dictates its function. (6.3)
- Describe the flow of materials through the endomembrane system and explain what happens at each step. (6.4)
- Describe the origin of the mitochondria and chloroplasts in eukaryotic cells. (6.5)
- What are the major roles of the cytoskeleton? (6.6)
- What are the major components of the extracellular matrix and what functions do they perform? (6.7)
- Compare and contrast cellular junctions in plant and animal cells. (6.7)

Chapter 7

- Describe the fluid mosaic model of membrane structure and explain how it was determined this is most likely the correct model. (7.1)
- What makes membranes more or less fluid? (7.1)
- Describe the major functions of membrane proteins. (7.1)
- Describe the different types of passive transport across membranes and explain how this transport is regulated. (7.3)
- Describe how water is regulated in animal cells and plant cells. (7.3)
- Describe how sodium and potassium are transported across a membrane. (7.4)
- What is bulk transport? What types of items are transported this way? Explain how it is so drastically different from passive and active transport. (7.5)

Chapter 8

- Explain the difference between anabolic and catabolic processes and provide examples of each. (8.1)
- Describe the first and second laws of thermodynamics and how they relate to biological systems. (8.1)
- Describe the free energy equation. (8.2)
- Explain how cellular respiration is an open system. (8.2)
- Explain how ATP works in terms of free energy. (8.3)
- Draw energy diagrams representing exergonic and endergonic reactions including a representation of how an enzyme would impact those reactions. (8.4)
- Explain how an enzymes structure dictates its function. (8.4)
- Explain how environmental factors, cofactors, and inhibitors impact enzyme function. (8.4)
- Describe the methods of enzyme regulation. (8.5)

Chapter 9

- Explain how cellular respiration is a redox reaction. (9.1)
- Explain the role of electron carriers in biological systems. (9.1)
- Describe the process of glycolysis paying special attention to reactants, products, ATP, and electron carriers. (9.2)
- Describe the process of the oxidation of pyruvate paying special attention to reactants, products, ATP, and electron carriers. (9.3)
- Describe the process of the Citric Acid Cycle paying special attention to reactants, products, ATP, and electron carriers. (9.3)
- Describe the processes of the Electron Transport and Chemiosmosis paying special attention to reactants, products, ATP, and electron carriers. (9.4)
- Describe the two types of fermentation and explain when they happen in biological systems. (9.5)
- Describe how biological molecules besides glucose can be metabolized. (9.6)

Chapter 10

- Describe what happens to the reactants of photosynthesis and into what products are they converted. (10.1)
- Explain how chlorophyll a, chlorophyll b, and caroteniods behave differently in the presence of light and what benefit this provides. (10.2)
- Describe what happens in the light-dependent reactions of photosynthesis. Be sure to outline what happens in PSII and PSI as well as what molecules serve as reactants in the process and what are products. (10.2)
- Describe what happens in the light-independent reactions of photosynthesis. Be sure to include information about the reactants and products. (10.3)
- Describe how C_4 plants and CAM plants handle photosynthesis differently and what factors cause this. (10.4)

Chapter 11

- Describe how yeast cells communicate with each other for mating purposes. (11.1)
- What are the different local and long distance signaling tactics of cells? (11.1)
- Describe a generalized signal transduction model. (11.1)
- Briefly describe the differences between G Protein-Coupled Receptors, Receptor Tyrosine Kinases, and Ion Channel Receptors. (11.2)
- Describe intracellular receptors. What must be true of the ligand (hormone) for this to happen? (11.2)
- Describe the generalized model of a signal transduction pathway. (11.3)
- What are second messengers? Provide examples. (11.3)
- What is the ultimate destination of the signal transduction pathway? In general, what is the response? (11.4)
- Explain the conditions that can lead to apoptosis. (11.5)

Chapter 12

- Briefly describe what happens in each stage of the cell cycle including all phases of mitosis. (12.2)
- How do spindle fibers pull chromosomes apart? (12.2)
- Describe the process of cell division in bacteria. (12.2)
- Describe the experiments that illustrate there are cytoplasmic signals that regulate the cell cycle. (12.3)
- Describe how cyclins and cyclin-dependent kinases regulate the cell cycle. (12.3)
- Describe the action of platelet-derived growth factor (PDGF). (12.3)
- Explain cancer development in terms of cell cycle controls. (12.3)

Key Terms

Chapter 6

cell wall
central vacuole
centriole
chloroplast
chromatin
chromosome
cilia
contractile vacuole
cytoplasm
cytoplasmic streaming
cytoskeleton
cytosol
endomembrane system
endosymbiont theory
eukaryotic cell
extracellular matrix (ECM)
flagellum
food vacuole
Golgi apparatus
lysosome
mitochondrion
motor protein
nuclear envelope
nucleoid
nucleolus
nucleus
organelle
peroxisome
plasma membrane
plasmodesmata
prokaryotic cell
ribosome
rough ER
smooth ER
stroma
tight junction
transport vesicle
vacuole

Chapter 7

active transport
amphipathic
aquaporin
concentration gradient
cotransport
diffusion
endocytosis
exocytosis
facilitated diffusion
flaccid
fluid mosaic model
gated channel
hypertonic
hypotonic
integral protein
ion channel
isotonic
ligand
membrane potential
osmoregulation
osmosis
passive transport
peripheral protein
phagocytosis
pinocytosis
plasmolysis
receptor-mediated endocytosis
selective permeability
sodium-potassium pump
tonicity
transport protein
turgid

Chapter 8

activation energy
active site
allosteric regulation
anabolic pathway
catabolic pathway
catalyst
coenzyme
cofactor
competitive inhibitor
endergonic reaction
energy
entropy
enzyme
enzyme-substrate complex
exergonic reaction
feedback inhibition
first law of thermodynamics
free energy
induced fit
metabolic pathway
metabolism
noncompetitive inhibitor
phosphorylated
second law of thermodynamics
spontaneous process
substrate
thermal energy
thermodynamics

Chapter 9

aerobic
alcohol fermentation
anaerobic
ATP synthase
cellular respiration
chemiosmosis
electron transport chain
facultative anaerobe
fermentation
glycolysis
lactic acid fermentation
obligate anaerobes
oxidation
oxidative phosphorylation
redox reaction
reduction
substrate-level phosphorylation

Chapter 10

absorption spectrum
autotroph
bundle-sheath cell
C3 plant
C4 plant
CAM plant
carbon fixation
carotenoid
chlorophyll
cyclic electron flow
electromagnetic spectrum
heterotroph
light-harvesting complex
mesophyll
photon
photophosphorylation
photosynthesis
photosystem
primary electron acceptor
reaction center complex
stomata
stroma
thylakoid
visible light
wavelength

Chapter 11

apoptosis
G-protein-linked receptor
hormone
ligand
ligand-gated ion channel
local regulator
protein kinase
reception
receptor tyrosine kinase
response
scaffolding protein
second messenger
signal transduction pathway
transduction

Chapter 12

anchorage dependence
benign tumor
binary fission
cell cycle
cell division
cell plate
checkpoint
chromatin
chromosome
cleavage
cyclin
cyclin-dependent kinase (Cdk)
cytokinesis
density-dependent inhibition
gamete
genome
growth factor
interphase
kinetochore
malignant tumor
metastasis
mitosis
mitotic spindle
origin of replication
sister chromatids
somatic cell
transformation