Learning Log

Chapter 40

1. Using Figure 40.4, in what sense are exchange surfaces such as the lining of the digestive system both internal & external?
2. If you were deciding where to put the thermostat in a house, what factors would govern your decision? How do these factors relate to the fact that many homeostatic control sensors in humans are located in the brain? *(CUES: appendages, receptor, control center, effector, negative feedback)*
3. Using Figure 40.7 and the idea of energy coupling in Figure 8.10, discuss why heat is produced in the absorption of nutrients, in cellular respiration, & in the biosynthesis of biopolymers. *(CUES: exergonic, endergonic, hydrolysis, dehydration synthesis)*
4. Which animal must eat a larger portion of its weight in food each day: a house cat or an African lion caged in a zoo? Explain. *(CUES: size, metabolic rate)*
5. In cool weather, jackrabbits sometimes flatten their ears against their body. What is an advantage and disadvantage for their survival?  *(CUES: homeostasis, acute senses, blood vessels)*

Chapter 43

1. Although pus is often seen as a sign of infection, it is also an indicator of immune defenses in action. Explain. *(CUES: white blood cells, inflammatory response)*
2. Use Figure 43.5 to describe how the lymphatic system functions during an immune response. *(CUES: lymph nodes, macrophages, lymphocytes)*
3. Use Figure 43.6 to describe what happens when you get a paper cut. *(CUES: mast cells, clotting elements, phagocytes, neutrophils, macrophages, phagocytosis)*
4. Directly compare & contrast the following:
   1. A receptor binding to a ligand
   2. An enzyme binding to a substrate
   3. An antibody/T-cell receptor binding to an antigen.

*(CUES: specificity)*

1. Use Figure 43.9 to describe the function of MHC molecules on both types of T cells. *(CUES: Class I MHC, Class II MHC, cytotoxic T cells, helper T cells, antigen-presenting cells)*
2. Use Figure 43.11 to compare & contrast alternative mRNA splicing and immune cell receptor gene rearrangement. *(CUES: light chain, heavy chain, recombinase, gene segments)*
3. Use Figure 43.12 to describe the process of clonal selection. *(CUES: antigen molecules, receptors, specificity, proliferation, plasma cells, memory cells)*
4. Explain 2 advantages of having memory cells when a pathogen is encountered for a second time. *(CUES: primary immune response, secondary immune response)*
5. By using Figure 43.16, explain in detail how cytotoxic T cells function. *(CUES: T Cell Receptor—TCR, CD8, target cell, Class I MHC, perforin, apoptosis)*
6. By using Figure 43.17, explain in detail how B cells function? *(CUES: macrophage, Class II MHC, helper T cell, cytokines, proliferation, differentiation, memory B cells, plasma cells, antibodies)*
7. Use Figure 43.15 to explain in detail how helper T cells assist both the cell-mediated & humoral immune responses. *(CUES: antigen fragments, Class II MHC, helper T cell, TCR, CD4, cytokines, helper T cell clones, cytotoxic T cell, B cell)*
8. Use Figure 43.19 to explain FOUR ways how antigens are disposed of after they are bound by an antibody.
9. In an effort to maintain exam exemptions, one of the seniors at your table comes to school when they are “sick as a dog”, thus infecting you with a virus that affects the upper respiratory system. Use Figure 43.14 as a foundation to describe how your body responds. *(CUES: antigen, dendritic cells, helper T cells, cytotoxic T cells, B cells, memory cells, plasma cells, antibodies)*

Chapter 45

1. Suppose you were studying a cell’s response to a particular hormone, and you observed that the cell continued to respond to the hormone even when treated with a chemical that blocks transcription. What would you surmise about the hormone and its receptor? Why? *(CUES: water-soluble hormone, lipid-soluble hormone, cell surface receptor, intracellular receptor)*
2. After studying Figures 45.7 and 45.8, propose an explanation for why people with defects in specific endocrine pathways typically have defects in the final gland in the pathway rather than in the hypothalamus or pituitary.
3. Use Figure 45.12: In a glucose tolerance test, periodic measurements of blood glucose level are taken after a person drinks a glucose-rich solution. In a healthy individual, blood glucose rises moderately at first but falls to near normal within 2 – 3 hours. Predict the results of this test in a person with diabetes mellitus. Explain your answer. *(CUES: pancreas, insulin, glycogen)*
4. Use Figure 45.13: Suppose you receive an injection of cortisone, a glucocorticoid, in an inflamed joint. What aspects of glucocorticoid activity would you be exploiting? If a glucocorticoid pill were also effective at treating the inflammation, why would it still be preferable to introduce the drug locally?

Chapter 48

1. Use Figure 48.3: Describe the basic pathway of information flow through neurons that causes you to turn your head when someone calls your name.  *(CUES: PNS, CNS, sensory input, motor output, integration)*
2. How might increased branching of an axon help coordinate responses to signals communicated by the nervous system? Explain.
3. Ouabain, a plant substance used in some cultures to poison hunting arrows, disables the sodium-potassium pump. What change in the resting membrane potential would you expect to see if you treated a neuron with ouabain? Why? *(CUES: homeostasis, resting potential, ion gradients)*
4. In multiple sclerosis, myelin sheaths harden & deteriorate. How would this affect the frequency at which action potentials could be generated? Explain.
5. If all the Ca2+ in the fluid surrounding a neuron were removed, how would this affect the transmission of information within and between neurons? Why?  *(CUES: voltage-gated ion channel, synaptic vesicles, neurotransmitter, reception of signal)*
6. If a drug mimicked the activity of GABA in the CNS, what general effect on behavior might you expect? Explain.