Temperature Regulation

*Suggested Bozeman Videos: Thermoregulation, Homeostasis Hugs (Counter Current Exchange)*

Section 40.2

1. True or False. Cells can function over only a narrow range of temperatures.
2. What is the general lower and upper temperature limit for cells?
3. How can changes in tissue temperature lead to the disruption of an organism’s metabolism and homeostasis?

Section 40.3

1. What is an ectotherm?
2. What is an endotherm?
3. What two types of animals are endotherms?
4. What is a heterotherm?
5. Why do endotherms produce more heat metabolically?
6. What may have led to the evolution of endothermy?
7. What are two major differences between endotherms and ectotherms?
8. Explain the experiment shown in Figure 40.9. How are the lizard and the mouse different?
9. Explain Figure 40.10. How can the ectotherm lizard maintain a fairly stable body temperature despite changing environmental temperatures?
10. How can blood flow to the skin help regulate body temperature?
11. How does a “hot fish” use counter current heat exchange to maintain a body temperature much warmer than the water? Why is this advantageous?

Section 40.4

1. What is an organism’s basal metabolic rate?
2. What is the relationship between basal metabolic rate per gram body tissue and body size? (Figure 40.15)
3. How does shivering warm an animal?
4. What are some adaptations that cold-climate species have evolved to handle the cold? (Look at the two rabbit species in Figure 40.18.)
5. How does sweating and panting cool down an endotherm?
6. What is a fever?
7. What is regulated hypothermia? What is daily torpor? What is hibernation?

Gas Exchange in Animals

*Suggested Bozeman Videos: Cooperative Interactions, Organ Systems*

Section 49.1

1. What is the only means by which respiratory gases can be exchanged?
2. What is the equation for Fick’s Law of diffusion? Describe each variable in the equation: Q, D, A, P1-P2, and L.
3. Why can oxygen be obtained more easily from air than from water?
4. How does oxygen availability change with altitude?

Section 49.2

1. What adaptations can maximize respiratory gas exchange?
2. What are the four different systems for gas exchange shown in Figure 49.3?
3. What is ventilation? What is perfusion?
4. What is an insect’s tracheal system? What are spiracles?
5. How does counter current blood flow in gills (blood flow opposite to water flow) make gas exchange more efficient in gills?
6. How do birds achieve unidirectional ventilation to maximize gas exchange? (Figure 49.8)
7. Why is tidal breathing, like that in humans, somewhat inefficient? What’s the problem?

Circulatory Systems

Section 50.1

1. What is the function of a circulatory system?
2. What’s the difference between an open circulatory system and a closed circulatory system?
3. What are some of the advantages that closed circulatory systems have over open circulatory systems?
4. Then how do highly active insect species achieve high levels of metabolic activity despite having an open circulatory system?

Section 50.2

1. In the circulatory systems of vertebrate animals what general evolutionary theme emerges?
2. What are capillaries? What important function do they serve?
3. What limits the ability of the fish circulatory system to supply its tissues with oxygen and nutrients?
4. How does the three-chambered amphibian heart improve the pressure and speed of blood delivered to body tissues?
5. How do amphibians supplement their oxygen supply?
6. Why would reptiles want to reduce blood flow to their lungs at times?
7. Birds and mammals have fully separated pulmonary and systemic circuits. Both types of animals have four-chambered hearts. What are some of the advantages of this?

Nutrition, Digestion, and Absorption

Section 51.2

1. Define the following terms: saprobes, detritivores, predators (herbivores, carnivores, omnivores), and filter feeders.
2. Describe a few herbivore adaptations.
3. Describe a few carnivore adaptations.
4. What is a gastrovascular cavity?
5. What are some of the advantages of a tubular gut?
6. What are some of the main sections and parts of a tubular gut?
7. What is the role of bacteria in the gut?
8. What are villi and microvilli? What are their functions?
9. What is the role of the following digestive enzymes: proteases, carbohydrases, peptidases, lipases, and nucleases?