Name: _____ **AP Biology** [redacted]

Chapter 39 Active Reading Guide
Motor Mechanisms and Behavior

Section 1

1. Skeletal muscle is attached to bone and striated. What does striated mean?

2. A single muscle cell is also called a muscle fiber. Write a description of each term.
   muscle-

   muscle fiber-

   myofibrils-

   sarcomere-

   thick filaments-

   thin filaments-

3. The mechanism of muscle contraction is described by the sliding-filament model. In the following space, draw a sketch of a sarcomere in a relaxed muscle. Below it, draw a sketch of a sarcomere in a contracted muscle. On your figure, label actin and myosin.

4. Describe the myosin molecule.

5. As you see in Figure 39.4, muscle contraction occurs when actin and myosin interact. Myosin heads bind to actin, forming cross-bridges. What molecule binds to myosin to provide the energy of contraction?

6. In a muscle fiber, the specialized endoplasmic reticulum is known as the _____ or _____.

7. What causes the release of Ca^{2+}?

8. Here is a jumbled summary of steps involved in muscle contraction. Indicate the correct order of steps by filling in the first column in the table below.

#	Steps
	Calcium ions bind to troponin molecules of thin filaments.
	Acetylcholine is released from synaptic vesicles.
	Acetylcholine binds to receptors on the muscle fibers. This allows Na+ ions to rush, causing depolarization.
	The troponin/tropomyosin complex is moved so the myosin-binding site of actin is exposed.
	Depolarization continues across the sarcolemma and down the transverse tubule system.
	Ca++ is released from cisterns of the SR (sarcoplasmic reticulum).
	Nerve impulse arrives at the neuromuscular junction.
	Myosin heads rotate, bind the actin, and pull the actin fibers toward the center of the sarcomere.
	In the presence of Ca++, myosin acts as an enzyme. It catalyzes breakdown of ATP. Energy is transferred from ATP to the myosin head; myosin is activated.

9. What is meant by a motor unit?

10. The three types of muscles are skeletal, cardiac, and smooth. Select from these three choices to answer the following questions.
    a. _____ has intercalated disks.

    b. _____ lacks striations.

    c. _____ is striated and voluntary.

    d. _____ has both fast-twitch and slow-twitch fibers.

    e. _____ is associated with the heart.

Section 2

11. Your text describes three types of skeletons. Explain how a hydrostatic skeleton works.

12. List three phyla that have a hydrostatic skeleton.

13. What is an exoskeleton? From what is it made?

14. Which phylum is characterized by an exoskeleton? _____

15. All chordates have an endoskeleton. What minerals are common in bone and cartilage?

Section 3

16. How is behavior defined?

17. What is behavioral ecology?

18. What is a fixed action pattern (FAP)? Give an example.

19. What is a sign stimulus?

20. Nicholas Tinbergen's work with the stickleback fish is a classic study. Explain what he found using the terms fixed action pattern and sign stimulus in your response.

21. What is migration?

22. Explain what is meant by circadian clock and circadian rhythms. Identify two behaviors, either plant or animal, that demonstrate a circadian rhythm.

23. Discuss two navigational strategies used by birds to migrate.

24. Animals communicate in various ways. Discuss at least three specific examples using different organisms.

25. Notice the pictures that show fruit fly courtship behavior (see AP Biology Lab 11B, "Reproductive Behavior in Fruit Flies"). What different modes of communication are used by the fruit fly?

26. Karl von Frisch studied European honeybees. What are the two types of dances that a returning worker bee does, and what information does each dance convey?

27. What are pheromones? Give three specific types of information that can be transmitted through pheromones.

Section 4

28. What is the difference between innate and learned behavior? Give an example of each.

29. Describe the process of imprinting, and explain what is meant by sensitive or critical period.

30. Describe the classic study of parental imprinting done by Konrad Lorenz.

31. What special challenges did researchers face in order to return whooping cranes to the wild? What would you have to wear if you worked with hatchlings? Why?

32. There are several types of learning. What occurs in spatial learning?

33. What are two types of associative learning? Which type did Ivan Pavlov use to get a dog to salivate at the sound of a bell?

34. What occurs in operant conditioning?

35. What is cognition? Give three examples of cognition in animal species; include at least one bird behavior.

36. Many bird songs are learned during a critical period. What will happen if a white-crowned sparrow does not hear the song of its species during this time?

Section 5

37. What is foraging behavior?

38. What is proposed by the optimal foraging theory? Explain it in terms of cost and benefit, and cite two examples from your text.

39. To demonstrate that you understand the principle of optimal foraging, describe a food source that you would not be likely to exploit and explain why.

40. Explain each of these mating systems:
    promiscuity-

    monogamy-

    polygamy-

    polygyny-

    polyandry-

41. Explain two factors that may be important in determining the evolution of these systems, and apply each factor to a particular species.

42. There are two types of sexual selection. Explain each of them.
    intersexual selection:

    intrasexual selection:

43. What is agonistic behavior? Give one example of this behavior that is not in your book.

Section 6

44. What is altruism?

45. Explain the evolutionary advantage to a population of having members who exhibit altruistic behavior.

46. Altruism may reduce the fitness of an individual—for example, by making that individual more obvious to a predator. Explain this behavior using the concept of inclusive fitness.

47. Explain the logic behind geneticist J.B.S. Haldane's comment that he would lay down his life for two brothers or eight cousins.

48. Contrast kin selection and reciprocal altruism.