

3.E Formatives

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

Below is a list of signal types that animals use for communication. Choose the one that best fits the criteria in the following questions.

- A) olfactory
- B) visual
- C) auditory
- D) tactile
- E) electrical

- _____ 1. A long-lasting signal that works at night.
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
- _____ 2. A fast signal that requires daylight and no obstructions.
 - a. A
 - b. B
 - c. C
 - d. D
 - e. E
- _____ 3. A chemical produced by an animal that serves as a communication to another animal of the same species is called
 - a. a marker.
 - b. an inducer.
 - c. a pheromone.
 - d. an imprinter.
 - e. an agonistic chemical.
- _____ 4. One way to understand how early environment influences differing behaviors in similar species is through an experimental technique known as "cross fostering." Suppose that the curly-whiskered mud rat differs from the bald mud rat in several ways, for example curly-whiskered rats are much more aggressive. How would you set up a cross-fostering experiment to determine if environment plays a role in this mud rat's aggression?
 - a. You would cross curly-whiskered mud rats and bald mud rats and hand-rear the offspring.
 - b. You would place newborn curly-whiskered mud rats with bald mud rat parents, newborn bald mud rats with curly-whiskered mud rat parents, and let some mud rats of both species be raised by their own species. Then compare the outcomes.
 - c. You would remove the offspring of curly-whiskered mud rats and bald mud rats from their parents and raise them in the same environment.
 - d. You would see if curly-whiskered mud rats bred true for aggression.
 - e. None of these schemes describes cross fostering.

- _____ 5. The presence of altruistic behavior in animals is most likely due to kin selection, a theory maintaining that
- aggression between sexes promotes the survival of the fittest individuals.
 - genes enhance survival of copies of themselves by directing organisms to assist others who share those genes.
 - companionship is advantageous to animals because in the future they can help each other.
 - critical thinking abilities are normal traits for animals and they have arisen, like other traits, through natural selection.
 - natural selection has generally favored the evolution of exaggerated aggressive and submissive behaviors to resolve conflict without grave harm to participants.
- _____ 6. In Belding's ground squirrels, it is mostly the females that behave altruistically by sounding alarm calls. What is the likely reason for this distinction?
- Males have smaller vocal cords and are less likely to make sounds.
 - Females invest more in foraging and food stores, so they are more defensive.
 - Females settle in the area in which they were born, so the calling females are warning kin.
 - The sex ratio is biased.
 - Males forage alone; therefore, alarm calls are useless.
- _____ 7. Which of the following is an example of Müllerian mimicry?
- two species of unpalatable butterfly that have the same color pattern
 - a day-flying hawkmoth that looks like a wasp
 - a katydid whose wings look like a dead leaf
 - two species of rattlesnake that both rattle their tails
 - two species of moths that with wing spots that look like owl's eyes
- _____ 8. Which of the following is an example of Batesian mimicry?
- an insect that resembles a twig
 - a butterfly that resembles a leaf
 - a nonvenomous snake that looks like a venomous snake
 - a fawn with fur coloring that camouflages it in the forest environment
 - a snapping turtle that uses its tongue to mimic a worm, thus attracting fish
- _____ 9. Which of the following is an example of aposematic coloration?
- stripes of a skunk
 - eye color in humans
 - green color of a plant
 - colors of an insect-pollinated flower
 - a katydid whose wings look like a dead leaf
- _____ 10. All of the following represent ways that animals defend themselves against predators *except*
- incorporating plant toxins into their tissues.
 - cryptic coloration.
 - mobbing.
 - interspecific competition.
 - hiding or fleeing.
- _____ 11. Which of the following is a sensation and not a perception?
- seeing the colors in a rainbow
 - a nerve impulse induced by sugar stimulating sweet receptors on the tongue
 - the smell of natural gas escaping from an open burner on a gas stove
 - the unique taste of french fries with cheese
 - the sound of a fire-truck siren as it passes by your car

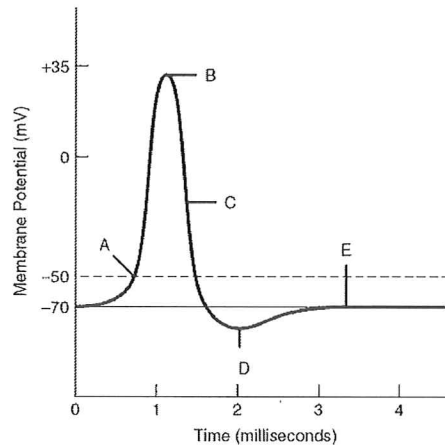
- _____ 12. Why are we able to differentiate tastes and smells?
- The action potentials initiated by taste receptors are transmitted to a separate region of the brain than those initiated by receptors for smell.
 - The sensory region of the cerebral cortex distinguishes something we taste from something we smell by the difference in the action potential.
 - The brain distinguishes between taste, arising from interoceptors, from smell arising from exteroceptors.
 - Because we are able to see what we are tasting, the brain uses this information to distinguish taste from smell.
 - Taste receptors are able to detect fewer molecules of the stimulus, which means these receptors will initiate a receptor potential before smell receptors do.
- _____ 13. What is the correct sequence of events that would lead to a person hearing a sound?
- transmission
 - transduction
 - integration
 - amplification
- 1, 2, 3, 4
 - 1, 4, 2, 3
 - 2, 4, 1, 3
 - 3, 1, 2, 4
 - 3, 1, 4, 2
- _____ 14. What do hearing, touch, and a full stomach have in common?
- The transducers are all proprioceptors.
 - The sensory information from all three is sent to the thalamus.
 - The sensory receptors are all hair cells.
 - Electrical energy is transduced to form an action potential.
 - Only A and B are correct.
- _____ 15. What do muscles, nerves, and glands have in common?
- They synapse with neurons.
 - They are referred to as postsynaptic cells.
 - They are target cells.
 - A and B only
 - A, B, and C
- _____ 16. If an otherwise normal nerve cell were made permeable to large negative ions, what would happen?
- The membrane potential would not form.
 - Potassium would not leave the resting cell.
 - Sodium would not enter the resting cell.
 - The membrane potential would become positive.
 - The sodium-potassium pump would not function.
- _____ 17. The sodium-potassium pump of neurons pumps
- Na^+ and K^+ into the cell.
 - Na^+ and K^+ out of the cell.
 - Na^+ into the cell and K^+ out of the cell.
 - Na^+ out of the cell and K^+ into the cell.
 - Na^+ and K^+ into the cell and H^+ out of the cell through an antiport.

Refer to the information below to answer the following questions.

A previously unknown organism has been discovered. It contains long cells with excitable membranes that scientists suspect are used for rapid information transfer. The membrane of the cell is permeable only to ion X, which carries a negative charge. Active transport pumps in the membrane move X into the cell while simultaneously moving ion Y, also carrying a negative charge, out of the cell.

- _____ 18. Which of the following is *true* about the establishment of the resting membrane potential in this cell?
- The resting potential of this cell will be zero.
 - The resting potential of this cell will be negative.
 - A negative resting potential is directly produced by the pump moving a negative charge into the cell.
 - A negative resting potential is directly produced by the diffusion of Y^- into the cell.
 - A positive resting potential is directly produced by the diffusion of X^- out of the cell.
- _____ 19. Which of the following is a *correct* statement about a resting neuron?
- It releases lots of acetylcholine.
 - The membrane is very leaky to sodium.
 - The membrane is equally permeable to sodium and potassium.
 - The membrane potential is more negative than the threshold potential.
 - The concentration of sodium is greater inside the cell than outside.
- _____ 20. Which of following is a true statement about the threshold potential of a membrane?
- It is equal to about 35 mV.
 - It is equal to about 70 mV.
 - It opens voltage-sensitive gates that result in the rapid outflow of sodium ions.
 - It is the depolarization that is needed to generate an action potential.
 - It is a graded potential that is proportional to the strength of a stimulus.
- _____ 21. After an action potential, the resting potential is restored by
- the opening of sodium activation gates.
 - the opening of voltage-sensitive potassium channels and the closing of sodium activation gates.
 - an increase in the membrane's permeability to potassium and chloride ions.
 - the delay in the action of the sodium-potassium pump.
 - the refractory period in which the membrane is hyperpolarized.

For the following questions, refer to the graph of an action potential in the figure below and use the letters to indicate your answer.



- _____ 22. The membrane is unable to respond to any further stimulation, regardless of intensity.
- A
 - B
 - C
 - D
 - E
- _____ 23. The threshold potential is reached.
- A
 - B
 - C
 - D
 - E
- _____ 24. Repolarization occurs, sodium gates close, and some potassium gates reopen.
- A
 - B
 - C
 - D
 - E
- _____ 25. Action potentials are normally carried in one direction from the axon hillock to the axon terminals. By using an electronic probe, you experimentally depolarize the middle of the axon to threshold. What do you expect?
- No action potential will be initiated.
 - An action potential will be initiated and proceed in the normal direction toward the axon terminal.
 - An action potential will be initiated and proceed back toward the axon hillock.
 - Two action potentials will be initiated, one going toward the axon terminal and one going back toward the hillock.
 - An action potential will be initiated, but it will die out before it reaches the axon terminal.

Name: _____

ID: A

- _____ 26. Which of the following offers the best description of neural transmission across a mammalian synaptic gap?
- a. Neural impulses involve the flow of K^+ and Na^+ across the gap.
 - b. Neural impulses travel across the gap as electrical currents.
 - c. Neural impulses cause the release of chemicals that diffuse across the gap.
 - d. Neural impulses travel across the gap in both directions.
 - e. The calcium within the axons and dendrites of nerves adjacent to a synapse acts as the neurotransmitter.
- _____ 27. Neurotransmitters categorized as inhibitory would *not* be expected to
- a. bind to receptors.
 - b. open K^+ channels.
 - c. open Na^+ channels.
 - d. open Cl^- channels.
 - e. hyperpolarize the membrane.

3.E Formatives

Answer Section

MULTIPLE CHOICE

- | | |
|------------|-------------------|
| 1. ANS: A | TOP: Concept 51.2 |
| 2. ANS: B | TOP: Concept 51.2 |
| 3. ANS: C | TOP: Concept 51.2 |
| 4. ANS: B | TOP: Concept 51.3 |
| 5. ANS: B | TOP: Concept 51.6 |
| 6. ANS: C | TOP: Concept 51.6 |
| 7. ANS: A | TOP: Concept 53.1 |
| 8. ANS: C | TOP: Concept 53.1 |
| 9. ANS: A | TOP: Concept 53.1 |
| 10. ANS: D | TOP: Concept 53.1 |
| 11. ANS: B | TOP: Concept 49.1 |
| 12. ANS: A | TOP: Concept 49.1 |
| 13. ANS: C | TOP: Concept 49.1 |
| 14. ANS: D | TOP: Concept 49.1 |
| 15. ANS: E | TOP: Concept 48.1 |
| 16. ANS: A | TOP: Concept 48.2 |
| 17. ANS: D | TOP: Concept 48.2 |
| 18. ANS: E | TOP: Concept 48.2 |
| 19. ANS: D | TOP: Concept 48.2 |
| 20. ANS: D | TOP: Concept 48.3 |
| 21. ANS: B | TOP: Concept 48.3 |
| 22. ANS: D | TOP: Concept 48.3 |
| 23. ANS: A | TOP: Concept 48.3 |
| 24. ANS: C | TOP: Concept 48.3 |
| 25. ANS: D | TOP: Concept 48.3 |
| 26. ANS: C | TOP: Concept 48.4 |
| 27. ANS: C | TOP: Concept 48.4 |