

Assessment NSCS Program Learning Outcomes Pre/Post-Test Question

1. Draw an action potential from the perspective of voltage. Label the x and y axes and indicate the expected voltages for various parts of the action potential (threshold, rising and falling phases, undershoot/recovery). Indicate the Nernst potentials for the relevant ions.
2. Draw the currents underlying the action potential that explain the ionic basis of each part of it. Label them.
3. Re-draw the action potential from the voltage perspective but now for the situation in which sodium currents fail to inactivate.
4. By using what experimental technique could an experimenter record primarily from neuronal ion channels of a single type? (A11)
 - A. voltammetry
 - B. patch-clamp recording
 - C. functional magnetic resonance imaging
 - D. electro encephalography (EEG)
5. The proximate cause of vesicle exocytosis at the pre-synaptic terminal is: (A2)
 - A. calcium ions entering the terminal
 - B. depolarizing voltage changes
 - C. potassium ions exiting the terminal
 - D. an increase in membrane resistance along the synaptic active zone
6. The most potent coincidence detector underlying the development of long term potentiation (LTP) is: (A2, A6)
 - A. Protein Kinase A
 - B. AMPA receptors
 - C. NMDA receptors
 - D. Cam KII
7. Myelin increases the speed of transmission of action potentials. Explain the most important property of the myelin sheath that underlies the effect on transmission speed. (A2, B).
8. Astrocytes play a crucial role in central nervous system function by: (A1, A2)
 - A. modulating synaptic function
 - B. enwrapping axons to increase the speed of transmission of electrical signals
 - C. producing cerebrospinal fluid
 - D. altering cytoskeletal integrity in neighboring neurons
9. Which of the following statements is FALSE about the growth and migration of neurons during development? (A9)
 - A. Intracellular calcium can trigger cytoskeleton growth.
 - B. The growth cones help guide the axons of the neuron to their correct target.
 - C. Axonal growth typically depends on electrical signals.
 - D. Synaptic connections between neurons get refined after axonal and dendritic outgrowth.
10. Multiple sclerosis often yields failure of action potential transmission because of its effects on: (A1, A2, A10)
 - A. The axonal length constant (λ)
 - B. The axonal time constant (T)
 - C. Intermodal spacing along the axon

- D. The number of nodes of Ranvier
11. Which of the following components is critical for the adaptation in both photoreceptors and olfactory receptor cells. (A3)
- A. cyclic AMP
 - B. Ca⁺⁺
 - C. cyclic GMP
 - D. diacylglycerol
12. What is a sensory receptive field? Give an example from either the visual or the somatosensory system. (A3, B)
13. Which of the following brain structures is associated with execution of motor learning? (A3)
- A. Wernicke's area
 - B. Somatosensory cortex
 - C. Basal ganglia
 - D. Nucleus accumbens
14. Which one of the following components is NOT part of a reflex arc? (A2, A3)
- A. Sensory afferents
 - B. Interneurons
 - C. Primary motor cortex neurons
 - D. Dorsal root ganglion cells
15. Parkinson's Disease is caused by a (A1, A2, A10)
- A. Decrease in the production of dopamine
 - B. Loss of myelin in the CNS
 - C. Mutation in the gene coding for the enzyme superoxide dismutase 1 (SOD1)
 - D. Buildup of the protein Tau in neurons
16. Which one of the following does NOT occur when the parasympathetic nervous system is activated? (A1, A6, A7, A10)
- A. Decreased heart rate
 - B. Increased saliva production
 - C. Increased pupil dilation
 - D. Increased stomach secretions
17. Most of the synapses in the brain are chemical rather than electrical (electrical referring to gap junctions). Describe one advantage of each form of synapse. (A2, B)
18. The mind-brain identity theory is the theory that: (A1, A4, A6)
- A. mind and brain are two different essences
 - B. thinking about pain is correlated with experiencing pain
 - C. each type of mental event is a type of brain event
 - D. the states and processes of mind aren't reducible to those of the brain
19. Modern cognitive neuroscience (A1, A4, A5, A6)
- A. does not acknowledge behavioral measurement as its source of information
 - B. accepts that ultimately cognitive functions will be completely understood in terms of cellular and molecular mechanisms

- C. assumes that all functions can be localized to a specific brain region
 - D. none of these are true
20. What have we learned from the 3-way analogy between mind, brain, and computation? (A4, A5)
- A. There is no single computational model of mind
 - B. Parallel processors account for inter-individual differences
 - C. The way computer performs helps us understand the role of emotion in thinking
 - D. Thoughts compute exclusively over experiences in the physical world
21. When it comes to decision-making, people typically (A7, C)
- A. are rational decision makers
 - B. follow the laws of probability
 - C. weight losses more than gains
 - D. exhibit risk-seeking behavior
22. Which of the following has been shown to be most relevant to psychological judgments of similarity? (A6)
- A. symmetry
 - B. transitivity
 - C. prototypicality
 - D. logic
23. Which of these types of memories is most dramatically damaged in the amnesiac patient HM? (A6)
- A. semantic memory
 - B. episodic memory
 - C. procedural memory
 - D. working memory
24. The brain systems involved in remembering the past are: (A6)
- A. involved in imagining the future
 - B. important in acquiring skills
 - C. predominantly in the occipital cortex
 - D. the foundation for the allocation of attention
25. Visual illusions like the Muller-Lyer illusion show that at least part of the visual system is modular because these illusions (A5, A6)
- A. differ if viewed through just the right or the left eye
 - B. persist even when you know that it is an illusion
 - C. involve activation of hippocampus
 - D. are overcome by background knowledge
26. In cognitive science, prototype and exemplar theories refer to the way humans: (A7)
- A. remember skills versus specific episodes
 - B. engage in automatic vs. controlled decision making
 - C. learn categories and concepts
 - D. engage in selective versus divided attention
27. Which of the following most accurately describes the neurological condition known as “aphasia”? (A7, A10)

- A. It impairs one's ability to make fine movements
 - B. It impairs the ability to produce or comprehend language
 - C. It is associated with a lack of attention to one side of space
 - D. It impairs one's inability to navigate through one's environment
28. Cognitive neuropsychological research (A11)
- A. Is necessarily based on single case studies
 - B. Is most valuable when neural reorganization has occurred
 - C. Can only suggest correlations between brain and behavior
 - D. Can reveal causal relationships between brain and behavior
29. If a dependent variable is reliable, it is (A11)
- A. likely to produce the same results in the future
 - B. well controlled
 - C. a good test of the underlying concept
 - D. likely to produce large, easily measured, differences
30. A confounded experiment is one in which (A11)
- A. there are unequal numbers of male and female participants
 - B. an extraneous variable co-varies with one level of the independent variable
 - C. the dependent variable is unreliable
 - D. the independent variable systematically co-varies with the dependent variable
31. Why don't observational/correlational studies reveal causal relationships? (A11, B)
- A. participants are randomly assigned to conditions
 - B. a hidden variable could potentially account for the results
 - C. the dependent variable is not operationally defined
 - D. the dependent variable is invalid
32. Compared to EEG, fMRI (A11)
- A. is a direct measure of brain activity
 - B. doesn't depend upon a control condition
 - C. has better spatial resolution
 - D. has better temporal resolution
33. Briefly describe at least five properties of Fodor's modularity of mind theory. (A5)
34. What is meant by the phrase "executive function(s)"? How do executive function(s) and their associated neural architecture change across the human lifespan? (A7, B)
35. What are the advantages of Transcranial Magnetic Stimulation over (1) fMRI, (2) EEG, (3) cognitive neuropsychology? (A11)