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Chapter 2: Cognitive Neuroscience

Multiple Choice

1. Neuroscientists have learned a great deal about which brain areas contribute to different cognitive abilities through _____.
   A. blood tests
   B. childhood photographs of patients
   C. case studies
   D. textbooks

Cognitive domain: Knowledge
Answer location: Introduction: Knowledge from Cognitive Deficits
Question type: MS
Ans: C

2. One of the first clinical cases that contributed to our knowledge of brain function, Phinneas Gage, suffered damage to his _____.
   A. temporal lobe
   B. frontal lobe
   C. parietal lobe
   D. occipital lobe

Cognitive domain: Knowledge
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: B

3. The _____ is important for _____.
   A. temporal lobe; emotional regulation and decision making
   B. visual cortex; sensation
   C. parietal lobe; speech
   D. frontal lobe; emotional regulation and decision making

Cognitive domain: Knowledge
Answer location: The Brain
Question type: MS
Ans: D

4. Although Jenelle is capable of fluid thought processes, she has trouble producing fluid speech. She likely has _____.
   A. Wernicke's aphasia

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B. Broca's aphasia

Cognitive domain: Application
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: B

5. In _____, patients have difficulties understanding speech.
   A. Wernicke's aphasia
   B. Broca's aphasia

Cognitive domain: Analysis
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: A

6. Broca's area is located in the _____, while Wernicke's area is located in the _____.
   A. left temporal lobe; left frontal lobe
   B. right temporal lobe; right frontal lobe
   C. left frontal lobe; left temporal lobe
   D. right frontal lobe; right temporal lobe

Cognitive domain: Knowledge
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: C

7. _____ is the inability to correctly recognize objects, and is associated with damage to the _____.
   A. Object agnosia; inferior temporal cortex
   B. Wernicke's aphasia; inferior temporal cortex
   C. Object agnosia; inferior frontal cortex
   D. Aphasia; inferior temporal cortex

Cognitive domain: Knowledge
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: A

8. Oliver Sacks documented a patient that was unable to distinguish between living and nonliving things. Such a deficit likely resulted from damage to the _____.
   A. frontal lobe

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B. inferior parietal cortex
C. visual cortex
D. inferior temporal cortex

Cognitive domain: Application
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: D

9. Jolie suffered brain damage that caused deficits to her short-term memory, but her long-term memory was left intact. Which brain area is likely damaged that would account for this short-term memory deficit?
A. Wernicke's area
B. frontal lobe
C. hippocampus
D. temporal lobe

Cognitive domain: Comprehension
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: C

10. The brain is composed of billions of _____.
A. cortices
B. neurons
C. lobes
D. synapses

Cognitive domain: Knowledge
Answer location: The Neuron
Question type: MS
Ans: B

11. Which is the correct order of the parts of a neuron?
A. Dendrites, cell body, axon, synapse
B. Cell body, dendrites, axon, synapse
C. Synapse, axon, cell body, dendrites
D. Dendrites, axon, synapse, cell body

Cognitive domain: Knowledge
Answer location: The Neuron
Question type: MS
Ans: A

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12. The space between two neurons where neurotransmitters are released and received is called the _____.
    A. terminal
    B. myelin sheath
    C. synapse
    D. axon

Cognitive domain: Knowledge
Answer location: The Neuron
Question type: MS
Ans: C

13. The ion that is mainly responsible for maintaining the positive charge found in the extracellular space of a neuron at rest is _____.
    A. potassium
    B. sodium
    C. chlorine
    D. calcium

Cognitive domain: Comprehension
Answer location: The Neuron
Question type: MS
Ans: B

14. The four lobes of the brain all have different functions. This exhibits what principle?
    A. specialization
    B. depolarization
    C. functionalism
    D. lateralization

Cognitive domain: Comprehension
Answer location: The Brain
Question type: MS
Ans: D

15. The frontal lobe has an important role in reasoning, while the temporal lobe has a role in language. This illustrates what principle?
    A. functionalism
    B. localization
    C. specialization
    D. depolarization

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Cognitive domain: Comprehension
Answer location: The Brain
Question type: MS
Ans: B

16. John has sustained damage to an area of the brain known as Wernicke's area. What task is he likely to have difficulty with?
    A. Speech production
    B. Sensation
    C. Speech comprehension
    D. Object recognition

Cognitive domain: Application
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: C

17. All of the following are required in a neuron's ability to communicate with other neurons except _____.
    A. nucleus
    B. dendrites
    C. axon
    D. myelin sheath

Cognitive domain: Analysis
Answer location: The Neuron
Question type: MS
Ans: D

18. A group of clinical researchers have spent 10 years observing Tony, a man who sustained damage to his inferior temporal cortex. While they have documented a great deal of information on Tony, there are several issues they may encounter with their findings. Which is NOT one of the potential problems?
    A. The brain damage is not controlled by researchers
    B. It may be difficult to determine what area of damage has resulted in specific deficits
    C. They can generalize their findings to other people with damage to the same areas
    D. They cannot study the consequences damage[either damages or consequences, right?]f to other parts of the brain by observing Tony

Cognitive domain: Analysis
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: MS
Ans: C

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19. A researcher is interested in determining the function of a particular neuron in a drosophila. What technique might they use?
    A. Single-cell recording
    B. Case study
    C. Electroencephalography
    D. Magnetoencephalography

Cognitive domain: Application
Answer location: Measures in Cognitive Neuroscience
Question type: MS
Ans: A

20. _____ is a technique that is often used in sleep studies, and measures the activity of large groups of neurons.
    A. Magnetoencephalography
    B. Electroencephalography
    C. Single-cell recording
    D. Magnetic Resonance Imaging

Cognitive domain: Comprehension
Answer location: Measures in Cognitive Neuroscience
Question type: MS
Ans: A

21. Dr. Smith wants to assess the effect of inhibiting a particular area of the brain on a person's behavior. Which technique would best accomplish this?
    A. Electroencephalography
    B. Magnetic Resonance Imaging
    C. Positron Emission Tomography
    D. Transcranial magnetic stimulation

Cognitive domain: Comprehension
Answer location: Electrical Stimulation/Inhibition of Neurons
Question type: MS
Ans: D

22. Dr. Johnson suspects that a patient he has recently seen may have a brain tumor. Which technique would be the best option for him to use in terms of confirming this suspicion?
    A. Magnetic resonance imaging
    B. Positron Emission Tomography
    C. Transcranial magnetic stimulation
    D. Electroencephalography

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Cognitive domain: Comprehension
Answer location: Brain Imaging Techniques
Question type: MS
Ans: B

23. Dr. Brown is interested in measuring the differences in brain activity between two subsets of patients. Which method would be the most appropriate and safest one for him to use to achieve this?
    A. Magnetic resonance imaging
    B. Functional magnetic resonance imaging
    C. Positron emission tomography
    D. Transcranial magnetic stimulation

Cognitive domain: Comprehension
Answer location: Brain Imaging Techniques
Question type: MS
Ans: B

24. All of the following are noninvasive ways of imaging the brain, except:
    A. Magnetic resonance imaging
    B. Transcranial magnetic stimulation
    C. Positron emission tomography
    D. Functional magnetic resonance imaging

Cognitive domain: Analysis
Answer location: Brain Imaging Techniques
Question type: MS
Ans: C

25. Brain recording and brain imaging techniques have allowed scientists to link brain function to _____.
    A. cognition
    B. movement
    C. speech
    D. disease

Cognitive domain: Comprehension
Answer location: Recording Activity in the Living Brain
Question type: MS
Ans: A

26. It is suggested that the brain activity seen approximately half of a second before initiating a behavior is indicative of _____.

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A. The brain regretting the behavior
B. The brain's readiness to carry out the behavior
C. The actual behavior itself
D. The brain making a decision about the behavior

Cognitive domain: Comprehension
Answer location: Can All Mental Processes Be Explained in Terms of Brain Activity?
Question type: MS
Ans: B

27. In order for an action potential to be transmitted to the next neuron, it must first be _____ at the axon hillock.
A. weakened
B. strengthened
C. generated
D. terminated

Cognitive domain: Comprehension
Answer location: The Neuron
Question type: MS
Ans: C

28. Damage to the frontal lobe would likely cause deficits in _____.
A. reasoning
B. vision
C. sensation
D. speech comprehension

Cognitive domain: Comprehension
Answer location: The Brain
Question type: MS
Ans: A

29. In order to learn how to perform stereotaxic surgery on a laboratory animal, Jennifer watched her mentor perform a surgery first. What was likely active at the time of her observations, as well as when she performed the surgery herself?
A. The frontal lobe
B. Wernicke's area
C. Mirror neurons
D. The inferior temporal cortex

Cognitive domain: Comprehension
Answer location: Single-Cell Recording
Question type: MS
Ans: C

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30. _____ would be the best technique for determining what cortical brain areas are active during speech.
    A. Magnetoencephalography
    B. Magnetic Resonance Imaging
    C. Transcranial Magnetic Stimulation
    D. Positron Emission Tomography

Cognitive domain: Application
Answer location: Magnetoencephalography
Question type: MS
Ans: A

True or False

1. True or False. Complex cognitive tasks are a function of distributed processing in the brain.

Cognitive domain: Comprehension
Answer location: The Brain
Question type: TF
Ans: True

2. True or False. All behavior can undoubtedly be connected to specific brain activity.

Cognitive domain: Comprehension
Answer location: Can All Mental Processes Be Explained in Terms of Brain Activity?
Question type: TF
Ans: False

3. True or False. Phinneas Gage had damage to his temporal lobe.

Cognitive domain: Knowledge
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: TF
Ans: False

4. True or False. Patients that have suffered brain damage have mistaken furniture for people.

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Cognitive domain: Comprehension
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: TF
Ans: True

5. True or False. Patient H. M. lost the ability to form new memories, but his long-term memory remained intact.

Cognitive domain: Knowledge
Answer location: Clinical Case Studies in Cognitive Neuroscience
Question type: TF
Ans: True

6. True or False. Conducting a case study on a patient with damage to their frontal lobe has the potential to reveal a great deal of information about our brain's role in vision.

Cognitive domain: Comprehension
Answer location: The Brain
Question type: TF
Ans: False

7. True or False. Myelin sheath is present on all neurons.

Cognitive domain: Knowledge
Answer location: The Neuron
Question type: TF
Ans: False

8. True or False. During an action potential, there is an exchange of positive and negative ions between the extracellular and intracellular fluid.

Cognitive domain: Comprehension
Answer location: The Neuron
Question type: TF
Ans: True

9. True or False. Positron Emission Tomography is a safe and noninvasive way to image the brain.

Cognitive domain: Knowledge

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Answer location: Brain Imaging Techniques
Question type: TF
Ans: False

10. True or False. Magnetic Resonance Imaging is a temporal image of the brain, while functional Magnetic Resonance Imaging captures only spatial images of the brain.

Cognitive domain: Knowledge
Answer location: Brain Imaging Techniques
Question type: TF
Ans: False

Short Essay

1. Discuss how case studies have contributed to our understanding of how the brain works.
   Ans: Key points that a student should cover in their answer include examples such as Phinneas Gage, Patient H. M., or case studies of Broca's and Wernicke's aphasia. A correct answer will review at least two cases of patients presenting with brain damage and would cite the area of damage and the deficits associated with said damage. A key point would also denote how the consistency of areas damaged has contributed to our knowledge of that brain area.

2. Discuss the activities that take place during an action potential.
   Ans: A correct answer would include the neuroanatomy associated with an action potential (i.e. parts of a neuron), as well as the generation of the action potential at the axon hillock, through termination at the terminal buttons and subsequent vesicular release of neurotransmitters[ok?] into the synapse. A correct answer would describe the exchange of ions.

3. Compare and contrast the various brain imaging methods.
   Ans: A correct answer would name and describe the components and functions of each of the brain imaging methods. A correct answer would also list each imaging technique's ideal uses, and would describe how they are different from one another (i.e. their advantages and disadvantages).

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