You must put your name, student ID number and your TA’s name on both the paper test and your Scantron. Make sure to put the test version number on your Scantron. You must turn in both the test and the Scantron. We will not grade any Scantron without an accompanying test. Show your ID when you turn in your test.

You may write on the test but you must put the answers to each question on your Scantron. We will not re-grade the Scantron so do not fill in the blank until you are sure of your answer.

True/False (1 point each)

Indicate whether the statement is true (A) or false (B).

1. Motor neurons are always efferent from the nervous system.
   a. True
   b. False

2. Schwann cells build the myelin sheaths in the periphery of the body.
   a. True
   b. False

3. In a myelinated axon, sodium channels are absent in the nodes of Ranvier.
   a. True
   b. False

4. Chemical communication between neurons is faster than electrical communication within neurons.
   a. True
   b. False
5. Opiates work at the pain receptors in the skin.
   a. True  
   b. False

6. The sympathetic and parasympathetic nervous systems generally have opposing actions on the major internal organs.
   a. True  
   b. False

7. Cerebrospinal fluid provides the major cushion for the brain.
   a. True  
   b. False

8. Damage to the right hemisphere of the cortex would most likely cause loss of sensory or motor control on the left side of the body.
   a. True  
   b. False

9. Bumps and depressions in the skull are closely related to how well developed the underlying brain areas are.
   a. True  
   b. False

10. Central pattern generators are most likely to be found in the spinal cord.
    a. True  
    b. False
Multiple Choice (2 points each)
Identify the choice that best completes the statement or answers the question.

11. What structure is composed of two layers of fat molecules that are free to flow around one another?
   a. the endoplasmic reticulum
   b. a ribosome
   c. a mitochondrion
   d. the membrane

12. Small, charged molecules can cross the cell membrane through:
   a. diffusion.
   b. ribosomes.
   c. mitochondria.
   d. protein channels.

13. The tree-like branches of a neuron that receive information from other neurons are called:
   a. axons.
   b. dendrites.
   c. soma.
   d. myelin.

14. Allowing only certain people to cross the street, and only at certain times. is comparable to a neuron’s _____ with respect to ions.
   a. threshold of excitation
   b. all-or-none law
   c. resting potential
   d. selective permeability
15. Under which conditions would the sodium-potassium pump be far less effective in creating a concentration gradient?
   a. if dendrites were generally longer than axons
   b. if the glia-to-neuron ratio were higher
   c. if selective permeability of the membrane did not exist
   d. if it were an active transport system that required energy

16. What tends to open the sodium gates across a neuron's membrane?
   a. hyperpolarization of the membrane
   b. depolarization of the membrane
   c. increase in the sodium concentration outside the neuron
   d. passing the peak of the action potential and entering the refractory period

17. What will NOT affect the speed of an action potential?
   a. the presence of myelin
   b. the diameter of the axon
   c. the length of the axon
   d. the number of sodium gates

18. What are the nodes of Ranvier?
   a. gates in the membrane that admit all ions freely
   b. gaps in the myelin sheath
   c. branching points in an axon
   d. places where dendrites join the cell body
19. The circuit from sensory neuron to muscle response is called:
   a. a reflex arc.
   b. a synapse.
   c. flexion.
   d. extension.

20. Simultaneous weak stimuli at different locations produce a greater reflexive response than one of the stimuli by itself. What is this phenomenon called?
   a. Sherrington's law
   b. temporal summation
   c. spatial summation
   d. the all-or-none law

21. What do temporal summation and spatial summation have in common?
   a. Both involve the activity of only two neurons.
   b. Both require a response from the brain.
   c. Both depend on a combination of visual and auditory stimuli.
   d. Both enable a reflex to occur in response to weak stimuli.

22. Dopamine and norepinephrine are classified as:
   a. second messengers.
   b. purines.
   c. proteins.
   d. catecholamines.
23. The tiny packets that contain neurotransmitter in the presynaptic neuron are called:
   a. vesicles.
   b. bags.
   c. sacs.
   d. terminals.

24. Exocytosis is the process by which neurotransmitters are:
   a. excreted into the synaptic cleft.
   b. synthesized.
   c. destroyed.
   d. secreted into synaptic vesicles.

25. The main advantage of a neuron releasing more than one neurotransmitter is that:
   a. if it runs out of one, it has others.
   b. it can release different transmitters on different occasions.
   c. it can send more complex messages.
   d. it can release one from the axon's terminal and one from another location along the axon.

26. "Second messengers" carry their messages to:
   a. the presynaptic membrane.
   b. areas within the postsynaptic cell.
   c. areas within the presynaptic cell.
   d. the surrounding glia.
27. After serotonin or one of the catecholamine transmitters stimulates the postsynaptic receptor, most of the transmitter molecules:
   a. remain on the receptor until other neurotransmitters replace them.
   b. are broken into components while still attached to the postsynaptic cell.
   c. are metabolized by the postsynaptic cell as a source of energy.
   d. are reabsorbed by the presynaptic cell.

28. Why do the effects of certain transmitters, such as serotonin, vary from one synapse to another?
   a. The brain releases different forms of serotonin at different synapses.
   b. It depends whether it is an original serotonin molecule or one that has been recycled.
   c. The width of the synaptic cleft varies from one synapse to another.
   d. There are several kinds of postsynaptic receptors for serotonin.

29. The stimulant effects of MDMA are likely to due actions at ____ synapses, while the hallucinogenic effects are likely to due to actions at ____ synapses.
   a. dopamine, nitric oxide
   b. neuropeptide Y, serotonin
   c. dopamine, serotonin
   d. serotonin, dopamine
30. Anandamide and 2-AG are believed to be the naturally occurring neurotransmitters that bind to the same receptors as which drug?
   a. heroin
   b. cocaine
   c. alcohol
   d. marijuana

31. Drugs that grossly distort perception are known as:
   a. hallucinogens.
   b. depressants.
   c. opiates.
   d. stimulants.

32. If the spinal cord is cut at a given segment, the brain loses sensation at:
   a. that segment only.
   b. that segment and all segments above it.
   c. that segment and all segments below it.
   d. all other segments.

33. What, generally, is the relationship between the activity of the sympathetic and the parasympathetic nervous systems?
   a. The sympathetic controls internal organs while the parasympathetic controls peripheral organs.
   b. The sympathetic usually has specific, localized effects, while the parasympathetic has broad effects.
   c. They usually have opposite effects on the same organ.
   d. The sympathetic is involved in voluntary behavior, while the parasympathetic is involved in involuntary behavior.
34. The term pons (meaning "bridge") is named as such because:
   a. the sensory and motor neurons connect with each other.
   b. passing axons skip over the pons.
   c. **axons within the pons cross over from one side to the other.**
   d. neurons compete with one another, as in the game of bridge.

35. The ascending portion of the reticular formation sends outputs to:
   a. the raphe system.
   b. the cerebellum.
   c. **much of the cerebral cortex.**
   d. motor areas of the spinal cord.

36. Olfactory information is processed by the:
   a. thalamus via the olfactory bulbs.
   b. **cortex via the olfactory bulbs.**
   c. spinal cord.
   d. medulla.

37. Although the pituitary is often called the master gland, its activity is regulated by the:
   a. basal ganglia.
   b. hippocampus.
   c. **hypothalamus.**
   d. thalamus.

38. A blind person who suddenly loses the ability to read Braille has probably suffered damage to what area of the cerebral cortex?
   a. temporal lobe
   b. frontal lobe
   c. occipital lobe
   d. **parietal lobe**
39. The area of the brain known to be important for "binding" is the:
   a. thalamus.
   b. central sulcus.
   c. **parietal cortex**.
   d. corpus callosum.

40. An MRI device creates an image of the brain based on:
   a. x-rays.
   b. gamma rays.
   c. **release of electromagnetic energy from atomic nuclei**.
   d. release of radioactive substances.

41. When an axon releases a transmitter at the nerve-muscle junction, the response of the muscle is to:
   a. always relax.
   b. **always contract**.
   c. relax or contract, depending on the transmitter.
   d. relax or contract, depending on the duration and amount of transmitter.

42. Compared to the average weekend jogger, a world class marathon runner probably has a higher percentage of which kind of fibers in his legs?
   a. **slow-twitch**
   b. fast-twitch
   c. smooth muscle
   d. white muscle
43. Compared to a long distance runner, a world class sprinter probably has more of which kind of fibers in her legs?
   a. slow-twitch
   b. **fast-twitch**
   c. smooth muscle
   d. striated muscle

44. A ballistic movement:
   a. is a rhythmic alternation between two movements.
   b. is guided by feedback during the course of the movement.
   c. **proceeds automatically once it has been triggered.**
   d. tends to overcorrect itself.

45. Watching another person shoot a basketball is most likely to activate ____ neurons in the brain of the person who is watching.
   a. primary motor cortex
   b. spinal cord
   c. **mirror**
   d. observational

46. Which of the following would most likely happen with damage to the prefrontal cortex?
   a. inability to move
   b. loss of somatosensory experiences
   c. **poorly planned movements**
   d. no effect on movement
47. What is the name of the rapid eye movement occurring when a person moves his or her eyes from one focus point to another?
   a. gyration
   b. sclerosis
   c. slide
   d. **saccade**

48. The cerebellum is most important for any process that requires:
   a. **precise timing**.
   b. control of muscle strength.
   c. comparison between the left and right hemispheres.
   d. detecting the intensity of a stimulus.

49. Genetic factors have their greatest impact on Parkinson’s disease in cases of:
   a. **early onset of the disease**.
   b. late onset of the disease.
   c. first-born children.
   d. children with older brothers and sisters.

50. Which of the following is a limitation of using L-dopa for Parkinson's disease?
   a. It only helps those who are in the later stages.
   b. It doesn't cross the blood-brain barrier.
   c. **It can contribute to a greater loss of dopamine neurons**.
   d. It blocks glutamate receptors.
Diagrams (3 points each)
For the illustrations or graphs below, identify the numbered structures (numbers correspond to question number on test).

51. Answer choices are:
   a. Axon
   b. **Dendrite**
   c. Myelin sheath
   d. Presynaptic terminal
   e. Soma

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53. Answer choices are:
   a. **Excitatory Postsynaptic Potential (EPSP)**
   b. Inhibitory Postsynaptic Potential (IPSP)
   c. Resting Potential
   d. **Spatial Summation**
   e. Temporal Summation

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   c. Resting Potential
   d. Spatial Summation
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