



Jerusalem Science Contest 5784

Neuroscience

Test 5

Form – A

Answer Key

- 1) What is the most immediate direct cause of muscle contraction?
 - a) Motor cortex
 - b) Synaptic potential
 - c) Muscle action potential**
 - d) Acetylcholine

- 2) Where are the neuron cell bodies that trigger voluntary movement?
 - a) Higher motor cortex.
 - b) Primary motor cortex**
 - c) Basal ganglia.
 - d) Spinal cord anterior horn motor neuron

- 3) How many motor neurons can cause contraction of an individual muscle fiber?
 - a) 1**
 - b) 2
 - c) 10
 - d) All motor neurons in the relevant part of the primary motor cortex

- 4) Which neurotransmitter is active at the neuromuscular junction?
 - a) Glutamate
 - b) Acetylcholine**
 - c) Dopamine
 - d) Acetylcholinesterase

- 5) How many synapses are involved in voluntary contraction of a muscle in your hand?
 - a) 1**
 - b) 2
 - c) 3
 - d) It depends on the action to be performed

- 6) Which is correct regarding the muscles at a joint?
- a) Agonist muscles contract to stabilize the joint and prevent movement.
 - b) Antagonist and agonist muscles cannot both contract at the same time.
 - c) If the antagonist muscle relaxes, the joint cannot move.
 - d) Contraction of agonist and antagonist muscles depends on the action to be performed.**
- 7) Which statement is NOT correct regarding co-contraction?
- a) Agonist muscles contract.
 - b) Antagonist muscles contract.
 - c) No movement occurs.**
 - d) It is useful for precise control of movement.
- 8) Which sensory receptors are important for precision movement?
- a) Pacinian corpuscles
 - b) Meissner corpuscles
 - c) Hair cells
 - d) Golgi tendon organs**
- 9) Which of the following allows for precise, complex movements?
- a) Spinal reflexes
 - b) Pain receptors
 - c) Inhibition**
 - d) Integrity of the motor unit
- 10) Which brain structure is NOT involved in motor control.
- a) Thalamus
 - b) Hypothalamus**
 - c) Basal Ganglia
 - d) Brainstem
- 11) Which statement is true regarding the motor homunculus?
- a) It is identical to the somatosensory homunculus
 - b) Refers to higher motor regions where planning of movement occurs
 - c) Refers to the way motor neurons controlling muscles from different body parts are distributed in primary motor cortex**
 - d) Is where sensory and motor integration occurs in the cerebral cortex
- 12) Which of the following is a stereotyped movement?
- a) Spinal reflex to pain
 - b) Calligraphy
 - c) Knee jerk reflex
 - d) Running**

- 13) Shira reaches for the handle of a saucepan on the stove, which she does not realize is extremely hot. As she touches the handle, her arm withdraws almost instantaneously. Shira only feels the pain of her burned hand after it is off of the handle. How many synapses are involved in the reflex that caused Shira to withdraw her hand and avoid a more serious burn?
- a) 0
 - b) 1
 - c) 2**
 - d) 3
- 14) Which is true regarding the knee jerk reflex?
- a) Requires input from primary motor cortex.
 - b) Is a response to painful stimulation of the kneecap
 - c) Does not require any central nervous system involvement.
 - d) Is triggered by stretch of a tendon below the kneecap.**
- 15) Which is a feature of Parkinson's disease?
- a) Loss of temperature sensation.
 - b) Degeneration of primary motor cortex.
 - c) Diminished voluntary (intentional) movement.**
 - d) Overactive release of Dopamine.
- 16) The phenomenon that a person can have awareness of his/her own brain functioning indicates that
- a) the human brain is the same as an animal brain, but bigger.
 - b) the "self", or the "me", is something separate from the brain.
 - c) there are parts of human experience that are not described by scientific theory.
 - d) both b and c**
- 17) The fact that God is omniscient (all-knowing) results in the fact that:
- a) when a person dies, all of the data in his brain is wiped out.
 - b) a memory transfer, from one brain to another brain, is theoretically possible.
 - c) all of the data contained within one's brain will continue to exist even after the brain stops functioning.**
 - d) a human being is capable of knowing everything if he connects himself to God.
- 18) If you are conscious of yourself thinking and you can pay attention to your thoughts, then
- a) you are your thoughts
 - b) you are not your thoughts**
 - c) your brain is so phenomenal that it has a part that can think about itself thinking, and a part that can think about itself thinking about itself thinking, and so on.**
 - d) this is a sign that you are of superior intelligence

19) According to Jewish tradition, which is *not* a way that a person attains knowledge?

- a) Through the senses, which bring information to the brain.
- b) Through thought, which generates knowledge internally.
- c) Through a spiritual medium, which teaches an unborn fetus all of the Torah.
- d) Through telepathic transfer of knowledge from one brain to another.**

20) What is one reason for why Tefillin are worn upon the head?

- a) To show that one should restrict his thinking to purely spiritual matters.
- b) To represent that all of the powers of the mind should be dedicated to the service of God.**
- c) To pray that God keep us mentally healthy.
- d) To serve as Divine protection that no heretical thoughts enter the head.