

Wednesday, November 16th, 2022

Following directions on the mark-sense form, write your **name, and student number** in the blanks and fill in the bubbles. In addition, write your **name** on this exam.

When finished with the test, turn in both the mark-sense form and the exam at the front of the room.

PLACE ALL ANSWERS ON THE MARK-SENSE FORM

KEY: Correct answers are given in **red bold-face**.

MULTIPLE CHOICE: Always choose the **BEST, most complete answer. (2 points each)**

1. Sensory receptors are specialized cells that
 - a) communicate directly with skeletal muscle fibers.
 - b) convert physical stimuli into changes in membrane potential.**
 - c) have lipid molecules embedded in cell membranes.
 - d) are found only in the skin.
 - e) are responsible for synaptic transmission

2. The “adequate stimulus” for a sensory receptor
 - a) is the type of stimulus that is most effective in activating the sensory receptor.**
 - b) always causes a depolarization of the membrane potential.
 - c) always causes a hyperpolarization of the membrane potential.
 - d) is the smallest stimulus that will elicit a response.
 - e) prevents adaptation.

3. Which of the following is the best description of the “neural code”?
 - a) A series of dots and dashes that are used to represent physical stimuli.
 - b) All synaptic connections are coded as positive.
 - c) Electrical messages are hidden in chemical synapses.
 - d) The intensity of a stimulus is encoded by the magnitude of the change in membrane potential it produces in the sensory receptor.**
 - e) An encryption system that protects the identity of sensory receptors.

4. How do phasic sensory receptors respond to sustained, long-lasting stimuli?
 - a) response increases over time
 - b) response remains constant over time
 - c) response oscillates over time
 - d) response declines over time**
 - e) response is unpredictable

5. Which of the following is NOT considered to be a somatic sensation?
- a) **sound**
 - b) temperature
 - c) pain
 - d) touch
 - e) itch
6. Which of the following is a difference between the somatosensory neural pathways for pain and fine touch?
- a) the location of the primary sensory receptor
 - b) **the location of the secondary sensory neuron**
 - c) the number of different neurons in the labelled line
 - d) the pathway for pain sensation is always bilateral
 - e) signals from touch stimuli bypass the thalamus
7. What is the difference between how sharp, fast pain and slow, diffuse pain are detected?
- a) Sharp, fast pain is detected by chemoreceptors only.
 - b) Slow, diffuse pain is detected by chemoreceptors only.
 - c) **Sharp, fast pain is detected by A-delta fibers and slow, diffuse pain is detected by C fibers.**
 - d) Slow diffuse pain is detected exclusively by mechanoreceptors.
 - e) Sharp, fast pain is detected by receptors exclusively located in the hands and feet.
8. When the sensation of pain from an internal organ is localized to a region on the surface of the body, this is called
- a) a sensory illusion.
 - b) phantom limb pain.
 - c) psychosomatic pain.
 - d) hypochondria.
 - e) **referred pain.**
9. Where are taste receptors found in the body?
- a) **in the mouth, digestive tract, and lungs**
 - b) only in the mouth
 - c) only on the tongue
 - d) on the skin surface and the tongue
 - e) everywhere on the body
10. How many different olfactory receptor proteins are found in each single olfactory sensory neuron?
- a) **1**
 - b) 2-5
 - c) 5-7
 - d) 10-20
 - e) 343

11. How can the number of odors we detect exceed the number of different types of olfactory receptor proteins?
- a) Novel odorant molecules cause the expression of new olfactory receptor proteins.
 - b) Some odors activate non-olfactory accessory neurons.
 - c) Odorant molecules can bind to more than one type of olfactory receptor protein.**
 - d) The olfactory sensory neurons express different receptor proteins as needed.
 - e) Exposure to new odors causes new olfactory sensory neurons to appear.
12. What are the major sensory modalities that converge in the brain to generate what we call “flavor”?
- a) visual, tactile, and vestibular
 - b) auditory, visual, and taste
 - c) auditory, olfactory, and somatosensory
 - d) taste, olfactory, and somatosensory**
 - e) taste, olfactory, and visual
13. Which of the following structures is NOT directly involved in audition?
- a) oval window
 - b) basilar membrane
 - c) tympanic membrane
 - d) cochlea
 - e) semicircular canal**
14. What is the function of the ossicles in the middle ear?
- a) prevent water from entering the inner ear through the round window
 - b) transmit sound waves from the outer ear to the inner ear**
 - c) connect the helicotrema to the tectorial membrane
 - d) connect the tympanic membrane to the Eustachian tube
 - e) prevention of ear infections
15. What determines the optimal sound frequency that stimulates a hair cell receptor in the cochlea?
- a) the size of its tip link proteins
 - b) the density of potassium leak channels
 - c) its position along the basilar membrane**
 - d) its distance from the tectorial membrane
 - e) its degree of myelination

16. Which of the following is involved in detecting rotational movements of the head?
- a) the tympanic membrane
 - b) the cochlea
 - c) the semicircular canals**
 - d) the oculomotor nucleus
 - e) the utricle and saccule
17. What is the function of the vestibulo-ocular reflex?
- a) maintaining balance
 - b) controlling posture
 - c) sensing gravitational forces
 - d) maintaining visual fixation during head movements**
 - e) keeping the eyes open during rapid body movements
18. What structure(s) in the brain receive direct input from the vestibular sensory neurons?
- a) visual and auditory cortex
 - b) somatosensory cortex
 - c) basal ganglia and dorsal root ganglia
 - d) hippocampus
 - e) vestibular nuclei of the medulla and the cerebellum**
19. Which of the following is NOT a principal component of the visual pathway into the brain?
- a) the cerebellum**
 - b) the retina
 - c) the optic chiasm
 - d) the optic nerve
 - e) the lateral geniculate body of the thalamus
20. What is accommodation in the visual system?
- a) decreasing the retinal response to sustained light
 - b) adjusting the shape of the lens to keep objects in focus**
 - c) learning to recognize new objects
 - d) adjusting visual perception when wearing new glasses
 - e) reversing the orientation of vertical and horizontal images projected on the retina
21. What process initiates the visual experience?
- a) action potentials in the optic nerve
 - b) synaptic potentials in bipolar cells
 - c) phototransduction**
 - d) opening the optic disc
 - e) occluding the optic chiasm

22. What is the origin of color vision?
- a) color-specific regions in the visual cortex
 - b) segregation of different color streams in the thalamus
 - c) photopigments in the different layers of the thalamus
 - d) the existence of different photopigments in different cone photoreceptors**
 - e) the existence of different photopigments in different rod photoreceptors
23. During active muscle contractions, transient chemical bonds are formed between
- a) adjacent muscle fascicles.
 - b) acetylcholine and calcium channels.
 - c) T-tubules and the sarcoplasmic reticulum.
 - d) troponin and the sarcomere.
 - e) thick and thin filaments composed mostly of myosin and actin, respectively.**
24. The T-tubules are essential for propagating action potentials from
- a) the sarcolemma to the interior of the muscle cell.**
 - b) the motor nerve terminal to the motor endplate.
 - c) the tendons to the muscle fibers.
 - d) the sarcoplasmic reticulum to the mitochondria.
 - e) the nucleus to the Golgi apparatus.
25. The relaxation phase of muscle contraction occurs as
- a) the thick filaments begin to shorten.
 - b) the thin filaments begin to shorten.
 - c) chloride ions are released from the sarcoplasm.
 - d) glutamate is released.
 - e) calcium ions are pumped back into the sarcoplasmic reticulum.**
26. During a voluntary movement, motor units are recruited in order of
- a) increasing resistance to fatigue.
 - b) decreasing axonal conduction velocity.
 - c) decreasing contraction speed.
 - d) increasing force.**
 - e) decreasing force.
27. It is thought that motor neurons in the spinal cord are normally activated in order of increasing size because
- a) small cells receive more synaptic input than large cells.
 - b) small cells consume more energy than large cells.
 - c) small cells do not have voltage-gated channels.
 - d) large cells cannot generate action potentials.
 - e) the smaller the cell, the higher the input resistance.**

28. The knee jerk reflex is initiated by
- a) the activation of cutaneous receptors in the skin.
 - b) the activation of sensory afferent fibers innervating muscle spindles.**
 - c) spontaneous action potentials in spinal motor neurons.
 - d) spinal interneurons that make synaptic connections onto motor neurons.
 - e) visual or auditory input.
29. The functional role of the flexion reflex is to
- a) increase running speed to escape danger.
 - b) override the knee jerk reflex.
 - c) withdraw a limb away from a noxious stimulus.**
 - d) counteract the vestibulo-ocular reflex.
 - e) stabilize the head during flexion movements.
30. Diseases affecting the cerebellum produce all of the following motor deficits EXCEPT
- a. delayed movement onset
 - b. range of movement errors (dysmetria)
 - c. defects in movement accuracy
 - d. paralysis**
 - e. patterned movement errors

END OF TEST

Turn in your mark-sense form
and your question sheets
at the front of the room.