Chapter 41 Exercises

Review Questions

1. Where does perception occur?
- **a.** spinal cord
- **b.** cerebral cortex
- **c.** receptors
- **d.** thalamus

2. If a person's cold receptors no longer convert cold stimuli into sensory signals, that person has a problem with the process of _____.
- **a.** reception
- **b.** transmission
- **c.** perception
- **d.** transduction

3. After somatosensory transduction, the sensory signal travels through the brain as a(n) _____ signal.
- **a.** electrical
- **b.** pressure
- **c.** optical
- **d.** thermal

4. Many people experience motion sickness while traveling in a car. This sensation results from contradictory inputs arising from which senses?
- **a.** proprioception and kinesthesia
- **b.** somatosensation and equilibrium
- **c.** gustation and vibration
- **d.** vision and vestibular system

5. The _____ are found only in _____ skin and detect skin deflection.
- **a.** Meissner's corpuscles; hairy
- **b.** Merkel's disks; glabrous
- **c.** hair receptors; hairy
- **d.** Krause end bulbs; hairy

6. If you were to burn your epidermis, what receptor type would you most likely burn?
- **a.** free nerve endings
- **b.** Ruffini endings
- **c.** Pacinian corpuscle
- **d.** hair receptors

7. Many diabetic patients are warned by their doctors to test their glucose levels by pricking the sides of their fingers rather than the pads. Pricking the sides avoids stimulating which receptor?
- **a.** Krause end bulbs
- **b.** Meissner's corpuscles
- **c.** Ruffini ending
- **d.** nociceptors

8. Which of the following has the fewest taste receptors?
- **a.** fungiform papillae
- **b.** circumvallate papillae
- **c.** foliate papillae
- **d.** filiform papillae

9. How many different taste molecules do taste cells each detect?
- **a.** one
- **b.** five
- **c.** ten
- **d.** It depends on the spot on the tongue.

10. Salty foods activate the taste cells by _____.
- **a.** exciting the taste cell directly
- **b.** causing hydrogen ions to enter the cell
- **c.** causing sodium channels to close
- **d.** binding directly to the receptors

11. All sensory signals except _____ travel to the _____ in the brain before the cerebral cortex.
- **a.** vision; thalamus
- **b.** olfaction; thalamus
- **c.** vision; cranial nerves
- **d.** olfaction; cranial nerves

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12. How is the ability to recognize the umami taste an evolutionary advantage?
- **a.** Umami identifies healthy foods that are low in salt and sugar.
- **b.** Umami enhances the flavor of bland foods.
- **c.** Umami identifies foods that might contain essential amino acids.
- **d.** Umami identifies foods that help maintain electrolyte balance.

13. In sound, pitch is measured in _____, and volume is measured in _____.
- **a.** nanometers (nm); decibels (dB)
- **b.** decibels (dB); nanometers (nm)
- **c.** decibels (dB); hertz (Hz)
- **d.** hertz (Hz); decibels (dB)

14. Auditory hair cells are indirectly anchored to the _____.
- **a.** basilar membrane
- **b.** oval window
- **c.** tectorial membrane
- **d.** ossicles

15. Which of the following are found both in the auditory system and the vestibular system?
- **a.** basilar membrane
- **b.** hair cells
- **c.** semicircular canals
- **d.** ossicles

16. Benign Paroxysmal Positional Vertigo is a disorder where some of the calcium carbonate crystals in the utricle migrate into the semicircular canals. Why does this condition cause periods of dizziness?
- **a.** The hair cells in the semicircular canals will be constantly activated.
- **b.** The hair cells in the semicircular canals will now be stimulated by gravity.
- **c.** The utricle will no longer recognize acceleration.
- **d.** There will be too much volume in the semicircular canals for them to detect motion.

17. Why do people over 55 often need reading glasses?
- **a.** Their cornea no longer focuses correctly.
- **b.** Their lens no longer focuses correctly.
- **c.** Their eyeball has elongated with age, causing images to focus in front of their retina.
- **d.** Their retina has thinned with age, making vision more difficult.

18. Why is it easier to see images at night using peripheral, rather than central, vision?
- **a.** Cones are denser in the periphery of the retina.
- **b.** Bipolar cells are denser in the periphery of the retina.
- **c.** Rods are denser in the periphery of the retina.
- **d.** The optic nerve exits at the periphery of the retina.

19. A person catching a ball must coordinate their head and eyes. What part of the brain is helping to do this?
- **a.** hypothalamus
- **b.** pineal gland
- **c.** thalamus
- **d.** superior colliculus

20. A satellite is launched into space but explodes after exiting the Earth's atmosphere. Which statement accurately reflects the observations made by an astronaut on a space walk outside the International Space Station during the explosion?
- **a.** The astronaut would see the explosion but would not hear a boom.
- **b.** The astronaut would not sense the explosion.
- **c.** The astronaut would see the explosion and then hear the boom.
- **d.** The astronaut would feel the concussive force of the explosion but will not see it.

Critical Thinking Questions

21. If a person sustains damage to axons leading from sensory receptors to the central nervous system, which step or steps of sensory perception will be affected?

22. In what way does the overall magnitude of a stimulus affect the just-noticeable difference in the perception of that stimulus?

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23. Describe the difference in the localization of the sensory receptors for general and special senses in humans.

24. What can be inferred about the relative sizes of the areas of cortex that process signals from skin not densely innervated with sensory receptors and skin that is densely innervated with sensory receptors?

25. Many studies have demonstrated that women are able to tolerate the same painful stimuli for longer than men. Why don't all people experience pain the same way?

26. From the perspective of the recipient of the signal, in what ways do pheromones differ from other odorants?

27. What might be the effect on an animal of not being able to perceive taste?

28. A few recent cancer detection studies have used trained dogs to detect lung cancer in urine samples. What is the hypothesis behind this study? Why are dogs a better choice of detectors in this study than humans?

29. How would a rise in altitude likely affect the speed of a sound transmitted through air? Why?

30. How might being in a place with less gravity than Earth has (such as Earth's moon) affect vestibular sensation, and why?

31. How does the structure of the ear allow a person to determine where a sound originates?

32. How could the pineal gland, the brain structure that plays a role in annual cycles, use visual information from the suprachiasmatic nucleus of the hypothalamus?

33. How is the relationship between photoreceptors and bipolar cells different from other sensory receptors and adjacent cells?

34. Cataracts, the medical condition where the lens of the eye becomes cloudy, are a leading cause of blindness. Describe how developing a cataract would change the path of light through the eye.

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