Chapter 04
Sensation and Perception

Multiple Choice Questions

1. *(p. 97)* Anna is reading her psychology text. The activation of receptors in her retina by a source of physical energy is called _____.
A. perception
B. sensation
C. integration
D. interpretation

APA Goal Outcome: 1.2
Bloom's Taxonomy: Apply
Difficulty: Easy
Learning Outcome: 10-1

2. *(p. 97)* The activation of the sense organs by a source of physical energy is known as _____.
A. perception
B. sensation
C. integration
D. interpretation

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-1

3. *(p. 97)* The sorting out, interpretation, analysis, and integration of stimuli by the sense organs and brain is known as _____.
A. perception
B. sensation
C. activation
D. stimulation

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-1

4. *(p. 97)* Which of the following statements is TRUE of sensation and perception?
A. Perception generally precedes sensation in our processing of a stimulus.
B. Sensation and perception are essentially synonyms.
C. Sensation involves the interpretation of a stimulus, whereas perception does not.
D. Sensation involves the activation of sense receptors; perception involves interpretation.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 10-1

5. *(p. 97)* The study of the relationship between the physical aspects of stimuli and our psychological experience of them is known as _____.
A. developmental psychology
B. thermodynamics
C. psychophysics
D. experimental psychology

APA Goal Outcome: 1.2, 10.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-1

6. *(p. 97)* Dr. Breiland examines the relationship between the physical properties of light, such as its amplitude and wavelength, and humans' perception of color. Which of the following terms MOST ACCURATELY describes Dr. Breiland's field of study?
A. Developmental psychology
B. Psychophysics
C. Thermodynamics
D. Experimental psychology

APA Goal Outcome: 1.2, 10.2
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 10-1

7. *(p. 98)* A(n) _____ is the smallest intensity of a stimulus that must be present for the stimulus to be detected.
A. difference threshold
B. absolute threshold
C. adaptation threshold
D. intensity threshold

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

8. *(p. 98)* A(n) _____ threshold is the stimulus intensity that is detected 50% of the time.
A. difference
B. absolute
C. adaptation
D. frequency

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

9. *(p. 98)* One can detect a single drop of perfume diffused in an area the size of a one-bedroom apartment. This is due to:
A. absolute threshold.
B. difference threshold.
C. adaptation threshold.
D. psychophysical minimum.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 10-2

10. *(p. 98)* Which of the following most closely approximates the meaning of the term *noise* as psychophysicists use it?
A. Only unwanted stimuli
B. An unpleasant sound
C. Any distraction
D. Only auditory stimuli

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 10-2

11. *(p. 99)* The smallest level of added or reduced stimulation required to sense that a change in stimulation has occurred is known as the _____.
A. difference threshold
B. absolute threshold
C. adaptation threshold
D. intensity threshold

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

12. *(p. 99)* A snack manufacturer realizes that he must increase the salt content of his company's chips by 3% in order for a sample of consumers to notice that the chips are saltier than they were before. This example most nearly illustrates the concept of a(n):
A. absolute threshold.
B. difference threshold.
C. frequency threshold.
D. adaptation threshold.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 10-2

13. *(p. 99)* Weber's law states that a just noticeable difference is a _____.
A. fixed value
B. constant proportion of the intensity of an initial stimulus
C. variable proportion of the intensity of an initial stimulus
D. random value

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

14. *(p. 99)* Acme Foods wants to make its chips saltier, but it doesn't want to spend more than it has to on salt. A sample of consumers are asked to compare its current chip (saltiness = 100) with saltier versions and to say whether the new version is saltier. On average, sample consumers reliably say the new chip is saltier when its saltiness value is 108, but not when its saltiness value is below 108. Assuming Acme Foods' sample consumers are representative of people in general, which of the following best represents the just noticeable difference for saltiness?
A. 8%
B. 108
C. 80%
D. 100

APA Goal Outcome: 1.2, 2.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 10-2

15. *(p. 102)* _____ is a basic law of psychophysics stating that a just noticeable difference is a constant proportion to the intensity of an initial stimulus.
A. Fitt's law
B. Weber's law
C. Bloch's law
D. Hick's law

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

16. *(p. 99)* The function relating the value of a stimulus along some dimension to the just noticeable difference is known as _____ law.
A. Wernicke's
B. Wundt's
C. Weber's
D. Wertheimer's

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

17. *(p. 100)* Which of the following laws would help explain why a person in a quiet room is more startled by the ringing of a telephone than a person who is already in a noisy room?
A. Fitt's law
B. Weber's law
C. Bloch's law
D. Hick's law

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 10-2

18. *(p. 100)* _____ is an adjustment in sensory capacity after prolonged exposure to unchanging stimuli.
A. Adaptation
B. Accommodation
C. Acclimation
D. Attenuation

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

19. *(p. 100)* "It's so noisy! How can you stand it?" remarks Caitlyn as the thruway traffic screams past her friend Dave's ground floor apartment. "I don't even notice it anymore," Dave replies. This exchange best exemplifies the concept of:
A. adaptation.
B. accommodation.
C. acclimation.
D. attenuation.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 10-2

20. *(p. 102)* In regards to what we see in our world, the range of wavelengths that humans are sensitive to is called the _____.
A. power spectrum
B. mass spectrum
C. frequency spectrum
D. visual spectrum

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

21. *(p. 103)* Which of the following words is most nearly synonymous with the term *refract?*
A. Bend
B. Transmit
C. Split
D. Reflect

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

22. *(p. 103)* The _____ bends light as it passes, playing a primary role in focusing the light more sharply.
A. cornea
B. pupil
C. iris
D. lens

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

23. *(p. 103)* The _____ is a dark hole in the center of the _____, the colored part of the eye.
A. pupil; iris
B. iris; pupil
C. cornea; lens
D. lens; cornea

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

24. *(p. 103-104)* Refraction is to accommodation what the _____ is to the _____.
A. pupil; lens
B. cornea; pupil
C. cornea; lens
D. lens; cornea

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 11-1

25. *(p. 103-104)* Which of the following sequences accurately reflects the order in which light passes through the structures of the eye during vision?
A. Pupil cornea lens retina
B. Pupil lens cornea retina
C. Cornea lens pupil retina
D. Cornea pupil lens retina

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-1

26. *(p. 104)* The part of the eye that converts the electromagnetic energy of light to electrical impulses for transmission to the brain is known as the _____.
A. retina
B. fovea
C. iris
D. pupil

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

27. *(p. 104)* As compared to cones, rods:
A. are more densely concentrated in the fovea.
B. are responsible for color perception.
C. are highly sensitive to light.
D. are less numerous.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-1

28. *(p. 104)* Thin, cylindrical receptor cells in the retina that are highly sensitive to light are called _____.
A. lenses
B. pons
C. rods
D. cones

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

29. *(p. 104)* _____ are light-sensitive receptor cells in the retina that are responsible for sharp focus and color perception, particularly in bright light, and are concentrated on the part of the retina called the fovea.
A. Lenses
B. Pons
C. Rods
D. Cones

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

30. *(p. 104)* Adelaide notices a flicker of motion out of the corner of her eye as she hurries down a dim alley late at night. Sydney deciphers a complex wiring diagram under the bright glare of her desk lamp. Adelaide's vision is driven mainly by her _____. Sydney is mainly using her _____.
A. cones; cones as well
B. rods; rods as well
C. cones; rods
D. rods; cones

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 11-1

31. *(p. 104)* Which of the following is true of cones?
A. They play a key role in night vision.
B. They are thin, cylindrical receptor cells that are highly sensitive to light.
C. They are primarily responsible for the sharply focused perception of color.
D. They play a key role in seeing objects that are outside the main center of focus.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-1

32. *(p. 104)* The _____ play a key role in peripheral vision, seeing objects that are outside the main center of focus.
A. lenses
B. pons
C. rods
D. cones

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

33. *(p. 105)* Which of the following sequences accurately reflects the order in which light stimulates cells early in the visual processing of an image?
A. Bipolar cells ganglion cells rods and cones
B. Bipolar cells rods and cones ganglion cells
C. Ganglion cells rods and cones bipolar cells
D. Rods and cones bipolar cells ganglion cells

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Medium
Learning Outcome: 11-1

34. *(p. 105)* _____ cells receive information directly from the rods and cones and communicate that information to the _____ cells.
A. Bipolar; ganglion
B. Dendritic; microglial
C. Adrenergic; peptidergic
D. Squamous; columnar

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

35. *(p. 105)* The _____ nerve is a bundle of ganglion axons that carry visual information to the brain.
A. cochlear
B. optic
C. lacrimal
D. phrenic

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

36. *(p. 106)* The point at which the optic nerves meet and then split is termed the optic:
A. callosum.
B. fissure.
C. chiasm.
D. sulcus.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

37. *(p. 106)* A major function of the ganglion cells is to:
A. detect variations in light and darkness.
B. detect a variety of basic visual features, such as motion.
C. detect specific types of objects in the visual field.
D. integrate the activity of different neural systems for vision.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-1

38. *(p. 106)* The ultimate processing of visual images takes place in the visual _____ of the brain.
A. callosum
B. thalamus
C. cortex
D. medulla

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

39. *(p. 106)* _____ is the activation of neurons in the cortex by visual stimuli of specific shapes or patterns.
A. Blob detection
B. Interest point detection
C. Corner detection
D. Feature detection

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

40. *(p. 109)* As compared to women, color blindness is _____ among men.
A. less common
B. about as common
C. five times less common
D. more common

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 11-2

41. *(p. 109)* In the most common form of color blindness:
A. everything is seen in black and white.
B. blue and yellow cannot be distinguished.
C. all red and green objects appear yellow.
D. green objects appear red.

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Medium
Learning Outcome: 11-2

42. *(p. 109)* Damon is among the 7% of males with color blindness. He suffers from the most common form of color blindness. Which of the following statements best illustrates Damon's experience of color?
A. The blue sky and green grass appear to be the same color.
B. A pound of butter looks to be the same color as the blue dish on which it is resting.
C. Everything looks black, gray, or white.
D. Red apples on a tree seem to be yellow.

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 11-2

43. *(p. 109)* The _____ states that there are three kinds of cones in the retina, each of which responds primarily to a specific range of wavelengths.
A. opponent-process theory
B. emission theory
C. trichromatic theory of color vision
D. visual perception theory

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-2

44. *(p. 109-110)* The trichromatic theory was first proposed by _____. The opponent-process theory was first proposed by _____.
A. Thomas Young; Ewald Hering
B. Ewald Hering; Hermann von Helmholtz
C. Hermann von Helmholtz; Thomas Young
D. Thomas Young; Hermann von Helmholtz

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-2

45. *(p. 110)* According to the _____ of color vision, receptor cells are linked in pairs, working in opposition to each other.
A. opponent-process theory
B. emission theory
C. trichromatic theory of color vision
D. visual perception theory

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-2

46. *(p. 110)* Which of the following is true of the opponent-process theory?
A. According to the opponent-process theory, perception of color is influenced by the relative strength with which each of the three kinds of cones is activated.
B. The opponent-process theory suggests that in addition to black and white, there are four, rather than three, colors.
C. According to the opponent-process theory, the cells that respond to color operate independently, rather than in conjunction.
D. The opponent-process theory provides a weak explanation for afterimages.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-2

47. *(p. 110)* Suppose you stare at an illustration of the American flag for a while, then glance at a blank white page. The red stripes look green when you glance at the blank page because:
A. cones responsive to green light begin firing.
B. cones responsive to red light stop firing.
C. the receptor cells for the red component of the pairing become fatigued.
D. the receptor cells for the green component of the pairing begin to adapt.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-2

48. *(p. 110)* With respect to the trichromatic and the opponent-process theories of color perception, which of the following statements is most accurate?
A. The trichromatic theory has largely been discredited.
B. The opponent-process theory has largely been discredited.
C. Trichromatic process works within the retina itself; whereas opponent mechanisms operate both in the retina and at later stages of neuronal processing.
D. The opponent-process theory describes color processing early in the visual system; trichromatic theory describes color processing later on in the visual system.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-2

49. *(p. 112)* The eardrum is a:
A. part of the outer ear that vibrates when sound waves hit it.
B. thin membrane leading to the inner ear.
C. coiled tube in the inner ear filled with fluid that vibrates in response to sound.
D. vibrating structure that runs through the center of the cochlea, dividing it into an upper chamber and a lower chamber and containing sense receptors for sound.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

50. *(p. 112)* The cochlea is a:
A. part of the outer ear that vibrates when sound waves hit it.
B. thin membrane leading to the inner ear.
C. coiled tube in the inner ear filled with fluid that vibrates in response to sound.
D. vibrating structure that runs through the center of the cochlea, dividing it into an upper chamber and a lower chamber and containing sense receptors for sound.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

51. *(p. 112)* The basilar membrane is a:
A. part of the outer ear that vibrates when sound waves hit it.
B. a tube like passage that leads to the eardrum.
C. coiled tube in the inner ear filled with fluid that vibrates in response to sound.
D. vibrating structure that runs through the center of the cochlea, dividing it into an upper chamber and a lower chamber and containing sense receptors for sound.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

52. *(p. 112)* The bones of the middle ear include each of the following EXCEPT the:
A. hammer.
B. anvil.
C. pinna.
D. stirrup.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-1

53. *(p. 112-113)* Which of the following sequences correctly arranges the structures of the inner ear from the largest and most inclusive to the smallest and most specific?
A. Cochlea basilar membrane hair cells
B. Cochlea hair cells basilar membrane
C. Basilar membrane hair cells cochlea
D. Basilar membrane cochlea hair cells

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

54. *(p. 113)* Hair cells for hearing are located in the:
A. eardrum.
B. cochlea.
C. auditory canal.
D. semicircular canals.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

55. *(p. 104, 113)* Making an analogy between hearing and vision, the auditory hair cells in the_____ are similar to the _____ in the _____.
A. cochlea; rods and cones; retina
B. cochlea; ganglion cells; cornea
C. eardrum; rods and cones; cornea
D. eardrum; ganglion cells; retina

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

56. *(p. 113)* _____ is the number of wave cycles that occur in a second.
A. Amplitude
B. Wavelength
C. Frequency
D. Sound pressure

APA Goal Outcome: 1.2, 2.2, 4.4, 7.3
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

57. *(p. 114)* People can detect sounds ranging in frequency from _____ to _____.
A. 20 dB - 20,000 dB
B. 50 dB - 50,000 dB
C. 20 cycles per second - 20,000 cycles per second
D. 50 cycles per second - 50,000 cycles per second

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

58. *(p. 114)* _____ is a feature of wave patterns that allows us to distinguish between loud and soft sounds.
A. Amplitude
B. Wavelength
C. Frequency
D. Sound pressure

APA Goal Outcome: 1.2, 2.2, 4.4, 7.3
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

59. *(p. 114)* Amplitude range is measured in _____.
A. decibels
B. hertz
C. sones
D. phones

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

60. *(p. 115)* The _____ states that different areas of the basilar membrane respond to different frequencies.
A. place theory of hearing
B. proximal stimuli theory
C. frequency theory of hearing
D. wave theory

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

61. *(p. 115)* The _____ suggests that the entire basilar membrane acts as a microphone, vibrating as a whole in response to a sound.
A. place theory of hearing
B. proximal stimuli theory
C. frequency theory of hearing
D. wave theory

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

62. *(p. 115)* Which of the following statements is true?
A. Place theory and frequency theory explain our perception of high- but not low-frequency sounds.
B. Place theory and frequency theory explain our perception of low- but not high-frequency sounds.
C. Both place theory and frequency theory provide the full explanations for hearing.
D. Place theory accounts for the perception of high-frequency sounds; frequency theory explains our perception of low-frequency sounds.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-1

63. *(p. 115)* The _____ consists of three tubes containing fluid that sloshes through them when the head moves, signaling rotational or angular movement to the brain.
A. oval window
B. auditory canal
C. eustachian tube
D. semicircular canal

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

64. *(p. 115)* Which of the following ear structures is correctly matched with an auditory or body sense?
A. Otoliths; hearing
B. Semicircular canals; rotational or angular motion of the body
C. Cochlea; body acceleration
D. Eardrum; body balance

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-1

65. *(p. 115)* Which of the following sequences correctly arranges structures from the largest and most inclusive to the smallest and most specific?
A. Inner ear otoliths semicircular canal
B. Inner ear semicircular canals otoliths
C. Otoliths semicircular canals inner ear
D. Otoliths inner ear semicircular canals

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

66. *(p. 116)* The brain's inexperience in interpreting messages from the weightless _____ is the cause of the space sickness commonly experienced by two-thirds of all space travellers.
A. hair cells
B. otoliths
C. eustachian tube
D. cochlea

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

67. *(p. 116)* The human sense of smell permits us to detect _____ separate smells.
A. more than 10,000
B. 1,000-10,000
C. 100-1,000
D. 10-100

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

68. *(p. 116-117)* Gustation is to olfaction what _____ is to _____.
A. hearing; smell
B. taste; hearing
C. taste; smell
D. small; taste

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

69. *(p. 116)* Which of the following statements regarding smell is FALSE?
A. Men generally have a better sense of smell than women.
B. People can distinguish men from women based only on the smell of breath.
C. People can distinguish happy from sad emotions based on underarm smells.
D. Women are able to identify their babies solely on the basis of smell just a few hours after birth.

APA Goal Outcome: 1.2, 5.5, 8.2
Bloom's Taxonomy: Remember
Difficulty: Medium
Learning Outcome: 12-2

70. *(p. 117)* _____ are chemicals nonhumans secrete into the environment that produce a reaction in other members of the same species, permitting the transmission of messages such as sexual availability.
A. Pheromones
B. Ketones
C. Hydratones
D. Kairomones

APA Goal Outcome: 1.2, 3.1
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

71. *(p. 117)* How many basic types of taste are there?
A. 1-3
B. 4-5
C. 6-7
D. 8-10

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

72. *(p. 117)* Roast beef with a rich brown gravy is often described as a "savory" dish. The basic taste prominent in such a dish is:
A. bitter.
B. salty.
C. umami.
D. sweet.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-2

73. *(p. 117)* Which of the following is true of "supertasters"?
A. They seek out relatively sweeter and fattier foods than nontasters.
B. They are prone to obesity.
C. They are relatively insensitive to taste.
D. They find sweets sweeter, cream creamier, and spicy dishes spicier.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-2

74. *(p. 119)* Nerve receptor cells for the skin senses are:
A. located at a uniform depth throughout the skin.
B. evenly distributed throughout the skin.
C. unevenly distributed throughout the skin.
D. not related to the sense of pressure.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-3

75. *(p. 119)* According to your text, approximately how much does pain cost the United States each year?
A. $100 billion
B. $1 billion
C. $100 million
D. $3.49

APA Goal Outcome: 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-3

76. *(p. 119)* Which of the following does the text offer as the main reason for the fact that women experience pain more intensely than men?
A. Women produce certain hormones related to the menstrual cycle.
B. Women have more pain gates in the nervous system than men.
C. Women have more substance P than do men.
D. Women are encouraged by our culture to experience and express pain more intensely than men.

APA Goal Outcome: 1.2, 4.4, 5.5, 8.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-3

77. *(p. 120)* The body's own painkillers are called:
A. substance Ps.
B. endorphins.
C. g factors.
D. opiods.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-3

78. *(p. 121)* Which of the folowing treatments for pain is most effective for people who continually say to themselves, "This pain will never stop," "The pain is ruining my life"?
A. Cognitive restructuring
B. Biofeedback and relaxation techniques
C. Light therapy
D. Nerve and brain stimulation

APA Goal Outcome: 4.2, 9.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-3

79. *(p. 121)* Whenever Mr. Redding catches himself saying, "This pain is ruining my life," he is supposed to immediately tell himself, "STOP! I am in control of my pain." This pain management technique is known as _____ restructuring.
A. psychodynamic
B. cognitive
C. neuroscience
D. personality

APA Goal Outcome: 1.4, 4.2, 9.2
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 12-3

80. *(p. 121)* To manage Mrs. Sampson's excruciating pain, a low-voltage electric current is occasionally passed through her lower back, the affected body part. Which of the following pain management techniques in Mrs. Sampson using?
A. Acupuncture
B. Cognitive restructuring
C. Biofeedback
D. Nerve stimulation

APA Goal Outcome: 4.2, 9.2
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 12-3

81. *(p. 121)* How does light therapy work?
A. It passes an electric current through the part of the body that is affected by pain.
B. It stimulates nerve cells in the brain to provide direct pain relief.
C. It stimulates the production of healing enzymes.
D. It encourages the development of different thought patterns and beliefs.

APA Goal Outcome: 1.4, 4.2, 9.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-3

82. *(p. 121)* _____ is a condition in which exposure to one sensation evokes an additional one.
A. Synesthesia
B. Polythesia
C. Multithesia
D. Hyperthesia

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-3

83. *(p. 121)* Which of the following alternatives is most accurate?
A. Synesthesia is rare. Exposure to one sensation evokes an additional one in most people with synesthesia.
B. Synesthesia is rare. Exposure to sound does not evoke different hues in most people with synesthesia.
C. Synesthesia is common. Senses work independently in most people with synesthesia.
D. Synesthesia is common. Perception is multimodal in most people with synesthesia.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-3

84. *(p. 124)* _____ is series of principles that describe how we organize bits and pieces of information into meaningful wholes.
A. Gestalt laws of organization
B. Taylor's principles of scientific management
C. The neoclassical perspective
D. The bureaucratic theory

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

85. *(p. 125)* Artie organizes the binders in his office by color. This color-coding exemplifies the Gestalt principle of:
A. proximity.
B. similarity.
C. chromaticity.
D. closure.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Easy
Learning Outcome: 13-1

86. *(p. 125)* Consider the figure within parentheses: (XX XX XX). That we perceive three pairs of Xs reflects the Gestalt principle(s) of:
A. symmetry.
B. proximity.
C. closure.
D. chromaticity.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

87. *(p. 125)* In a general sense, the overriding Gestalt principle of perceptual organization is:
A. complexity.
B. simplicity.
C. symmetry.
D. similarity.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

88. *(p. 125)* Which of the following Gestalt laws is CORRECTLY defined?
A. Similarity - the tendency to fill in small gaps in objects
B. Simplicity - stimuli resembling one another tend to be grouped together
C. Proximity - stimuli closer to one another tend to be grouped together
D. Closure - stimuli are perceived in the most basic manner possible

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

89. *(p. 125)* Which of the following statements is most accurate with respect to the role of gestalt psychology in contemporary psychology?
A. The Gestalt influence has diminished over the years and is barely evident today.
B. Gestaltists remain a major force in the psychology of perception.
C. Gestalt psychology no longer plays a prominent role, but the Gestaltists' focus on the organization of perceptual elements remains influential.
D. Gestalt psychology is no longer a major school of thought, but the Gestaltists' focus on bottom-up processing elements remains influential.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

90. *(p. 125)* Perception that is guided by higher-level knowledge, experience, expectations, and motivations is known as _____.
A. horizontal processing
B. bottom-up processing
C. top-down processing
D. diagonal processing

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

91. *(p. 126)* Perception that consists of the progression of recognizing and processing information from individual components of a stimuli and moving to the perception of the whole is known as _____.
A. horizontal processing
B. bottom-up processing
C. top-down processing
D. diagonal processing

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

92. *(p. 126)* Which of the following statements most accurately expresses the relationship between top-down and bottom-up processing?
A. Some stimuli are processed in a bottom-up fashion, while others are processed in a top-down manner.
B. The contribution to perception of top-down processes is much smaller than researchers originally supposed.
C. Top-down processing permits us to process the fundamental characteristics of stimuli.
D. Top-down and bottom-up processes occur simultaneously in the perception of the world around us.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

93. *(p. 127)* The ability to view the world in three dimensions and to perceive distance is known as _____.
A. multistable perception
B. depth perception
C. haptic perception
D. direct perception

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-2

94. *(p. 127)* The difference in the images seen by the left eye and the right eye is known as _____.
A. fixation disparity
B. stereopsis
C. retinal slip
D. binocular disparity

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-2

95. *(p. 128)* Which of the following is a monocular cue?
A. Motion parallax
B. Convergence
C. Shadow stereopsis
D. Retinal disparity

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 13-2

96. *(p. 127)* _____ is the change in position of an object on the retina caused by movement of your body relative to the object.
A. Shadow stereopsis
B. Convergence
C. Motion parallax
D. Retinal disparity

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-2

97. *(p. 128)* Mark and a Jacob are driving home on a college break. Mark is in the passenger seat. Bored, Mark gazes into the middle of an empty field. He notices that distant hilltops seem to move slowly in the same direction in which their car is moving; by contrast, mile markers on the side of the highway seem to whiz past them in the opposite direction. The difference in the apparent speed and direction of objects' motion serves as a depth cue termed motion:
A. disparity.
B. parallax.
C. perspective.
D. gradient.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 13-2

98. *(p. 129)* You are sitting in a stationary train at a busy station. Suddenly, you feel like you are slowly sliding backward as the train next to you begins to pull out. This illusion reflects the operation of the _____ cue of _____.
A. monocular; motion parallax
B. binocular; motion parallax
C. monocular; linear perspective
D. binocular; binocular disparity

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 13-2

99. *(p. 128)* From the window of an office on a skyscraper's 90th floor, taxis on the street look tiny. Of course, you know they are not toy cars; you are just really far up. This example illustrates the _____ cue of _____.
A. monocular; relative size
B. binocular; relative size
C. monocular; texture gradient
D. binocular; texture gradient

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 13-2

100. *(p. 128)* You are standing on the beach; the sea is choppy. You observe that the crests of distant waves appear less distinct than the crests of waves nearer the beach. This example illustrates a monocular cue known as:
A. linear perspective.
B. relative size.
C. texture gradient.
D. binocular disparity.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 13-2

101. *(p. 128)* At the beginning of a drawing class, the instructor suggests that an illusion of depth may be created in a two-dimensional picture by including parallel lines that converge at a vanishing point. Your instructor is making reference to a monocular depth cue known as:
A. linear perspective.
B. linear parallax.
C. relative size.
D. texture gradient.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 13-2

102. *(p. 128)* Which depth cue is correctly matched with a description?
A. Motion parallax - more distant objects produce smaller images on the retina
B. Texture gradient - change in the body's position produces change in an object's retinal position
C. Relative size - details becomes less distinct with increasing distance
D. Linear perspective - parallel lines appear to converge with increasing distance

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-2

103. *(p. 128-129)* _____ constancy is a phenomenon in which physical objects are perceived as unvarying and consistent despite changes in their appearance or in the physical environment.
A. Perceptual
B. Objective
C. Virtual
D. Direct

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

104. *(p. 129)* At night, the moon appears smaller when it is overhead than when it is on the horizon. This is an example of:
A. perceptual constancy.
B. objective constancy.
C. virtual constancy.
D. direct constancy.

APA Goal Outcome: 1.2, 4.2
Bloom's Taxonomy: Apply
Difficulty: Easy
Learning Outcome: 13-3

105. *(p. 130-131)* _____ are physical stimuli that consistently produce errors in perception.
A. Tactile illusions
B. Auditory illusions
C. Gestalt illusions
D. Visual illusions

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

106. *(p. 133)* _____ refers to the perception of messages about which we have no awareness.
A. Direct perception
B. Extrasensory perception
C. Subliminal perception
D. Haptic perception

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

107. *(p. 133)* _____ refers to perception that does not involve our known senses.
A. Direct perception
B. Extrasensory perception
C. Subliminal perception
D. Haptic perception

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

108. *(p. 133)* Approximately what proportion of the American population believes that extrasensory perception, or ESP, exists?
A. 5 percent
B. 10 percent
C. 25 percent
D. 50 percent

APA Goal Outcome: 3.1, 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

109. *(p. 134)* Why might contemporary, mainstream psychologists reconsider the possibility that ESP exists?
A. A lot of people believe in ESP; they might be on to something.
B. The research supporting ESP's existence is methodologically sound.
C. Psychologists have developed plausible theories of how ESP might work.
D. The topic has been addressed by a credible and prestigious psychological journal.

APA Goal Outcome: 3.1
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-3

Fill in the Blank Questions

110. *(p. 97)* A(n) _____ is any passing source of physical energy that produces a response in a sense organ.
stimulus

APA Goal Outcome: 1.2, 2.3
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-1

111. *(p. 97)* Dr. Garner studies the relationship between the objective brightness of visual stimuli and observers' subjective impression of their brightness. Dr. Garner is a(n) _____.
psychophysicist

APA Goal Outcome: 1.2, 2.2
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 10-1

112. *(p. 99)* The difference threshold is also known as a(n) _____.
just noticeable difference

APA Goal Outcome: 1.2, 2.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 10-2

113. *(p. 104)* The lens focuses light by changing its own thickness. This process is known as _____.
accomodation

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Medium
Learning Outcome: 11-1

114. *(p. 104)* You turn your head to look directly at an unusual butterfly your friend spotted in the garden. In doing so, you ensure that the insect's image falls on your _____.
fovea

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 11-1

115. *(p. 105)* Rods contain _____, a complex reddish-purple substance whose composition changes chemically when energized by light.
rhodopsin

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

116. *(p. 106)* The optic nerves from each eye meet at a point roughly between the two eyes called the _____.
optic chiasm

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

117. *(p. 106)* The activation of neurons in the cortex by visual stimuli of a particular shape or pattern is known as _____.
feature detection

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 11-1

118. *(p. 112)* Hearing a ring, you reach for your bag to retrieve your phone. At that instant, a nearby woman flips open her phone and begins talking. Looking at your silent bag, you realize you have failed to _____ the ringing sound correctly.
localize

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Apply
Difficulty: Medium
Learning Outcome: 12-1

119. *(p. 112-113)* The _____ divides the cochlea into lower and upper chambers.
basilar membrane

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

120. *(p. 113)* _____ is the characteristic that makes sound seem "high" or "low."
Pitch

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

121. *(p. 113)* When the _____ are bent by the vibrations entering the cochlea, the cells send a neural message to the brain.
hair cells

APA Goal Outcome: 1.2, 2.3
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-1

122. *(p. 116-117)* Olfaction is to _____ what smell is to taste.
gustation

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 12-2

123. *(p. 119)* When a cell is damaged it releases a chemical called _____.
substance P

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-3

124. *(p. 124)* _____ are a series of principles that describe how we organize bits and pieces of information into meaningful wholes.
Gestalt laws of organization

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-1

125. *(p. 125)* Your expectations play a key role in your perception in
top-down processing

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

126. *(p. 128)* _____ is the change in position of an object on the retina caused by movement of your body relative to the object.
Motion parallax

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

127. *(p. 128)* _____ is the phenomenon in which physical objects are perceived as unvarying and consistent despite changes in their appearance or in the physical environment.
Perceptual constancy

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

128. *(p. 129-130)* _____ is the perception that a stationary object is moving.
Apparent movement

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

129. *(p. 133)* _____ refers to the perception of messages about which we have no awareness.
Subliminal perception

APA Goal Outcome: 1.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 13-3

Essay Questions

130. *(p. 97)* Define sensation and Perception. Discuss each of the senses and how researchers study sensation and perception.

To consider how psychologists understand the senses and, more broadly, sensation and perception, one needs a basic working vocabulary. In formal terms, sensation is the activation of the sense organs by a source of physical energy. Perception is the sorting out, interpretation, analysis, and integration of stimuli carried out by the sense organs and brain. A stimulus is any passing source of physical energy that produces a response in a sense organ. Stimuli vary in both type and intensity. Different types of stimuli activate different sense organs. For instance, we can differentiate light stimuli (which activate the sense of sight and allow us to see the colors of a tree in autumn) from sound stimuli (which, through the sense of hearing, permit us to hear the sounds of an orchestra). In addition, stimuli differ in intensity, relating to how strong a stimulus needs to be before it can be detected.

APA Goal Outcome: 1.2, 2.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 10-1

131. *(p. 98-100)* Define and provide original examples from your own experience of (a) an absolute threshold; (b) a difference threshold; and (c) adaptation.

Students' examples may vary.

Absolute threshold—The minimum intensity stimulus that must be present for it to be detected. *Example*: the lightest touch of a feather that we can feel; the faintest sound that we can hear.
Difference threshold—The minimum change in stimulus intensity necessary for a difference in intensity to be detected. *Example*: A cup of coffee may taste bitter; we may add just enough sugar to make it taste just noticeably sweeter. *Example*: we may adjust the air conditioner or the heater just barely enough to make the room feel just noticeably cooler or warmer.
Adaptation—a decrease in the response of a sensory system following prolonged exposure to an unchanging stimulus. *Example*: A pair of shoes may feel tight or pinch when we first put them on, but we no longer notice the pinching after a while. *Example*: bath water may feel hot at first, but we become accustomed to the temperature after a few minutes.
Ideally, the examples provided should be drawn from everyday life, rather than from the laboratory.

APA Goal Outcome: 1.2, 2.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 10-2

132. *(p. 100)* Define what adaptation is in regards to sensation and perception. Provide an example of accommodation from either the text or your own experiences.

Students' examples may vary.

Adaptation is an adjustment in sensory capacity after prolonged exposure to unchanging stimuli. Adaptation occurs as people become accustomed to a stimulus and change their frame of reference. In a sense, our brain mentally turns down the volume of the stimulation that it's experiencing.
One example of adaptation is the decrease in sensitivity that occurs after repeated exposure to a strong stimulus. If you were to hear a loud tone over and over again, eventually it would begin to sound softer. Similarly, although jumping into a cold lake may be temporarily unpleasant, eventually you probably will get used to the temperature.
This apparent decline in sensitivity to sensory stimuli is due to the inability of the sensory nerve receptors to fire off messages to the brain indefinitely. Because these receptor cells are most responsive to changes in stimulation, constant stimulation is not effective in producing a sustained reaction.
Judgments of sensory stimuli are also affected by the context in which the judgments are made. This is the case because judgments are made not in isolation from other stimuli but in terms of preceding sensory experience.

APA Goal Outcome: 4.3, 4.4
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 10-2

133. *(p. 104)* Distinguish between rods and cones with respect to both their structure and their function.

Rods are thin, cylindrical receptors. They are highly sensitive to light in dimly lit situations and play a key role in peripheral vision. However, they are largely insensitive to color and detail.
Cones are tapered, cone-shaped receptors. They are concentrated in the center of the retina, or the *fovea*. They are responsible for the perception of fine details and color and play a key role in vision under well-illuminated or daytime viewing conditions. In the dark, cones reach their maximum level of adaptation very quickly, within a few minutes. By contrast, rods continue to dark-adapt for 20-30 minutes.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 11-1

134. *(p. 104-107)* Review the processing of a visual image (a) prior to the retina; (b) from the retina to the cortex; and (c) within the cortex.

Prior to the retina: Reflected light first passes through the *cornea*, which refracts the light to focus it more sharply. Light then passes through the *pupil*, which dilates or constricts to let more or less light in, depending on the level of illumination in the environment. Next, light enters the *lens*, which accommodates, or changes its shape, to focus the image properly on the retina.
From the retina to the cortex: The retina is a thin layer of light-sensitive receptor cells at the back of the eye. There are two kinds of receptor cells in the retina: *rods and cones*. Rods are highly sensitive to light in dimly lit situations and play a key role in peripheral vision. However, they are largely insensitive to color and detail. Cones are concentrated in the center of the retina, or the *fovea*. They are responsible for the perception of fine details and color and play a key role in vision under well-illuminated or daytime viewing conditions. Stimulation of the nerve cells in the eye triggers a neural response that is transmitted to other nerve cells in the retina called *bipolar cells* and *ganglion cells.* The axons of the ganglion cells form the *optic nerve*, which carries the visual message into the brain. Ultimately, impulses from the right half of each retina travel to the left hemisphere; those from the left half of each retina travel to the right hemisphere.
Within the cortex: The cortex contains specialized neurons, called *feature detectors*, which respond to visual stimuli containing specific shapes, patterns, and so on. Some feature detectors, for example, are activated only by moving rather than stationary stimuli; others are activated only by lines oriented in a particular direction.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 11-1

135. *(p. 109-110)* Distinguish between the trichromatic and opponent-process theories of color vision. Provide evidence in support of each theory.

Trichromatic theory—There are three kinds of cones in the retina, each of which responds to a specific range of wavelengths: blue-violet, green, and yellow-red. Our perception of color is determined by the proportion of each of the three cone types that are active. Evidence suggests that trichromatic theory accurately describes color processing in the retina itself.
Opponent-process theory—Color-sensitive receptor cells are linked in pairs: black-white pairs, yellow-blue pairs, and red-green pairs. If an object reflects blue (short wavelength) light, it will simultaneously excite the blue sensitive receptors and inhibit the yellow-sensitive ones. Opponent-process theory explains color vision at the level of the ganglion cells and in the cortex. It provides a good explanation of afterimages: When the yellow-sensitive component of the yellow-blue pairing, for example, becomes fatigued through continued stimulation, only the blue component is able to respond, shifting the perceptual balance toward that color.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 11-1

136. *(p. 113-114)* What is sound? Describe the concepts of frequency, amplitude and pitch and provide examples of each.

What we refer to as sound is actually the physical movement of air molecules in regular, wavelike patterns caused by a vibrating source. Sometimes it is even possible to see these vibrations: We are able to see the audio speaker moving when low notes are played because of a primary characteristic of sound called frequency. Frequency is the number of wave cycles that occur in a second. At very low frequencies there are relatively few wave cycles per second. These cycles are visible to the naked eye as vibrations in the speaker. Low frequencies are translated into a sound that is very low in pitch. (Pitch is the characteristic that makes sound seem "high" or "low.") Higher frequencies are heard as sounds of higher pitch. At the upper end of the sound spectrum, people can detect sounds with frequencies as high as 20,000 cycles per second. Amplitude is a feature of wave patterns that allows us to distinguish between loud and soft sounds. Amplitude is the spread between the up-and-down peaks and valleys of air pressure in a sound wave as it travels through the air. Waves with small peaks and valleys produce soft sounds; those with relatively large peaks and valleys produce loud sounds. We are sensitive to broad variations in sound amplitudes. The strongest sounds we are capable of hearing are over a trillion times as intense as the very weakest sound we can hear. This range is measured in decibels.

APA Goal Outcome: 1.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 12-1

137. *(p. 116- 117)* Briefly describe how the sense of smell works including the role receptors play. What is one form on chemical communication discussed in the text that operates via smell?

The human sense of smell (olfaction) permits us to detect more than 10,000 separate smells. The sense of smell is sparked when the molecules of a substance enter the nasal passages and meet olfactory cells, the receptor neurons of the nose, which are spread across the nasal cavity. More than 1,000 separate types of receptors have been identified on those cells so far. Each of these receptors is so specialized that it responds only to a small band of different odors. The responses of the separate olfactory cells are then transmitted to the brain, where they are combined into recognition of a particular smell. Smell may also act as a hidden means of communication for humans. It has long been known that nonhumans release pheromones, chemicals they secrete into the environment that produce a reaction in other members of the same species, permitting the transmission of messages such as sexual availability.

APA Goal Outcome: 1.4, 4.2, 9.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

138. *(p. 117)* Briefly describe how the sense of gustation or taste works including the role receptors play and the 5 categories of taste described in the text. Make sure to provide examples of each of the categories of taste.

Students' examples may vary.

The sense of taste (gustation) involves receptor cells that respond to four basic stimulus qualities: sweet, sour, salty, and bitter. A fifth category also exists, a flavor called umami, although there is controversy about whether it qualifies as a fundamental
taste. Umami is a hard-to-translate Japanese word, although the English "meaty" or "savory" comes close. Chemically, umami involves food stimuli that contain amino acids (the substances that make up proteins). Examples are: sweet-sugar; sour-lime; salty-curry; bitter-bitter melon; umami-seaweed.
Although the specialization of the receptor cells leads them to respond most strongly to a particular type of taste, they also are capable of responding to other tastes as well. Ultimately, every taste is simply a combination of the basic flavor qualities, in the same way that the primary colors blend into a vast variety of shades and hues.
The receptor cells for taste are located in roughly 10,000 taste buds, which are distributed across the tongue and other parts of the mouth and throat. The taste buds wear out and are replaced every 10 days or so. That's a good thing, because if our taste buds weren't constantly reproducing, we'd lose the ability to taste after we'd accidentally burned our tongues.
The sense of taste differs significantly from one person to another, largely as a result of genetic factors. Some people, dubbed "supertasters," are highly sensitive to taste; they have twice as many taste receptors as "nontasters," who are relatively insensitive to taste. Supertasters (who, for unknown reasons, are more likely to be female than male) find sweets sweeter, cream creamier, and spicy dishes spicier, and weaker concentrations of flavor are enough to satisfy any cravings they may have.
In contrast, because they aren't so sensitive to taste, nontasters may seek out relatively sweeter and fattier foods in order to maximize the taste. As a consequence, they may be prone to obesity.

APA Goal Outcome: 1.4, 4.2, 9.2
Bloom's Taxonomy: Remember
Difficulty: Easy
Learning Outcome: 12-2

139. *(p. 121)* According to your text, 50 million Americans suffer from chronic pain. Describe three of the pain-management techniques mentioned in your text. Indicate the applications for which each technique is most appropriate.

Three of the following pain-management techniques should be described:

Medication—painkilling drugs are the most popular pain relief technique. Some medications treat the source of the pain, such as the swelling in painful joints; others treat the symptoms. Recent innovations include pumping pain medication directly into the spinal cord.
Nerve/brain stimulation—a low-voltage electric current is passed through the pain-afflicted body part; in other cases, electrodes may be planted into the brain, or a handheld battery pack can stimulate nerve cells to provide direct relief.
Light therapy—involves exposure to red/infrared light; seems to facilitate the production of enzymes that promote healing.
Hypnosis—has proven effective at relieving pain for those who can be hypnotized.
Biofeedback/relaxation techniques—people can be trained to relax muscles voluntarily; helps if the pain involves muscles, as in the case of headaches or back pain.
Surgery—nerve fibers carrying pain messages to the brain can be cut surgically. An extreme, last-resort measure, used most frequently with dying patients.
Cognitive restructuring—used to promote more positive self-talk; helps people increase their sense of control over their pain, actually reducing the amount of pain they experience.

APA Goal Outcome: 1.2, 4.2, 9.2
Bloom's Taxonomy: Remember
Difficulty: Medium
Learning Outcome: 12-3

140. *(p. 125-127)* Write a note on top-down processing and bottom-up processing.

In top-down processing, perception is guided by higher-level knowledge, experience, expectations, and motivations. Top-down processing is illustrated by the importance of context in determining how we perceive objects.
Top-down processing cannot occur on its own. Even though top-down processing allows us to fill in the gaps in ambiguous and out-of-context stimuli, we would be unable to perceive the meaning of such stimuli without bottom-up processing. Bottom-up processing consists of the progression of recognizing and processing information from individual components of a stimuli and moving to the perception of the whole.
Top-down and bottom-up processing occur simultaneously, and interact with each
other, in our perception of the world around us. Bottom-up processing permits us to
process the fundamental characteristics of stimuli, whereas top-down processing allows
us to bring our experience to bear on perception. As we learn more about the complex
processes involved in perception, we are developing a better understanding of how the brain continually interprets information from the senses and permits us to make responses appropriate to the environment.

APA Goal Outcome: 1.4, 4.2, 9.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

141. *(p. 124-125)* Briefly describe the Gestalt principles of similarity, proximity, and closure. Provide simple diagrams illustrating each of these principles. Explain how each principle relates to the fundamental Gestalt principle of simplicity.

The answer should include the following components:

Similarity—Perceptual elements that look alike are seen as grouped together. The drawing might show several alternating columns of X's and O's. These are seen as columns of X's and O's, rather than as a series of rows containing both X's and O's. Such a drawing is certainly easier to describe as alternating, homogenous columns rather than rows of mixed composition; in some sense, then, the typical percept is the simpler one.
Proximity—Elements that are closer together are grouped together. A drawing might show pairs of dots, such as (. . . . .). Such a figure would be seen as three pairs of dots, rather than as six unevenly spaced dots. Again, the usual percept is the simpler one.
Closure—Elements are grouped to form complete or enclosed patterns rather than open or broken ones. The drawing might be that of a triangle, with sizeable gaps in each side. We still see a complete triangle, rather than three separate vertices. Describing such a figure as a triangle is easier than describing it as three separated vertices; the usual perception is again the simpler one.

APA Goal Outcome: 1.2, 7.1
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-1

142. *(p. 128)* Imagine that you have been asked to draw or paint either an interior scene or a landscape for an art class. Using specific examples, explain how you might use three of the monocular cues to depth perception described in the text to create an impression of three dimensions on the two-dimensional paper or canvas.

Relative size—if two objects are the same size, the one that produces a smaller image on the retina is more distant than the one that generates a larger retinal image. For example, an impression of depth may be created in an interior scene if one pair of two similar pieces of furniture is shown as larger than the other; the larger one would be perceived as in the foreground. In a landscape, one of two similar trees, barns, buildings, etc., might analogously be shown as larger than the other, creating an impression of foreground and distance.
Texture gradient—the details of more distant objects are usually less distinct than are the details of nearer objects. In an interior scene, the textures and patterns of fabrics and the details of décor may be shown more clearly to suggest the foreground, and in a blurred or less distinct fashion to indicate that objects are in the background. Similarly, in a landscape, the colors, textures, and patterns of vegetation may be depicted clearly in the foreground, but less distinctly in the background.
Linear perspective—parallel lines seem to converge in the distance. This cue applies well to the rectilinear elements of the environment, such as floor tiles, moldings, or wainscoting in an interior scene, or fencing, pathways, driveways, roads, or railway tracks in a landscape. Parallel lines, such as the ceiling moldings and baseboards along a wall or top and bottom fence rails, should converge to suggest distance.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-2

143. *(p. 128-129)* Explain the phenomenon of perceptual constancy with a suitable example.

Perceptual constancy is a phenomenon in which physical objects are perceived as unvarying and consistent despite changes in their appearance or in the physical environment. Perceptual constancy leads us to view objects as having an unvarying size, shape, color, and brightness, even if the image on our retina varies. In some cases, though, our application of perceptual constancy can mislead us. One good example of this involves the rising moon. When the moon first appears at night, close to the horizon, it seems to be huge—much larger than when it is high in the sky later in the evening. You may have thought that the apparent change in the size of the moon was caused by the moon's being physically closer to the earth when it first appears. In fact, though, this is not the case at all: the actual image of the moon on our retina is the same, whether it is low or high in the sky. Perceptual constancy is not the only explanation for the moon illusion, and it remains a puzzle to psychologists. It may be that several different perceptual processes are involved in the illusion

APA Goal Outcome: 1.2, 4.4, 5.5, 8.2
Bloom's Taxonomy: Understand
Difficulty: Medium
Learning Outcome: 13-3

144. *(p. 133)* Briefly explain subliminal perception.

Subliminal perception refers to the perception of messages about which we have no awareness. The stimulus could be a written word, a sound, or even a smell that activates the sensory system but that is not intense enough for a person to report having experienced it. Although subliminal messages (which social psychologists refer to as priming) can influence behavior in subtle ways, there's little evidence that it can lead to major changes in attitudes or behavior. Most research suggests that they cannot. In short, although we are able to perceive at least some kinds of information of which we are unaware, there's little evidence that subliminal messages can change our attitudes or behavior in substantial ways. At the same time, subliminal perception does have at least some consequences. If our motivation to carry out a behavior is already high and the appropriate stimuli are presented subliminally, subliminal perception may have at least some effect on our behavior.

APA Goal Outcome: 1.2, 4.4
Bloom's Taxonomy: Understand
Difficulty: Easy
Learning Outcome: 13-3