Chapter 15: The Special Senses

Multiple Choice

1. Arrange the following to reflect the correct sequence an action potential would follow to reach the lateral olfactory area of the brain:
   1. olfactory bulb
   2. olfactory cortex
   3. olfactory epithelium
   4. olfactory tract
   A) 1, 2, 3, 4
   B) 3, 4, 1, 2
   C) 1, 4, 2, 3
   D) 3, 1, 4, 2
   E) 4, 3, 2, 1
   Answer: d
   Level: 2

2. Why does inhaling deeply and slowly through the nose help to identify an odor?
   A) More air containing the odor is brought into contact with the olfactory epithelium.
   B) Impulses originate slowly in the olfactory epithelium.
   C) The tissue needs more time in contact with the odor.
   D) Threshold for odor detection is high.
   E) Receptors in the olfactory epithelium are highly specific.
   Answer: a
   Level: 1

3. In order for a molecule to be detected by the olfactory neurons, it must
   A) be present in high concentrations.
   B) be one of the seven primary classes of odors.
   C) be dissolved in fluid covering the olfactory epithelium.
   D) interact with the mechanoreceptors of the olfactory hair membrane.
   E) enter the nose slowly.
   Answer: c
   Level: 1

4. You are an airborne molecule that dissolves in the fluid covering the olfactory epithelium. Which of the following must you do in order to depolarize neurons in the olfactory epithelium?
   A) stimulate mitral cells
   B) release acetylcholine
   C) cause proliferation of basal cells
   D) bind to receptor molecules on the olfactory hair membrane
   E) lower the threshold of the cell
5. The ability of the olfactory system to adapt to a particular odor may involve
A) sensitivity of the lateral olfactory area.
B) an increase in the sensitivity at the receptor sites.
C) association neurons inhibiting mitral cells or tufted cells.
D) the intermediate olfactory area sending afferent impulses to the olfactory bulb.
E) molecules that do not bind to receptors anymore.
Answer: c
Level: 1

6. The lateral olfactory area
A) provides emotional reactions to odors.
B) is the site of conscious perception of odors.
C) generates action potentials in olfactory neurons.
D) modulates the sense of olfaction within the olfactory bulb.
E) is the area where chemicals bind to receptors.
Answer: b
Level: 1

7. Which of the following statements is true?
A) Damaged olfactory neurons are replaced.
B) Olfactory epithelial receptors are highly specific.
C) Olfaction first goes to the thalamus and is then relayed to the cerebral cortex.
D) Continued stimulation of olfactory neurons produces the same level of response.
E) Replacement of neurons is a common phenomenon in the body.
Answer: a
Level: 1

8. Which of the following special senses is relayed directly to the cerebral cortex without going to the thalamus?
A) smell
B) taste
C) sight
D) sound
E) touch
Answer: a
Level: 1

9. Sensory structures that detect taste are
A) palates.
B) papillae.
C) taste buds.
D) ciliary membranes.
E) thermoreceptors.
10. Taste buds are not associated with _____ papillae.
A) foliate  
B) filiform  
C) fungiform  
D) vallate  
E) papilliform  
Answer: b  
Level: 1

11. The most sensitive taste buds are found in _____ papillae.
A) formate  
B) filiform  
C) fungiform  
D) vallate  
E) foliate  
Answer: e  
Level: 1

12. Taste buds
A) can perceive seven basic tastes.  
B) are replaced approximately every 30 days.  
C) can only perceive taste if the molecules are in solution.  
D) can be found covering both the superior and inferior surfaces of the tongue.  
E) have axons and generate their own action potentials.  
Answer: c  
Level: 1

13. Which of the following statements is false?
A) Each taste bud is most sensitive to one of the five basic tastes.  
B) Sensitivity of taste buds for sweet taste is very high.  
C) Adaptation for taste is rapid.  
D) Olfaction influences taste.  
E) Sensitivities for sweet and salty tastes are the lowest.  
Answer: b  
Level: 1

14. To which of the following substances would the taste buds be most sensitive?
A) syrup  
B) vinegar  
C) salt water  
D) quinine (tonic) water  
E) jelly  
Answer: d
15. Damage to which of the following cranial nerves may impair the sense of taste?
A) facial
B) abducens
C) trigeminal
D) hypoglossal
E) glossopharyngeal
Answer: a

16. Arrange the following in correct sequence:
1. gustatory cell depolarizes
2. action potential stimulated in gustatory neurons
3. food substance dissolves in saliva
4. neurotransmitter released by gustatory cell
5. food substance enters taste pore and attaches to receptor on gustatory hair
A) 5, 4, 1, 2, 3
B) 3, 5, 1, 4, 2
C) 5, 3, 1, 4, 2
D) 3, 1, 4, 5, 2
E) 3, 2, 1, 5, 4
Answer: b

17. You taste a sauce with the "tip of your tongue". These taste sensations would be carried via the _____ cranial nerve.
A) facial (VII)
B) vagus (X)
C) Trigeminal (V)
D) glossopharyngeal (IX)
E) hypoglossal (XII)
Answer: a

18. Which of the following structures is considered to be an accessory structure of the eye?
A) lens
B) retina
C) sclera
D) palpebrae
E) cornea
Answer: d

19. Palpebrae is another name for the
A) eyes.
B) eyelids.
C) eyebrows.
D) eyelashes.
E) conjunctiva.
Answer: b
Level: 1

20. Some thyroid disorders are characterized by an increase in the width of the palpebral fissure. This would be an increase in the distance between the
A) eyebrows.
B) eyelashes.
C) eyelids.
D) eyes.
E) lacrimal glands.
Answer: c
Level: 2

21. The blink reflex is designed to
A) maintain balance.
B) regulate pupil size.
C) provide clearer vision.
D) keep the eyes moist.
E) orient the eyes.
Answer: d
Level: 1

22. An inflammation of one of the ciliary glands of the eyelashes is called a
A) sty.
B) boil.
C) chalazion.
D) melbomian cyst.
E) pinkeye.
Answer: a
Level: 1

23. The transparent mucous membrane that covers the anterior surface of the eye is the
A) conjunctival fornix.
B) surface conjunctiva.
C) bulbar conjunctiva.
D) palpebral conjunctiva.
E) sclera.
Answer: c
Level: 1

24. Pinkeye is an inflammation of the
A) retina.
B) choroid.
C) sclera.
D) conjunctiva.
E) lacrimal gland.
Answer: d
Level: 1

25. The lacrimal glands
A) cause a sty when inflamed.
B) constantly produce a fluid called tears.
C) are located in the superomedial corner of the orbit.
D) are innervated by parasympathetic fibers from the oculomotor nerve.
E) produce sebum.
Answer: b
Level: 1

26. Tears
A) are produced only when a person cries.
B) wash foreign objects away from the eye.
C) contain lysozyme to trap dust.
D) are very acidic and kill microbes.
E) contain little water.
Answer: b
Level: 1

27. Why does a person's nose run when he cries?
A) Tears drain into the nasal cavity via the nasolacrimal duct.
B) Parasympathetic nerve stimulation causes the nose to secrete mucus.
C) Intense stimulation of the facial nerve as a result of crying increases nasal secretions.
D) The lacrimal glands secrete tears directly into the nose.
E) This stimulates fluid production in the nose.
Answer: a
Level: 1

28. Which of the following cranial nerves innervates an eye muscle?
A) optic
B) facial
C) abducens
D) trigeminal
E) vagus
Answer: c
Level: 1

29. The outermost tunic of the eyeball is the
A) iris.
B) sclera.
The transparent anterior portion of the sclera is the 
A) iris.  
B) retina.  
C) cornea.  
D) choroid.  
E) pupil.  
Answer: c  
Level: 1

Increased fluid accumulation in the cornea would result in 
A) a scattering of light rays.  
B) loss of pigment in the eye.  
C) a decrease in the strength of the tissue.  
D) an increase in the ability to transmit light to the retina.  
E) blockage of light rays.  
Answer: a  
Level: 2

The cornea 
A) is highly vascular.  
B) maintains the shape of the eye.  
C) is white like the rest of the sclera.  
D) is part of the focusing system of the eye.  
E) does not contain connective tissue.  
Answer: d  
Level: 1

The cornea is relatively easy to transplant because 
A) its proteoglycan content is high.  
B) it is easy to access and remove.  
C) it has an extensive blood supply.  
D) its high immunological activity prevents infection.  
E) it is not attached to the eye.  
Answer: b  
Level: 1

Which of the structures listed below is part of the vascular tunic? 
A) iris  
B) retina  
C) optic disc
D)  fovea centralis  
E)  cornea  
Answer: a  
Level: 1

35.  The ciliary body  
A)  contains rods and cones.  
B)  is continuous with the sclera.  
C)  consists of a ciliary ring and ciliary processes.  
D)  produces vitreous humor.  
E)  is photosensitive.  
Answer: c  
Level: 1

36.  The contractile structure that surrounds the pupil is the  
A)  iris.  
B)  ciliary ring.  
C)  sclera.  
D)  ciliary muscle.  
E)  retina.  
Answer: a  
Level: 1

37.  In bright sunlight the pupil of your eye constricts and contracts the  
A)  ciliary muscles  
B)  dilator pupillae  
C)  sphincter pupillae  
D)  suspensory ligaments  
E)  ciliary ring  
Answer: c  
Level: 1

38.  Which of the following is (are) associated with the retina?  
A)  lens  
B)  ciliary muscle  
C)  rods and cones  
D)  canals of Schlemm  
E)  pupil  
Answer: c  
Level: 1

39.  The area of greatest visual acuity is the  
A)  lens.  
B)  optic disc.  
C)  fovea centralis.  
D)  posterior chamber.
E) blind spot.
Answer: c
Level: 1

40. Blood vessels enter the eye and nerve processes exit the eye at the
A) optic disc.
B) macula lutea.
C) sensory retina.
D) fovea centralis.
E) pupil.
Answer: a
Level: 1

41. The optic disc
A) is located in the vascular tunic.
B) is the site of greatest visual acuity.
C) is also called the macula lutea.
D) is on the anterior surface of the eye.
E) contains no photoreceptor cells.
Answer: e
Level: 1

42. The anterior and posterior compartments of the eye are separated by the
A) lens.
B) retina.
C) cornea.
D) canal of Schlemm.
E) optic disc.
Answer: a
Level: 1

43. Which of the following functions is carried out by both aqueous and vitreous humor?
A) cleanses the eye
B) nourishment of the eye
C) refraction of light rays
D) generation of a visual image
E) control the amount of light entering the eye
Answer: c
Level: 1

44. Vitreous humor
A) is produced on a daily basis.
B) is less viscous than aqueous humor.
C) does not contribute to intraocular pressure.
D) helps to hold the lens and retina in place.
E) is located in the anterior compartment.
45. Glaucoma can result from
A) inhibition of the circulation of aqueous humor.
B) damage to the suspensory ligament.
C) a decrease in the number of cones.
D) opacity of the lens.
E) increased amounts of vitreous humor.
Answer: a

46. The lens
A) is biconcave.
B) focuses light on the retina.
C) floats in the vitreous humor.
D) is attached to the retina by suspensory ligaments.
E) is normally opaque.
Answer: b

47. Which of the following is correctly matched?
A) sclera - ciliary body
B) iris - sphincter pupillae
C) retina - canal of Schlemm
D) vitreous humor - anterior compartment
E) aqueous humor - posterior compartment
Answer: b

48. Light converges as it passes through the
A) vitreous humor, sclera, and iris.
B) lens, aqueous humor, and sclera.
C) cornea, retina, and vitreous humor.
D) lens, cornea and humors of the eye.
E) sclera, iris, and retina
Answer: d

49. For distant vision,
A) the lens is more spherical.
B) the suspensory ligaments relax.
C) the ciliary muscles are relaxed.
D) light is refracted more by the lens than by the humors.
E) the lens is thickened.
Answer: c
50. To focus on objects closer than 20 feet,
A) the lens must become flatter.
B) the cornea must move inward.
C) the ciliary muscles must contract.
D) the suspensory ligaments increase tension on the lens.
E) the retina must bend.
Answer: c

51. Increase in the distance from the eye to the near point of vision can be caused by
A) the lens becoming more rigid with age.
B) the lens becoming more opaque with age.
C) the lens becoming more convex with age.
D) the vitreous humor becoming thicker with age.
E) the lens becoming more flexible with age.
Answer: a

52. When you try to focus on the tip of your nose,
A) the pupils dilate.
B) the ciliary muscles relax.
C) the lens becomes more spherical.
D) the tension on the suspensory ligament increases.
E) the lens becomes flatter.
Answer: c

53. As an object moves closer to the eye,
A) the lens flattens.
B) the eyes rotate medially.
C) the ciliary muscles relax.
D) the diameter of the pupil increases.
E) the eye blinks.
Answer: b

54. The main factor affecting depth of focus is the
A) convergence.
B) accommodation.
C) shape of the lens.
D) size of the lens.
E) size of the pupil.
Answer: e
55. The pigmented layer of the retina
A) determines the color of the iris.
B) results in increased visual acuity.
C) protects the optic nerve from damage.
D) causes increased scattering of incoming light.
E) is the vascular layer of the retina.
Answer: b
Level: 1

56. Rhodopsin is found in the
A) rods.
B) cones.
C) choroid.
D) pigmented retina.
E) amacrine cells.
Answer: a
Level: 1

57. Night blindness could be caused by
A) a lack of cones.
B) a lack of iodopsin.
C) a lack of rhodopsin.
D) too much vitamin A in the diet.
E) a lack of vitamin C in the diet.
Answer: c
Level: 1

58. Rods, a type of photoreceptor cell, respond to light (stimulus) by
A) depolarizing.
B) repolarizing.
C) hypopolarizing.
D) hyperpolarizing.
E) opening Na+ channels in the cell membrane.
Answer: d
Level: 1

59. When rhodopsin is exposed to light,
A) more rhodopsin is formed.
B) retinal separates from opsin.
C) the cones generate action potentials.
D) free retinal is converted to vitamin A.
E) retinal becomes more attached to opsin.
Answer: b
Level: 1
60. Light and dark adaptation involves
A) pupillary reflexes.
B) variations in rod and cone function.
C) changes in the amount of available rhodopsin.
D) both A and C
E) A, B, and C
Answer: e
Level: 1

61. Color vision
A) is a function of cone cells.
B) is most acute in dim light.
C) is interpreted in the cerebellum.
D) depends on the amount of available rhodopsin.
E) is the interaction between rods and cones.
Answer: a
Level: 1

62. To which colors are the three different kinds of cones sensitive?
A) blue, red, and yellow
B) red, blue, and green
C) red, violet, and yellow
D) violet, green, and blue
E) orange, indigo, violet
Answer: b
Level: 1

63. Humans are able to distinguish several million shades of color because
A) humans have large retinas.
B) humans have binocular vision.
C) they have many different types of cone cells.
D) different proportions of cone cells respond to each wavelength of light.
E) humans have more cones than rods.
Answer: d
Level: 2

64. Which of the following is false?
A) Rods cannot detect color.
B) The visual pigment of cones is iodopsin.
C) Most of the optic tract axons terminate in the lateral geniculate nucleus of the thalamus.
D) Association neurons in the inner retinal layers modify signals of rods and cones.
E) Most of the optic tract axons terminate in the medial geniculate nucleus of the thalamus.
Answer: e
Level: 1

65. The photoreceptor cells are located
66. The correct pathway for impulses leaving the retina is
A) photoreceptors, ganglion cells, bipolar cells, optic nerve.
B) photoreceptors, bipolar cells, ganglion cells, optic nerve.
C) photoreceptors, bipolar cells, optic nerve, ganglion cells.
D) photoreceptors, ganglion cells, optic nerve, bipolar cells.
E) ganglion cells, bipolar cells, photoreceptors, optic nerve
Answer: b
Level: 2

67. Arrange the following events in correct sequence.
1. retinal cells generate action potential
2. person becomes aware of the information obtained by CNS
3. visual cortex translates action potential
4. bright light is shone into the eye
5. optic nerve conducts action potential to CNS
A) 4, 5, 1, 3, 2
B) 4, 1, 2, 3, 5
C) 4, 1, 5, 3, 2
D) 4, 2, 1, 5, 3
E) 4, 3, 5, 2, 1
Answer: c
Level: 2

68. Damage to the left side of the brain near the visual cortex could result in which of the following visual changes?
A) loss of temporal visual fields from both eyes
B) loss of nasal visual fields from both eyes
C) loss of right visual fields from both eyes
D) loss of left visual fields from both eyes
E) none of the above
Answer: c
Level: 2

69. A person loses all vision in their left eye. One possible cause could be damage to the
A) optic chiasma.
B) left optic tract.
C) optic nerve in the left eye.
D) right lateral geniculate nucleus.
E) right visual cortex in the occipital lobe.
Answer: c
Level: 2

70. Depth perception
A) relies on monocular vision.
B) does not require cerebral interpretation.
C) requires the image to strike the retina of both eyes in exactly the same way.
D) is the ability to distinguish between near and far objects and judge their distance.
E) only works when looking down at water.
Answer: d
Level: 1

71. The age-associated changes that result in loss of accommodation of the eyes is called
A) myopia.
B) hyperopia.
C) presbyopia.
D) retinopia.
E) astigmatism.
Answer: c
Level: 1

72. Which portion of the ear contains the sense organs for hearing and balance?
A) external ear
B) middle ear
C) inner ear
D) auditory tube
E) tympanic membrane.
Answer: c
Level: 1

73. The external ear terminates at the
A) pinna.
B) oval window.
C) tympanic membrane.
D) internal auditory meatus.
E) ossicles.
Answer: c
Level: 1

74. The auditory tube
A) amplifies sound waves.
B) helps maintain balance.
C) carries sound to the eardrum.
D) carries sound to the inner ear.
E) equalizes air pressure between the middle ear and outside air.
75. Rapid changes in altitude can distort the eardrum. Symptoms that may occur include
A) dizziness.
B) light headedness.
C) muffled sounds.
D) ringing in the ears.
E) loss of hearing.
Answer: c
Level: 1

76. The malleus, incus, and stapes
A) are parts of the cochlea.
B) are located in the inner ear.
C) are surrounded by endolymph.
D) transmit vibrations from the eardrum to the oval window.
E) are surrounded by fluid.
Answer: d
Level: 1

77. Sensory receptors for balance are found in the
A) pinna.
B) cochlea.
C) auditory ossicles.
D) semicircular canals.
E) auditory tube.
Answer: d
Level: 1

78. Which of the following sequences is correct?
A) oval window, vestibule, scala vestibuli
B) round window, helicotrema, scala tympani
C) bony labyrinth, round window, basilar membrane
D) tympanic membrane, vestibular membrane, basilar membrane
E) vestibular membrane, basilar membrane, auditory membrane
Answer: a
Level: 2

79. Which of the following is true?
A) The cochlear duct is filled with perilymph.
B) The bony core of the cochlea is called the modiolus.
C) The foot plate of the incus fits into the round window.
D) The vestibule is one of the regions of the organ of corti.
E) The spiral organ is found in the semicircular canals.
Answer: b
80. Which of the following is part of the spiral organ (organ of Corti)?
A) modiolus
B) vestibule
C) hair cells
D) scala tympani
E) chorda tympani
Answer: c

81. Which of the following is a part of the bony labyrinth?
A) malleus
B) vestibule
C) cochlear duct
D) tympanic membrane
E) ossicles
Answer: b

82. The sensory cells for hearing are located in the
A) organ of Corti or spiral organ.
B) oval window.
C) middle ear.
D) vestibule.
E) semicircular canals.
Answer: a

83. Which of the following definitions best describes the timbre of sounds?
A) loudness
B) amplitude
C) wave frequency
D) resonance quality
E) pitch
Answer: d

84. The direction from which a sound is coming can be determined by the
A) volume of the sound.
B) frequency of sound waves.
C) amplitude of the sound waves.
D) differences in the time that sound waves take to reach each ear.
E) timbre of sounds.
Answer: d
85. Arrange the following structures in the order in which they vibrate when a sound wave enters the ear.
1. eardrum
2. endolymph
3. ossicles
4. oval window
5. perilymph
A) 1, 3, 5, 2, 4
B) 1, 4, 3, 5, 2
C) 3, 1, 5, 2, 4
D) 1, 3, 2, 5, 4
E) 1, 3, 4, 5, 2
Answer: e
Level: 2

86. The attenuation reflex
A) amplifies loud noises.
B) enhances low frequency sounds.
C) prevents damage to delicate ear structures.
D) involves the scala vestibuli and the scala tympani.
E) vibrates the tympanic membrane.
Answer: c
Level: 1

87. The round window
A) reflects sound waves.
B) vibrates the basilar membrane.
C) allows for compression of the organ of Corti.
D) acts as a mechanical release for waves within the cochlea.
E) increases the pressure of the perilymph.
Answer: d
Level: 1

88. Arrange the following list of membranes in correct sequence.
1. tectorial membrane
2. vestibular membrane
3. tympanic membrane
4. basilar membrane
A) 1, 2, 3, 4
B) 3, 4, 1, 2
C) 3, 2, 4, 1
D) 2, 4, 3, 1
E) 4, 3, 2, 1
Answer: c
Level: 2
89. Arrange the following structures in the order in which they would vibrate as a result of the tympanic membrane vibrating.
1. oval window
2. vestibular membrane and endolymph
3. ossicles
4. basilar membrane
5. perilymph
A) 3, 5, 2, 4, 1
B) 1, 2, 5, 3, 4
C) 1, 2, 3, 4, 5
D) 3, 1, 5, 2, 4
E) 3, 2, 4, 5, 1
Answer: d
Level: 2

90. Cochlear neurons are stimulated by
A) vibrating the oval window.
B) vibrations of the tectorial membrane.
C) bending microvilli or stereocilia on the hair cells.
D) movement of the otoliths in the endolymph.
E) turning the spiral organ.
Answer: c
Level: 1

91. Auditory impulses are transmitted by the _____ portion of the vestibulocochlear nerve.
A) spiral
B) cochlear
C) vestibular
D) ossicular
E) tympanic
Answer: b
Level: 1

92. More sound volume is perceived when
A) sound wave amplitude increases.
B) action potentials from hair cells are blocked.
C) sound wave amplitude decreases.
D) sound wave frequency decreases
E) sound wave frequency increases.
Answer: a
Level: 1

93. The superior olivary nucleus
A) generates the endocochlear potential.
B) receives impulses from the vestibular nerve.
C) helps localize high-pitched tones near the apex of the basilar membrane.
D) sends efferent impulses that inhibit all hair cells not vibrating maximally.
E) stimulate additional hair cells.
Answer: d
Level: 1

94. Arrange the following parts of the neuronal pathway for hearing in the correct sequence.
1. inferior colliculus
2. medial geniculate nucleus
3. superior olivary nucleus
4. auditory cortex
5. cochlear nucleus
A) 4, 5, 3, 1, 2
B) 5, 3, 1, 2, 4
C) 1, 2, 3, 5, 4
D) 5, 2, 1, 3, 4
E) 5, 4, 1, 3, 2
Answer: b
Level: 2

95. The utricle and saccule are involved in
A) static balance.
B) kinetic balance.
C) hearing low intensity sounds.
D) hearing high intensity sounds.
E) evaluating movements of the head.
Answer: a
Level: 1

96. The position of the head with respect to gravity is determined by the
A) shift in fluid in the semicircular canals.
B) movements of otoliths in response to gravity.
C) movements of perilymph in the vestibular chamber.
D) impulses transmitted from the macula of the semicircular canals.
E) stimulation of the cochlear portion of the nerve.
Answer: b
Level: 1

97. Otoliths
A) amplify hearing.
B) are part of the ampulla.
C) are found in the semicircular canals.
D) stimulate hair cells to produce action potentials.
E) are found in the cochlear duct.
Answer: d
Level: 1
98. The semicircular canals
A) are parallel to each other.
B) can detect movement in only one direction.
C) have a base called a papilla.
D) contain cupulæ that respond to gravity.
E) allow a person to detect movement in all directions.
Answer: e
Level: 1

99. Neurons synapsing on the hair cells of the maculae and the crista ampullaris have cell bodies in the
A) superior colliculus.
B) vestibular ganglion.
C) superior olivary nucleus.
D) medial geniculate nucleus.
E) cochlear ganglion.
Answer: b
Level: 1

100. Damage to the vestibular branch of the vestibulocochlear nerve would result in loss of
A) taste.
B) sight.
C) hearing.
D) balance.
E) smell.
Answer: d
Level: 1

Refer to the following figure for questions 101-105.
101. What is layer “A” on the diagram of the retina?
A) bipolar layer
B) ganglionic layer
C) choroid
D) pigment cell layer
E) photoreceptor layer
Answer: c
Level: 1

102. What is layer “B” on the diagram of the retina?
A) bipolar layer
B) ganglionic layer
C) choroid
D) pigment cell layer
E) photoreceptor layer
Answer: d
Level: 1

103. What is layer “C” on the diagram of the retina?
A) bipolar layer
B) ganglionic layer
C) choroid
D) pigment cell layer
E) photoreceptor layer
Answer: e
Level: 1

104. What is layer “D” on the diagram of the retina?
A) bipolar layer
B) ganglionic layer
C) choroid
D) pigment cell layer
E) photoreceptor layer
Answer: a
Level: 1

105. What is layer “E” on the diagram of the retina?
A) bipolar layer
B) ganglionic layer
C) choroid
D) pigment cell layer
E) photoreceptor layer
Answer: b
Level: 1
For questions 106 to 110 match each of the following structures with the appropriate description.
A) relay olfactory information to the brain and synapse with association neurons in the olfactory bulb
B) area of the brain where the olfactory tracts terminate
C) enlargements on the dendrites of olfactory neurons
D) fibers that connect the olfactory bulb to the cortex
E) the expanded anterior portions of the olfactory nerves

106. olfactory bulbs
Answer: e
Level: 1

107. olfactory tracts
Answer: d
Level: 1

108. olfactory vesicles
Answer: c
Level: 1

109. olfactory cortex
Answer: b
Level: 1

110. mitral cells
Answer: a
Level: 1

For questions 111 to 115 match the following structures with the appropriate description.
A) the angle where the eyelids join
B) the space between the two eyelids
C) another name for the eyelids
D) the membrane that covers the inner surface of the eyelids
E) the membrane that covers the anterior sclera of the eye

111. palpebrae
Answer: c
Level: 1

112. palpebral fissure
Answer: b
Level: 1

113. canthi
Answer: a
Level: 1
114. palpebral conjunctiva
Answer: d
Level: 1

115. bulbar conjunctiva
Answer: e
Level: 1

For questions 116 to 120 match the following structures with the appropriate descriptions.
A) lubricate the eyelid
B) protect the eye from falling objects
C) an inflamed ciliary gland
D) small tubes that drain tears into the lacrimal sac
E) inflammation of the conjunctiva

116. eyebrows
Answer: b
Level: 1

117. Meibomian glands
Answer: a
Level: 1

118. conjunctivitis
Answer: e
Level: 1

119. sty
Answer: c
Level: 1

120. lacrimal canaliculi
Answer: d
Level: 1

For questions 121 to 125 match the following structures with the appropriate description.
A) photoreceptor cells that function in black and white vision
B) photoreceptor cells that function in color vision
C) the opening in the iris
D) the innermost tunic of the eye
E) a pigmented contractile structure

121. iris
Answer: e
Level: 1
122. pupil
   Answer: c
   Level: 1

123. retina
   Answer: d
   Level: 1

124. rods
   Answer: a
   Level: 1

125. cones
   Answer: b
   Level: 1

For questions 126 to 130 match the following structures with the appropriate description.
A) blood vessels enter and the optic nerve exits here
B) a small yellow spot near the center of the posterior retina
C) the portion of the retina with the greatest visual acuity
D) a jellylike substance in the posterior cavity of the eye
E) the fluid that fills the anterior cavity of the eye

126. macula
   Answer: b
   Level: 1

127. fovea centralis
   Answer: c
   Level: 1

128. optic disc
   Answer: a
   Level: 1

129. aqueous humor
   Answer: e
   Level: 1

130. vitreous humor
   Answer: d
   Level: 1

For questions 131 to 135 match the following structures with the appropriate description.
A) the area that can be seen with the eyes open
B) opening in the orbit through which the optic nerve passes
C) the cerebral area that integrates messages from retina
D) area where medial ganglion cell axons cross over
E) the route of the ganglionic axons beyond the chiasma

131. optic foramen
Answer: b
Level: 1

132. optic chiasma
Answer: d
Level: 1

133. visual field
Answer: a
Level: 1

134. optic tract
Answer: e
Level: 1

135. visual cortex
Answer: c
Level: 1

For questions 136 to 140 match the following description with its correct name.
A) difficulty seeing distant objects
B) a type of refractory error
C) clouding of the lens of the eye
D) increased intraocular pressure that can lead to loss of vision
E) loss of acute central vision

136. cataract
Answer: c
Level: 1

137. macular degeneration
Answer: e
Level: 1

138. myopia
Answer: a
Level: 1

139. astigmatism
Answer: b
140. glaucoma  
Answer: d  
Level: 1  

For questions 141 to 145 match the following structures with the appropriate description.

A) eardrum  
B) part of the ear that contains the organ of hearing  
C) the pinna and external auditory meatus are part of this  
D) fleshy portion of the external ear  
E) air-filled space within the temporal bone  

141. external ear  
Answer: c  
Level: 1  

142. middle ear  
Answer: e  
Level: 1  

143. inner ear  
Answer: b  
Level: 1  

144. auricle  
Answer: d  
Level: 1  

145. tympanic membrane  
Answer: a  
Level: 1  

For questions 146 to 150 match the following structures with the appropriate description.

A) organ of hearing  
B) passageway from the outside to the eardrum  
C) interconnecting tunnels in the temporal bone  
D) tiny bones in the middle ear  
E) connecting chambers of inner ear filled with endolymph  

146. external auditory meatus  
Answer: b  
Level: 1  

147. auditory ossicles  
Answer: d
148. bony labyrinth
Answer: c
Level: 1

149. membranous labyrinth
Answer: e
Level: 1

150. organ of Corti
Answer: a
Level: 1

For questions 151 to 155 match the following descriptions with the most appropriate structure.
A) structures that produce earwax
B) fluid in the membranous labyrinth
C) fluid between the membranous and bony labyrinth
D) ossicles connect this structure to eardrum
E) connects the middle ear to the pharynx

151. endolymph
Answer: b
Level: 1

152. perilymph
Answer: c
Level: 1

153. ceruminous glands
Answer: a
Level: 1

154. auditory tube
Answer: e
Level: 1

155. oval window
Answer: d
Level: 1

**Fill in the Blank**

156. The area of the olfactory cortex that is involved in the conscious perception of smell is the ________.
157. Taste buds consist of support and ____________ cells.
Answer: gustatory
Level: 1

158. The muscles that dilate the pupil are the _________ _________.
Answer: dilator pupillae
Level: 1

159. The bending of light is called _________.
Answer: refraction
Level: 1

160. The point at which light waves converge is called the _________.
Answer: focal point
Level: 1

161. ___________vision results because a slightly different image is seen by each eye.
Answer: binocular
Level: 1

162. In the retina the rods and cones synapse with ___________ cells that in turn synapse with ganglion cells, which form the optic nerve.
Answer: bipolar
Level: 1

163. The fluid inside the membranous labyrinth of the inner ear is _____________.
Answer: endolymph
Level: 1

164. The _________ tube connects the middle ear to the pharynx.
Answer: auditory
Level: 1

165. The three ossicles are: ____________, ____________, ____________.
Answer: malleus, incus, stapes
Level: 1

**Essay Questions**

166. Images focused on the retina are inverted. How do we see the world in its proper perspective?
Answer: The brain adjusts or interprets the inverted image, so that the world is perceived as
"right side up" even though we are actually seeing it "upside down".
Level: 3

167. Why might an individual with a middle ear infection notice a change in their taste sensation?
Answer: Taste sensations from the anterior two-thirds of the tongue are carried by a branch of the facial nerve called the chorda tympani, which crosses over the surface of the tympanic membrane. In a middle ear infection, the tympanic membrane is often inflamed and bulges to the outside. The inflammation and the bulging can both affect transmission of action potentials by the chorda tympani and that, in turn, could cause a change in taste sensation.
Level: 3

168. If you spin around on a stool and stop suddenly, the room seems to continue to move. Explain.
Answer: When the head suddenly stops moving, the endolymph in the semicircular canals, because of its momentum, continues to move in the direction of the spin. The movement of the endolymph stimulates the crista ampullaris. The brain adjusts to this sensory input by making the interpretation that the room is spinning.
Level: 3

169. Why do individuals experience sensitivity to bright light after cataract surgery?
Answer: Cataracts (a cloudy or opaque lens) obscure light transmission to the retina. Cataract surgery removes the lens, increasing the light transmission to the retina. The retina will be quite sensitive to this increased illumination.
Level: 3

170. Why do wine tasters both smell and taste wine to judge its quality?
Answer: Taste sensations can be strongly influenced by olfactory sensations. Much of what we refer to as "taste" is related to olfactory sensations. Wine tasters, by combining taste and smell, are better able to judge the quality of the "taste" of a wine.
Level: 3