Sensation and Perception 10th edition Goldstein Test Bank

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MULTIPLE CHOICE

1 : Our perception of the environment begins with _____.
A : energy
B : the proximal stimulus
C : the distal stimulus
D : cognition

Correct Answer : C

2 : Visible light is between _____ and _____ nm within the electromagnetic spectrum.
A : 100; 400
B : 400; 700
C : 500; 1000
D : 900; 1500

Correct Answer : B

3 : A wavelength of 10,000 meters would fall in the _____ range of the electromagnetic spectrum.
A : X-rays
B : radio wave
C : infrared rays
D : gamma rays

Correct Answer : B

4 : The electromagnetic spectrum is a continuum of electromagnetic energy that is produced by _____ and is radiated as _____.
A : electric charges; waves
B : magnetism; waves
C : electric charges; magnetism
D : magnetism; electric charges

Correct Answer : A

5 : The structure of the eye that provides about 80% of the eyes focusing power is the _____.
A : iris
B : pupil
C : cornea
D : lens

Correct Answer : C

6 : Jan tries to focus on the tip of her pencil as she brings it closer to her. She feels the strain on her eye as she does this. What she is feeling in her eye is due to the process called _____.
A : inhibition
B : reflection
C : accommodation
D : assimilation

Correct Answer : C

7 : The ciliary muscles change the shape of the _____, providing about 20% of the eyes focusing power.
A : iris
B : pupil
C : cornea
D : lens

Correct Answer : D

8 : Loreleis mother is 60 years old, and, because of the condition called _____, she has a difficult time bringing near objects into focus.
A : cataracts
B : diplopia
C : presbyopia
D : retinitis pigmentosa

Correct Answer : C

9 : In _____, the eyeball is too long, resulting in difficulty seeing far objects.
A : axial myopia
B : refractive myopia
C : axial hyperopia
D : refractive hyperopia

Correct Answer : A

10 : Individuals with myopia may have difficulty seeing _____ objects clearly. Often times, they are also referred to as being _____.
A : nearby; farsighted
B : nearby; nearsighted
C : distant; farsighted
D : distant; nearsighted

Correct Answer : D

11 : Vera has hyperopia, and tends to get headaches when she reads. This might be because _____.
A : Vera also has presbyopia and has the constant need to accommodate
B : Vera also has myopia and is unable to accommodate
C : Vera has just had LASIK surgery and her ciliary muscles are damaged
D : Vera is 5-years-old and lacks the visual acuity to read

Correct Answer : A

12 : The visual pigment molecules are contained in the _____.
A : inner segments of the visual receptors
B : outer segments of the visual receptors
C : axons of the rods
D : axons of the cones

Correct Answer : B

13 : _____ reacts to light to start the process of transduction.
A : Opsin
B : Retinal
C : Choroid
D : Thyric acid

Correct Answer : B

14 : The isomerization of a single pigment molecule triggers what is best described as a _____.
A : chain reaction
B : ballistic expansion
C : hyperactive potential
D : hypopolarization wave

Correct Answer : A

15 : Which of the following is true about the difference between the rods and the cones?
A : The rods control vision in high illumination conditions, and the cones controlvision in low illumination conditions.
B : The rods are packed in an area called the fovea, and the cones are found more in the peripheral retina.
C : There are about 120 million rods in the human eye and about 6 million cones.
D : The only difference between the rods and the cones is physical shape.

Correct Answer : C

16 : A retinal condition that destroys the cones in the fovea is _____.
A : macular degeneration
B : retinitis pigmentosa
C : presbyopia
D : retinal hypopolarization

Correct Answer : A

17 : In the early stages of _____, peripheral rod receptors are destroyed leading to poorer peripheral vision.
A : macular degeneration
B : retinitis pigmentosa
C : presbyopia
D : retinal hypopolarization

Correct Answer : B

18 : The blind spot is located _____.
A : in the fovea
B : in the vitreous
C : where the optic nerve leaves the eye
D : at the optic chiasm

Correct Answer : C

19 : Nina does a demonstration of seeing the blind spot, in which a grid pattern surrounds the black dot that disappears when it falls on the blind spot. What does Nina most likely see in the

area where the dot disappears?
A : a blurry gray area
B : a white circle
C : nothing
D : a continuation of the grid pattern

Correct Answer : D

20 : The episode of Mythbusters cited in the textbook demonstrated that dark adaptation was the reason why _____.
A : poker players wear sunglasses
B : pirates wore eyepatches
C : cardinals have good night vision
D : cats have good night vision

Correct Answer : B

21 : To isolate the rod portion of the dark adaptation curve, researchers _____.
A : use rod monochromats as the participants
B : present the stimulus foveally
C : present the stimulus in the periphery
D : use cone monochromats as participants

Correct Answer : A

22 : The rod-cone break in the dark adaptation curve occurs after about _____ in the dark.
A : 30 seconds
B : 2 minutes
C : 7 minutes
D : 30 minutes

Correct Answer : C

23 : When visual pigments become bleached they are _____.
A : dead
B : fully regenerated
C : color sensitive
D : detached from the opsin

Correct Answer : D

24 : Rushton demonstrated that the physiological mechanism behind dark adaptation is _____.
A : visual pigment regeneration
B : the enzyme cascade
C : modular organization
D : photon remission

Correct Answer : A

25 : Cone spectral sensitivity is measured by having the observer _____.
A : look up and blink
B : look straight forward without blinking
C : look directly into a light

D : look to the side of a flashing light

Correct Answer : C

26 : The peak in the spectral sensitivity curve is about _____ for the rods, and about _____ for the cones.
A : 700 nm; 400 nm
B : 450 nm; 800 nm
C : 500 nm; 560 nm
D : 600 nm; 450 nm

Correct Answer : C

27 : The Purkinje shift _____.
A : occurs when reds appear brighter than blues in well-lit conditions, but blues appear brighter than reds in dim conditions
B : occurs when blues appear brighter than reds in well-lit conditions, but blues appear brighter than reds in dim conditions
C : occurs when details that are easily seen in well-lit conditions become more difficult to see in low-light conditions
D : demonstrates the importance of eye movements in visual pigment regeneration

Correct Answer : A

28 : There are ____ different cone receptors, each with different absorption spectra.
A : 2
B : 3
C : 4
D : 7

Correct Answer : B

29 : The three major parts of a neuron are _____.
A : dendrites, cell body, and axon
B : axon, nerve fiber, and receptor
C : receptor, transmitter, and median
D : receptor, dendrites, and conductor

Correct Answer : A

30 : The difference in charge between the inside and the outside of the nerve fiber when the nerve is at rest is _____ mV.
A : 70
B : 10
C : 0
D : +19

Correct Answer : A

31 : Which of the following statements best defines the propagated response?
A : Once a response is triggered, the response travels the length of the axon without decreasing in amplitude.
B : Once a response is triggered, the response gradually increases in amplitude as it travels

down the length of the axon.
C : The response increases the positive charge of the chlorine ions throughout the length of the axon.
D : The number of negative potassium ions increase the closer the impulse is to the dendrites.

Correct Answer : A

32 : As stimulus intensity is increased, recording from a single neuron shows that _____.
A : the amplitude of the action potential increases
B : the amplitude of the action potential decreases
C : the amplitude of the action potential may increase or decrease, depending on the stimulus
D : the rate of firing of the nerve fiber increases

Correct Answer : D

33 : The upper limit of a neurons firing rate is estimated to be _____ impulses per second.
A : 20
B : 100
C : 800
D : 4400

Correct Answer : C

34 : At the beginning of the action potential, _____ ions flow from outside the nerve fiber into the nerve fiber.
A : positive potassium
B : negative potassium
C : positive sodium
D : negative sodium

Correct Answer : C

35 : The flow of ions that create the action potential are caused by the changes in the _____ of the nerve fiber.
A : suppression
B : permeability
C : accommodation
D : assimilation

Correct Answer : B

36 : Synaptic vesicles contain chemicals called _____ that are released across the synapse to the next neuron.
A : electrolytes
B : collagens
C : neurotransmitters
D : glial cells

Correct Answer : C

37 : The _____ analogy is used to describe the relationship of neurotransmitters with receptor sites.
A : needle in a haystack

B : lock and key
C : stadium wave
D : rolling stone

Correct Answer : B

38 : _____ is the process by which inhibitory transmitters cause the inside of the neuron to become more negative.
A : Hyperpolarization
B : Depolarization
C : Antipolarization
D : Repolarization

Correct Answer : A

39 : The rate of firing of the postsynaptic neuron depends on the amount of _____ input it receives from the presynaptic neuron.
A : excitation
B : inhibition
C : equalization
D : both excitation and inhibition

Correct Answer : D

40 : _____ is necessary for the neural transmission and processing of information.
A : Only inhibition
B : Only excitation
C : Only equalization
D : Both inhibition and excitation

Correct Answer : D

41 : Rods and cones synapse with _____ cells, which then synapse with ____ cells.
A : ganglion; bipolar
B : bipolar; ganglion
C : amacrine; unipolar
D : amacrine; bipolar

Correct Answer : B

42 : Converging circuits with excitation and inhibition are associated most closely with which step of the perceptual process?
A : recognition
B : attention
C : neural processing
D : the environmental stimulus

Correct Answer : C

43 : If we compare how the rods and cones converge onto other retinal neurons, we find that _____.
A : foveal cones converge more than the peripheral rods
B : rods and cones converge equally

C : rods converge more than foveal cones
D : horizontal cells converge onto the peripheral cones

Correct Answer : C

44 : Convergence results in _____ sensitivity and _____ acuity.
A : increased; increased
B : increased; decreased
C : decreased; decreased
D : decreased; increased

Correct Answer : B

45 : Reading the eye chart in an optometrists office is used to measure _____.
A : acuity
B : sensitivity
C : receptive fields
D : creativity

Correct Answer : A

46 : Acuity is better in the _____ than in the _____.
A : periphery; fovea
B : optic disk; fovea
C : optic disk; cornea
D : fovea; periphery

Correct Answer : D

47 : The difficulty of reading under dim light conditions can be explained by _____.
A : the increased sensitivity of cones under low light conditions
B : the increased acuity of cones under low light conditions
C : the fact that rod functioning predominates during dark adaptation, resulting in poor acuity
D : the fact that cone functioning predominates during dark adaptation, resulting in poor acuity

Correct Answer : C

48 : The stimuli used in the preferential looking technique of testing infant acuity are _____.
A : geons
B : gratings
C : greebles
D : graftings

Correct Answer : B

49 : Acuity develops to almost 20/20 vision by the time the infant is _____.
A : one month old
B : two months old
C : one year old
D : two years old

Correct Answer : C

50 : Which of the following is a reason for the poor acuity of newborns?
A : The rods are not developed at birth.
B : Newborns have too much visual pigment in the cones.
C : A newborns rods have very narrow inner segments.
D : The visual cortex of the newborn is only partially developed.

Correct Answer : D

ESSAY

51 : Name and define three kinds of focusing problems.

Correct Answer : When you changed focus from far away to the nearby pencil point during this demonstration, you were changing your accommodation. Either near objects or far objects can be in focus, but not both at the same time. Accommodation, therefore, makes it possible to adjust vision for different distances. However, as people get older, their ability to accommodate decreases due to hardening of the lens and weakening of the ciliary muscles, and so they become unable to accommodate enough to see objects, or read, at close range. This loss of the ability to accommodate, called presbyopia (for “old eye”), can be dealt with by wearing reading glasses, which brings near objects into focus by replacing the focusing power that can no longer be provided by the lens. ? Another problem that can be solved by a corrective lens is myopia, or nearsightedness, an inability to see distant objects clearly. Myopia occurs when the optical system brings parallel rays of light into focus at a point in front of the retina, so the image that reaches the retina is blurred. This problem can be caused by either of two factors: (1) refractive myopia, in which the cornea and/ or the lens bends the light too much, or (2) axial myopia, in which the eyeball is too long. Either way, images of faraway objects are not focused sharply, so objects look blurred. Corrective lenses can solve this problem. ? Finally, people with hyperopia, or farsightedness, can see distant objects clearly but have trouble seeing nearby objects because the focus point for parallel rays of light is located behind the retina, usually because the eyeball is too short. Young people can bring the image forward onto the retina by accommodating. However, older people, who have difficulty accommodating, often use corrective lenses that bring the focus point forward onto the retina.

52 : (a) Discuss the major differences between the rods and the cones. (b) Describe two retinal disorders that differentially affect the rods and the cones.

Correct Answer : There are two types of visual receptors, rods and cones, so called because of the rod- and cone-shaped outer segments. The rod and cone receptors not only have different shapes; they are also distributed differently across the retina. One small area, the fovea, contains only cones. When we look directly at an object, the object’s image falls on the fovea. The peripheral retina, which includes all of the retina outside of the fovea, contains both rods and cones. It is important to note that although the fovea has only cones, there are also many cones in the peripheral retina. ? A condition called macular degeneration, which is most common in older people, destroys the cone-rich fovea and a small area that surrounds it. (Macula is a term usually associated with medical practice that includes the fovea plus a small area surrounding the fovea.) This creates a blind region in central vision, so when a person looks directly at something, he or she loses sight of it. ? Another condition, called retinitis pigmentosa, is a degeneration of the retina that is passed from one generation to the next (although not always affecting everyone in a family). This condition first attacks the peripheral rod receptors and results in poor vision in the peripheral visual field. The peripheral retina contains many more rods than cones because there are about 120 million rods and only 6

million cones in the retina.

53 : (a) What is the blind spot? (b) Discuss two reasons why we are not usually aware of the blind spot.

Correct Answer : There is one area in the retina where there are no receptors. This occurs where the nerve fibers that make up the optic nerve leave the eye. Because of the absence of receptors, this place is called the blind spot. One reason we are not usually aware of the blind spot is that the blind spot is located off to the side of our visual field, where objects are not in sharp focus. Because of this and because we don't know exactly where to look for it, the blind spot is hard to detect. But the most important reason that we don't see the blind spot is that some mechanism in the brain "fills in" the place where the image disappears.?

54 : (a) Draw a graph (with appropriate axis labels) of the dark adaptation curve. (b) Describe the methodology used to isolate the rod component of the curve, and the cone component.

Correct Answer : Refer to Figure 2.13 in the text, which shows three dark adaptation curves. The dark adaptation curve shows that as adaptation proceeds, the subject becomes more sensitive to the light. Note that higher sensitivity is at the bottom of this graph, so movement of the dark adaptation curve downward means that the subject's sensitivity is increasing. The red dark adaptation curve indicates that the subject's sensitivity increases in two phases. It increases rapidly for the first 3 to 4 minutes after the light is extinguished and then levels off. At about 7 to 10 minutes, it begins increasing again and continues to do so until the subject has been in the dark for about 20 or 30 minutes. The sensitivity at the end of dark adaptation, labeled dark-adapted sensitivity, is about 100,000 times greater than the light-adapted sensitivity measured before dark adaptation began. ? The figure shows three dark adaptation curves. The red line is the two-stage dark adaptation curve, with an initial cone branch and a later rod branch, which occurs when the test light is in the peripheral retina. The green line is the cone adaptation curve, which occurs when the test light falls on the fovea. The purple curve is the rod adaptation curve measured in a rod monochromat. Note that the downward movement of these curves represents an increase in sensitivity. The curves actually begin at the points indicating "light-adapted sensitivity," but there is a slight delay between the time the lights are turned off and when measurement of the curves begins. ? To measure dark adaptation of the cones alone, we have to ensure that the image of the test light falls only on cones. We achieve this by having the subject look directly at the test light so its image falls on the all-cone fovea, and by making the test light small enough so that its entire image falls within the fovea. ? In order to reveal how the sensitivity of the rods is changing at the very beginning of dark adaptation, we need to measure dark adaptation in a per- son who has no cones. Such people, who have no cones because of a rare genetic defect, are called rod monochromats. Their all-rod retinas provide a way for us to study rod dark adaptation without interference from the cones. Because the rod monochromat has no cones, the light-adapted sensitivity we measure just before we turn off the lights is determined by the rods.

55 : What are the basic properties of action potentials?

Correct Answer : An important property of the action potential is that it is a propagated response - once the response is triggered, it travels all the way down the axon without decreasing in size. ? Another property is that the action potential remains the same size no matter how intense the stimulus is. Changing the stimulus intensity does not affect the size of the action potentials but does affect the rate of firing. ? Although increasing the stimulus intensity can increase the rate of firing, there is an upper limit to the number of nerve impulses per second that can be conducted down an axon. This limit occurs because of a property of the axon called the refractory period - the interval between the time one nerve impulse occurs and the next one can

be generated in the axon. ? Action potentials that occur in the absence of stimuli from the environment are called spontaneous activity. This spontaneous activity establishes a baseline level of firing for the neuron.

56 : Describe the process of synaptic transmission. Include in this description the differences between excitatory and inhibitory transmitters.

Correct Answer : Early in the 1900s, it was discovered that when action potentials reach the end of a neuron, they trigger the release of chemicals called neurotransmitters that are stored in structures called synaptic vesicles in the sending neuron. The neurotransmitter molecules flow into the synapse to small areas on the receiving neuron called receptor sites that are sensitive to specific neurotransmitters. These receptor sites exist in a variety of shapes that match the shapes of particular neurotransmitter molecules. ? Thus, when an electrical signal reaches the synapse, it triggers a chemical process that causes a new electrical signal in the receiving neuron. The nature of this signal depends on both the type of transmitter that is released and the nature of the receptor sites in the receiving neuron. Two types of responses can occur at these receptor sites, excitatory and inhibitory. An excitatory response occurs when the inside of the neuron becomes more positive, a process called depolarization. An inhibitory response occurs when the inside of the neuron becomes more negative, a process called hyperpolarization. ? Hyperpolarization is an inhibitory response because it causes the charge inside the axon to move away from the level of depolarization, indicated by the dashed line, needed to generate an action potential.

57 : Using words and/or diagrams, describe circuits with (a) no convergence and (b) convergence.

Correct Answer : Convergence occurs when a number of neurons synapse onto a single neuron. A great deal of convergence occurs in the retina because each eye has 126 million receptors but only 1 million ganglion cells. An important difference between rods and cones is that the signals from the rods converge more than do the signals from the cones. This difference between rod and cone convergence becomes even greater when we consider the cones in the fovea. Many of these foveal cones have “private lines” to ganglion cells, so that each ganglion cell receives signals from only one cone, with no convergence. ? Many rods sum their responses by feeding into the same ganglion cell, but only one or a few cones send their responses to any one ganglion cell. The fact that rod and cone sensitivity is determined not by individual receptors but by groups of receptors converging onto other neurons means that when we describe “rod vision” and “cone vision”, we are actually referring to the way groups of rods and cones participate in determining our perceptions.

58 : (a) In words and/or diagrams, discuss why convergence of the rods results in increased sensitivity, but decreased acuity. (b) In words and/or diagrams, discuss why the lack of convergence in the foveal cones results in decreased sensitivity, but increased acuity.

Correct Answer : When we present two spots of light next to each other, the rod’s signals cause the ganglion cell to fire. When we separate the two spots, the two separated rods feed into the same ganglion cell and cause it to fire. In both cases, the ganglion cell fires. Thus, firing of the ganglion cell provides no information about whether there are two spots close together or two separated spots. ? When we present a light that stimulates two neighboring cones, two adjacent ganglion cells fire. But when we separate the spots, two more-distantly separated ganglion cells fire. This separation between two firing cells provides information that there are two separate spots of light. Thus, the cones’ lack of convergence causes cone vision to have higher acuity than rod vision. ? Convergence is therefore a double-edged sword. High convergence results in high sensitivity but poor acuity (the rods). Low convergence results in

low sensitivity but high acuity (cones). The way the rods and cones are wired up in the retina, therefore, influences what we perceive.

59 : Describe how preferential looking and visual evoked potentials technique have been used to study infant perception.

Correct Answer : In the preferential looking (PL) technique, two stimuli are presented, and the experimenter watches the infant's eyes to determine where the infant is looking. In order to guard against bias, the experimenter does not know which stimulus is being presented on the left or right. If the infant looks at one stimulus more than the other, the experimenter concludes that he or she can tell the difference between them. ? Visual evoked potential (VEP) is recorded by disc electrodes placed on the infant's head over the visual cortex. For this technique, researchers alternate a gray field with a grating or checkerboard pattern. If the stripes or checks are large enough to be detected by the visual system, the visual cortex generates an electrical response called the visual evoked potential. If, however, the stripes are too fine to be detected by the visual system, no response is generated. Thus, the VEP provides an objective measure of the visual system's ability to detect details.