PSYCHOLOGY ENTRANCE EXAMINATIONS

Useful for CUET-PG Psychology, GATE & Other M.A/ M.Sc Psychology Entrances

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Chapter 02 Sensation & Perception

Explanations

1. c) retinal disparity.
Explanation: Retinal disparity refers to the difference in the images projected onto the retinas of each eye due to their slightly different positions. When the brain combines these two images, it uses the disparity between them to perceive depth and distance. This phenomenon is a crucial component of depth perception and allows us to perceive the three-dimensional structure of the world around us. While retinal disparity is indeed a type of binocular cue and a depth cue, it specifically refers to the difference in the lateral separation of objects as perceived by each eye.

2. d) ossicles.
Explanation: Conduction deafness refers to hearing loss caused by problems in the outer or middle ear, which obstruct the transmission of sound waves to the inner ear. The ossicles, specifically the three small bones in the middle ear (the malleus, incus, and stapes), play a crucial role in conducting sound vibrations from the eardrum to the cochlea in the inner ear. When the ossicles become rigid, damaged, or impaired due to factors such as infection, trauma, or age-related changes, conduction deafness can occur. This condition results in difficulty in transmitting sound vibrations efficiently to the inner ear, leading to hearing loss.

3. c) rods and cones.
Explanation: In the retina, photoreceptor cells are responsible for converting light into neural signals. There are two types of photoreceptor cells: rods and cones. Rods are sensitive to low levels of light and are primarily responsible for vision in dim lighting conditions, whereas cones are responsible for color vision and visual acuity in bright light. Together, rods and cones allow for the detection of different aspects of visual stimuli, enabling us to perceive our surroundings accurately.

4. d) brightness constancy.
Explanation: Brightness constancy refers to the tendency of the human visual

system to perceive the brightness of an object as constant even when the illumination conditions change. This means that the perceived brightness of an object remains relatively stable despite changes in lighting, allowing a white object to still appear white and a gray object to still appear gray regardless of the lighting conditions.

5. c) sensation.
Explanation: Sensation refers to the process by which sensory receptors detect and respond to physical stimuli from the environment, such as light, sound, taste, touch, and smell. It involves the initial conversion of physical energy into neural signals that can be interpreted by the brain. Perception, on the other hand, refers to the process of organizing and interpreting sensory information to make sense of the world around us. Sensory overload occurs when there is an excessive amount of sensory input that overwhelms the brain's processing capacity. Sensory adaptation is the process by which sensory receptors become less responsive to constant or repeated stimulation over time.

6. (c) 10
Explanation:

$$\frac{\Delta I}{I} = k$$

Given:

- In a room with **20 lit candles**, we must add **2 candles** to perceive a just noticeable difference. So, when $I = 20$, $\Delta I = 2$.

First, we calculate the Weber fraction (k):

$$k = \frac{\Delta I}{I} = \frac{2}{20} = 0.1$$

Now, we need to find the number of candles to add (ΔI) when there are **100 candles** to achieve a just noticeable difference:

$$\Delta I = k \times I = 0.1 \times 100 = 10$$

7. b) absolute threshold.
Explanation: This term refers to the minimum intensity of a stimulus needed to detect it 50% of the time. It represents the boundary between not being able to perceive a stimulus

and being able to perceive it. This concept is fundamental in understanding sensory perception as it helps delineate the sensitivity of our senses. The absolute threshold can vary depending on factors like the individual's sensory abilities, the nature of the stimulus, and the background environment. Understanding the absolute threshold is crucial in various fields such as psychology, neuroscience, and marketing, as it influences how we perceive and respond to the world around us.

8. d) opponent-process cell.
Explanation: Opponent-process cells are neurons found in the visual system, particularly in the retina and thalamus, that respond to pairs of complementary colors, such as red/green or blue/yellow. These cells are responsible for encoding color information by being excited by the presence of one color in the pair and inhibited by the absence of that color. They play a crucial role in color vision and contribute to our perception of hue and color contrast. Opponent-process cells help explain phenomena like color afterimages and color constancy, where our perception of color is influenced by the interaction between different wavelengths of light.

9. (b) brightness
Explanation: "brightness" refers to the intensity or luminance of light, which is perceived independently of wavelength. It relates to how much light is emitted or reflected by a surface, rather than the specific wavelength of the light.

10. b) retina.
Explanation: The retina is the layer of tissue located at the back of the eye that contains the photoreceptor cells responsible for vision. These photoreceptor cells, known as rods and cones, detect light and convert it into electrical signals that are sent to the brain via the optic nerve for processing. The cornea is the transparent outer layer of the eye that helps to focus light, while the lens further focuses the light onto the retina. The optic nerve carries visual information from the retina to the brain.

11. d) place and frequency theories.
Explanation: The two major pitch discrimination theories are the place theory and the frequency theory.
Place theory suggests that different pitches are experienced because different sound frequencies activate different areas of the cochlea's basilar membrane. According to this theory, higher frequencies produce vibrations closer to the base of the cochlea, while lower frequencies stimulate regions closer to the apex.

Frequency theory proposes that pitch is determined by the frequency of neural impulses generated by the basilar membrane in response to sound waves. According to this theory, the pitch of a sound is directly related to the rate at which nerve impulses are generated in response to the sound's frequency.

12. b) relative motion.
Explanation: When your friend tosses you a Frisbee, you perceive it as getting closer due to relative motion. Relative motion refers to the perception that objects that appear to be moving are actually moving relative to the observer's position. As the Frisbee moves closer to you, its motion relative to the background or other objects in the scene allows you to perceive its approach. Shape constancy and size constancy, on the other hand, refer to the perception of an object's shape and size remaining constant despite changes in viewing angle or distance, respectively. However, these factors are not directly related to perceiving the Frisbee's motion.

13. b) kinesthesis
Explanation: Kinesthesis, also known as kinesthetic sense or proprioception, is the body's ability to sense its own position and movement in space. This sense provides feedback to the brain about the position of our limbs and the motion of our muscles, which allows us to perform tasks like touching our finger to our nose with our eyes shut. Receptors in our muscles, tendons, and joints send signals to the brain about limb position and movement. This internal sense of body position is crucial for coordinated movement and balance, helping us navigate and interact with our environment even without visual cues.

14. d) transduction.
Explanation: Transduction is the process by which sensory receptors convert physical energy from the environment into neural signals that can be interpreted by the brain. This process occurs when a stimulus (such as light, sound, or pressure) activates specialized receptor cells in the sensory organs, leading to the generation of neural impulses that travel along sensory pathways to the brain. Sensory adaptation (a) refers to a decrease in sensitivity to a constant stimulus over time. Coding (b) involves the process by which neural signals are organized and interpreted by the brain. Perception (c) is the process of organizing and interpreting sensory information to make sense of the world.

15. a) They are responsible for night vision.
Explanation: Rods are photoreceptor cells in the retina of the eye that are highly sensitive to low light levels, making them essential for night vision. Unlike cones, which are responsible

for color vision and are concentrated in the fovea, rods do not detect color and are more dispersed throughout the peripheral regions of the retina. This distribution allows for better sensitivity to dim light across a wider field of vision, albeit with less detail and no color detection. During the nighttime or in dim lighting conditions, rods become the primary active photoreceptors, enabling us to see in shades of gray. They function optimally in low light and are less effective in bright daylight, where cones take over for detailed and color vision.

16. c) linear perspective
Explanation: Linear perspective is a visual cue that artists use to convey depth and distance in a two-dimensional artwork, such as a painting or drawing. When parallel lines or edges recede into the distance, they appear to converge or meet at a single point on the horizon line known as the vanishing point. By painting the parallel rows of trees so that they converge at the top of the canvas, the artist creates the illusion of depth and distance, suggesting that the rows of trees extend into the distance. This technique helps to create a sense of depth and three-dimensionality in the artwork, enhancing the viewer's perception of distance within the scene.

17. c) organ of Corti.
Explanation: The organ of Corti is a structure within the cochlea of the inner ear that plays a crucial role in hearing. It contains thousands of tiny hair cells that are responsible for converting sound vibrations into neural signals that are sent to the brain for interpretation. Similar to the retina in vision, the organ of Corti acts as the sensory receptor for auditory stimuli, detecting sound waves and transmitting information about pitch, frequency, and intensity to the brain. The cochlea (a) is a spiral-shaped structure in the inner ear that contains the organ of Corti. The eardrum (b) is a thin membrane that vibrates in response to sound waves. The auditory nerve (d) carries neural signals from the inner ear to the brain for processing, but it is not directly involved in the transduction of sound waves into neural signals.

18. a) Gibson
Explanation: James J. Gibson was a psychologist who most vigorously promoted the idea that perception must be considered ecologically. He is known for his ecological approach to perception, which emphasizes the importance of understanding perception in the context of the environment in which it occurs. According to Gibson, perception is not just about processing sensory information but also about actively perceiving the environment and the relationship between an organism and its surroundings. His work focused on

how organisms perceive affordances, which are opportunities for action provided by the environment. Gibson's ecological approach has had a significant influence on various fields, including psychology, neuroscience, and design.

19. b) visual acuity
Explanation: Visual acuity refers to the ability of the eye to distinguish fine details and to perceive objects sharply and clearly. It is commonly measured by reading letters or symbols of decreasing size on an eye chart, such as the Snellen chart. Visual acuity is affected by various factors, including the health and shape of the eye, the condition of the cornea and lens, and the quality of the retinal image formed by the eye's optics. Visual acuity is an important aspect of vision and is typically assessed during routine eye examinations to evaluate the clarity of vision and detect any potential vision problems.

20. c) sensory adaptation
Explanation: Sensory adaptation refers to a decrease in sensory responsiveness to an unchanging stimulus over time. It is a phenomenon where our sensory receptors become less sensitive to constant stimulation.
For example, when you first enter a room with a strong odor, you may notice the smell distinctly, but after a while, you become less aware of it as your sense of smell adapts to the constant stimulus. Similarly, if you stare at a bright light for an extended period, the intensity of the light may seem to decrease as your eyes adapt to the brightness.
Sensory adaptation allows our sensory systems to remain sensitive to changes in the environment by filtering out constant or unimportant stimuli. This phenomenon helps us focus on new or changing sensory information while ignoring background stimuli that remain constant.

21. b) features
Explanation: In the context of visual perception, the most primitive, low-level elements of a visual stimulus are its features. Features refer to basic visual characteristics such as lines, shapes, colors, textures, and orientations. These features are extracted from the incoming visual information by specialized cells in the visual system, such as neurons in the primary visual cortex. Features serve as building blocks for more complex visual processing. For example, lines and edges are basic features that combine to form shapes, and shapes combine to form objects. By analyzing the features present in a visual stimulus, the visual system can identify and interpret objects in the environment.

22. d) rod

Explanation: Rods are the photoreceptor cells in the retina of the eye that are most sensitive to dim light and are responsible for vision in low-light conditions, such as at night or in dimly lit environments. Rods contain a pigment called rhodopsin, which allows them to detect even small amounts of light. However, rods are not involved in color vision and do not function well in bright light conditions.
Cones, on the other hand (option b), are photoreceptor cells that are responsible for color vision and function best in bright light conditions. The fovea (option a) is a small, central pit in the retina that contains a high density of cones and is responsible for sharp central vision and color perception. Bipolar cells (option c) are interneurons that transmit signals from photoreceptor cells to ganglion cells in the retina and are not directly involved in light detection.

23. d) Hermann von Helmholtz.
Explanation: Hermann von Helmholtz proposed the unconscious inference theory in the mid-19th century. According to this theory, perception is the result of unconscious assumptions or inferences that the brain makes about sensory information based on past experiences and knowledge. These unconscious inferences help the brain make sense of ambiguous or incomplete sensory input, allowing us to perceive the world around us more efficiently.

24. a) acts as a gate controller for pain.
Explanation: The periaqueductal gray (PAG) is a region of gray matter located in the midbrain surrounding the cerebral aqueduct. It plays a crucial role in pain modulation and control. PAG acts as a gate controller for pain. It can inhibit or facilitate the transmission of pain signals from the spinal cord to higher brain regions, effectively gating the perception of pain. When the PAG is activated, it can inhibit the transmission of pain signals, reducing the perception of pain. Conversely, when the PAG is inhibited, it can allow pain signals to pass more freely, leading to an increase in pain perception.

25. b) bones in the middle ear
Explanation: The hammer, anvil, and stirrup are three small bones (ossicles) located in the middle ear. Hammer (malleus)Anvil (incus)Stirrup (stapes)These bones are among the smallest bones in the human body and are arranged in series within the middle ear cavity. They play a crucial role in the process of hearing by transmitting sound vibrations from the outer ear to the inner ear. Specifically, when sound waves strike the eardrum (tympanic membrane), the vibrations are transferred to the ossicles, which amplify and transmit the vibrations to the oval window of the cochlea, initiating the process of hearing.

26. d) cause all of the above.
Explanation: Research has shown that prolonged sensory deprivation can have various psychological effects, including those listed in the options:
a) Lead to confusion and grouchiness: Sensory deprivation can lead to cognitive disturbances such as confusion due to the lack of external sensory input. Additionally, the monotony and lack of stimulation can contribute to irritability or grouchiness.
b) Produce a restless, disoriented feeling: Sensory deprivation can induce feelings of restlessness and disorientation. Without external cues to orient oneself in time and space, individuals may experience a sense of confusion and agitation.
c) Cause hallucinations: In the absence of external sensory input, the brain may generate its own stimuli, leading to hallucinations. These hallucinations can involve perceptions of sights, sounds, or other sensory experiences that are not actually present in the environment.

27. a) rods and cones
Explanation: Receptors for light in the eye are specialized cells located in the retina, which is the light-sensitive tissue lining the back of the eye. The two main types of photoreceptor cells in the retina are rods and cones. Rods: Rods are highly sensitive to dim light and are responsible for vision in low-light conditions, such as at night. They do not perceive color but are crucial for peripheral and nighttime vision. Cones: Cones are responsible for color vision and visual acuity (sharpness of vision). They function best in bright light conditions and are concentrated mainly in the central part of the retina called the fovea. Cones allow us to perceive colors and details in our environment.

28. d) color constancy
Explanation: Color constancy is the phenomenon by which the perceived color of an object remains relatively constant under varying illumination conditions. This means that even though the amount and type of light hitting an object may change, we tend to perceive the color of the object as stable. In the case of a rose appearing equally red in both bright and dim light, color constancy allows us to perceive the color of the rose as red regardless of the intensity of the light illuminating it. This is because our visual system automatically adjusts for changes in illumination to maintain a consistent perception of color.

29. c) humans adapt readily, while lower animals typically do not.
Explanation: Experiments with distorted visual environments, such as wearing glasses that invert the visual field, have demonstrated that humans have a remarkable ability to adapt to changes in their visual perception. Over time, individuals exposed to such environments

can adjust their perceptual experiences to accommodate the distortions, allowing them to function effectively in the altered visual environment. While humans have been shown to adapt readily to distorted visual environments, lower animals, such as non-human primates or rodents, typically do not exhibit the same level of adaptability. This difference in adaptability between humans and lower animals suggests that humans possess unique cognitive and perceptual mechanisms that allow for flexible adaptation to changes in the environment.

30. c) sense receptors
Explanation: Sense receptors are specialized cells or structures located within the sensory organs (such as the eyes, ears, tongue, nose, skin, and internal body tissues) that are responsible for detecting sensory information from the environment or from within the body. These receptors convert various forms of physical or chemical stimuli into neural signals that can be transmitted to the brain for processing and interpretation.

31. b) a binocular depth cue in which we unconsciously rotate the eyes inward as we focus on an object.
Explanation: Eye convergence is a binocular depth cue that involves the inward rotation of the eyes to maintain fixation on a near object. When an object is closer to us, our eyes converge more to maintain single binocular vision. This convergence provides the brain with information about the depth and distance of objects in the visual field. While convergence helps us perceive depth accurately, it is not the only binocular depth cue. Other cues, such as retinal disparity and binocular disparity, also contribute to depth perception.

32. b) frequency of a pressure wave.
Explanation: Pitch is the perceptual attribute of sound that is closely related to the frequency of the sound wave. Frequency refers to the number of cycles of a sound wave that occur in a given unit of time (usually measured in Hertz, Hz). Higher frequencies correspond to higher pitches, while lower frequencies correspond to lower pitches. For example, a high-pitched sound, such as that produced by a whistle, has a higher frequency, while a low-pitched sound, such as that produced by a bass guitar, has a lower frequency.

33. b) To transform energy from the environment into neural impulses.
Explanation: Sensory receptor cells are specialized cells that convert various forms of energy from the environment into neural signals that can be interpreted by the brain. These cells play a crucial role in the process of sensation by detecting stimuli such as light, sound,

pressure, temperature, and chemicals. Once the sensory receptor cells detect a stimulus, they convert it into neural impulses or action potentials, which are then transmitted to the brain for further processing and interpretation. Therefore, the primary function of sensory receptor cells is to transform energy from the environment into neural impulses, allowing organisms to perceive and respond to their surroundings.

34. c) The ratio of the difference threshold to the reference stimulus.
Explanation: Weber's law states that the just noticeable difference (JND), or the smallest detectable difference between two stimuli, is proportional to the magnitude of the stimuli. The Weber fraction, or Weber's constant, represents the proportion of the difference threshold to the intensity of the reference stimulus. In other words, it quantifies the relationship between the change in stimulus intensity and the original intensity. This constant varies depending on the type of sensory stimulus being measured.

35. b) The light can be detected 50% of the time at 5 units of brightness.
Explanation: The absolute threshold is the minimum amount of stimulus energy needed for an observer to detect a stimulus. In this scenario, an absolute threshold of 5 units of brightness indicates that the dim light can be detected 50% of the time when its brightness reaches 5 units. This suggests that half of the time the light is presented at this level, it will be perceived by an observer. It doesn't mean that the light must always be exactly 5 units bright for detection, but rather that it's the level at which it can be detected with a certain probability.

36. b) Internal factors and the observer's response bias.
Explanation: According to the signal detection theory, an observer's response to a stimulus is affected not only by the intensity of the stimulus but also by internal factors such as the observer's response bias. Response bias refers to the tendency of an observer to favor responding in a particular way based on individual characteristics or prior experiences. These internal factors influence how an observer interprets and responds to stimuli, affecting their decision-making process and the likelihood of detecting a stimulus correctly.

37. c) They define the minimum stimulus intensity for detection.
Explanation: Sensory thresholds establish the minimum level of stimulus intensity required for an individual to detect and perceive sensory information. These thresholds vary depending on the sensory modality and the specific characteristics of the stimulus. By defining the minimum threshold, sensory systems enable organisms to respond to relevant environmental stimuli and engage in perception and behavior accordingly.

38. c) Weber's constant.
Explanation: Weber's constant is a principle within Weber's law, which states that the just-noticeable difference (JND) between two stimuli is proportional to the magnitude of the stimuli and is a constant ratio. It doesn't directly influence sensory thresholds but rather describes the relationship between the magnitude of a stimulus and the perception of change in that stimulus. Factors such as the number of sensations competing for attention, the subject's motivation, and potential rewards and punishments can influence sensory thresholds by affecting an individual's sensitivity to stimuli and their willingness to detect and respond to them.

39. c) Vision; it is the primary way we gather information about the world.
Explanation: Vision is the primary sensory system in humans because it provides us with the most extensive and detailed information about our environment. Through vision, we perceive shapes, colors, distances, and movements, allowing us to navigate the world, recognize objects, and interact with our surroundings effectively. Vision plays a crucial role in psychology because much of our cognitive processes, including perception, attention, memory, and learning, are heavily influenced by visual stimuli. Additionally, many psychological experiments and theories rely on visual tasks and stimuli to investigate various aspects of human behavior and cognition.

40. a) Wavelength
Explanation: Wavelength corresponds to the hue or color of light. Hue refers to the dominant wavelength of light, which determines its perceived color. Different wavelengths of light correspond to different colors in the visible spectrum. For example, shorter wavelengths are associated with blue and violet colors, while longer wavelengths are associated with red and orange colors. Therefore, wavelength is the property of light that primarily determines its hue or color.

41. a) Rods
Explanation: Rods are the primary photoreceptor cells in the retina responsible for night vision. They are highly sensitive to light and function effectively at low illuminations, making them crucial for vision in dimly lit environments, such as at night. Rods contain a pigment called rhodopsin, which enables them to detect even small amounts of light. Unlike cones, which are responsible for color vision and function best in bright light conditions, rods are not sensitive to color and provide black-and-white vision under low-light conditions. Additionally, rods are more abundant in the peripheral regions of the retina, allowing for better sensitivity to dim light in the peripheral visual field.

42. b) Red, blue, and green
Explanation: According to the trichromatic theory of color vision, the human eye is sensitive to three primary colors: red, blue, and green. This theory suggests that the retina contains three types of cone photoreceptors, each sensitive to a different range of wavelengths of light. Red cones are most sensitive to long wavelengths of light, corresponding to the color red. Green cones are most sensitive to medium wavelengths of light, corresponding to the color green. Blue cones are most sensitive to short wavelengths of light, corresponding to the color blue. By combining the signals from these three types of cones, the visual system is able to perceive a wide range of colors. Other colors are perceived through the stimulation of these three types of cones in various combinations and proportions.

43. b) Opponent-process theory
Explanation: The opponent-process theory of color vision best explains the occurrence of afterimages and the phenomenon of color blindness. This theory proposes that color vision is based on the existence of three pairs of opponent colors: red-green, blue-yellow, and black-white. According to the opponent-process theory, each pair of opponent colors works in opposition to each other. For example, if you stare at a red object for an extended period and then look at a white surface, you may experience a green afterimage. This occurs because the red-sensitive cones in your retina become fatigued, and when you shift your gaze to a white surface, the green-sensitive cones are relatively more active, leading to the perception of a green afterimage.

44. b) Trichromats
Explanation: Trichromats are individuals with normal color vision who possess three types of cones in their retinas, each sensitive to different wavelengths of light. These cones are responsible for perceiving a wide spectrum of colors. Trichromats can differentiate between various hues, including red, green, blue, and their combinations, due to the presence of three functional cone types. This ability to perceive a full range of colors is essential for tasks such as distinguishing between objects, identifying signals, and appreciating the richness of the visual world. Trichromacy is the most common form of color vision among humans, allowing individuals to experience the diverse and vibrant array of colors present in their environment.

45. a) Activation of retinal cones
Explanation: In the composite theory of color vision, the first stage in the process of experiencing color is the activation of retinal cones. This theory combines elements of both the trichromatic theory and the opponent-process theory. According to this theory, color

vision involves three types of cones in the retina, each sensitive to different wavelengths of light (red, green, and blue), similar to the trichromatic theory. However, it also proposes that color vision involves opponent processes at the level of retinal ganglion cells and beyond, similar to the opponent-process theory.

46. c) Three types
Explanation: According to the Young-Helmholtz trichromatic theory of color vision, there are three types of cones in the retina. These cones are sensitive to different wavelengths of light, allowing humans to perceive a wide range of colors. The three types of cones are typically referred to as: Red-sensitive cones: These cones are most sensitive to long wavelengths of light, corresponding to the color red. Green-sensitive cones: These cones are most sensitive to medium wavelengths of light, corresponding to the color green. Blue-sensitive cones: These cones are most sensitive to short wavelengths of light, corresponding to the color blue.

47. c) Afterimage
Explanation: An afterimage is a visual sensation that persists after the original stimulus has been removed. It occurs when the visual system continues to respond to a stimulus even after it is no longer present. Afterimages can manifest in various forms, such as seeing complementary colors or ghostly outlines of the original stimulus. In the scenario described, staring at a red object for a prolonged period may result in a green afterimage when the eyes are subsequently directed to a neutral surface. This occurs due to the temporary adaptation or fatigue of the cone cells in the retina that are sensitive to red light. When the eyes shift focus, the cones that are sensitive to green light become relatively more active, leading to the perception of a green afterimage.

48. (c) Composite theory
Explanation: Composite theory is another term used to describe the combination of trichromatic theory and opponent-process theory in explaining color vision. This theory acknowledges the role of both the trichromatic nature of color receptors in the retina, as proposed by trichromatic theory, and the opponent processes in the visual system, as proposed by opponent-process theory. It suggests that both mechanisms work together to provide a comprehensive explanation for how humans experience color. Therefore, while trichromatic theory and opponent-process theory are important individually, composite theory integrates aspects of both to provide a more complete understanding of color vision.

49. a) Cycles per second
Explanation: The frequency of sound waves refers to how many cycles of compression and rarefaction occur per unit of time. It is commonly expressed in Hertz (Hz), which represents cycles per second. For instance, if a sound wave has a frequency of 1000 Hz, it means that the air particles vibrate or oscillate back and forth 1000 times per second as the sound wave travels through the medium. Expressing frequency in cycles per second provides a straightforward way to quantify the pitch or tone of a sound. Higher frequencies correspond to higher-pitched sounds, while lower frequencies correspond to lower-pitched sounds. This measurement is essential for various applications, including music, speech recognition, and audio engineering.

50. c) The inner ear
Explanation: The inner ear is responsible for transducing sound vibrations into neural impulses. This process occurs primarily in the cochlea, a spiral-shaped, fluid-filled structure within the inner ear.
When sound waves enter the ear, they travel through the ear canal and cause the eardrum to vibrate. These vibrations are then transmitted through the middle ear bones (hammer, anvil, and stirrup) to the oval window, a membrane-covered opening in the cochlea. Within the cochlea, specialized sensory cells called hair cells are stimulated by the movement of fluid in response to sound vibrations. These hair cells convert mechanical energy from the fluid into electrical signals, which are then transmitted to the auditory nerve.

51. b) Pain-relieving chemicals released in the brain.
Explanation: Endorphins are neurotransmitters, which are chemicals that transmit signals in the brain. They are often referred to as “feel-good” chemicals because they are associated with feelings of pleasure and well-being. Endorphins are released by the brain in response to various stimuli, including pain, stress, and exercise. One of the primary functions of endorphins is to act as natural painkillers. When released in response to pain, endorphins bind to specialized receptors in the brain and spinal cord called opioid receptors. By binding to these receptors, endorphins block the transmission of pain signals and inhibit the perception of pain. This mechanism effectively relieves pain and produces feelings of euphoria and relaxation.

52. a) Hypnosis
Explanation: Hypnosis is a method used to control pain that may be mediated by endorphins. Endorphins are neurotransmitters that act as natural painkillers in the body. During hypnosis, individuals enter a relaxed state of focused attention, during which

suggestions for pain relief can be made. It is believed that hypnosis may stimulate the release of endorphins in the brain, which can then help alleviate pain.

53. (b) Distortion of light
Explanation: The Ames room illusion does involve a manipulation of how light is perceived by the viewer. The distorted geometry of the room creates visual cues that alter the way light interacts with objects within the space. As a result, the lighting conditions within the room contribute to the illusion of depth and size distortion observed by the viewer. While the primary cause of the illusion is the geometric misalignment of the room, the distortion of light as it interacts with the manipulated space is a crucial aspect of how the illusion is perceived.

54. c) Perceptual set
Explanation: Perceptual set refers to the tendency for our expectations, beliefs, experiences, and motivations to influence how we perceive sensory stimuli. It can greatly affect our interpretation of incoming sensory information, leading us to perceive stimuli in line with our expectations or preconceived notions. Perceptual set describes the phenomenon where what we expect to see greatly affects our perception of sensory stimuli. When we have a perceptual set, we are predisposed to interpret stimuli in a particular way based on factors such as past experiences, cultural influences, and situational context.

55. c) (A) is true, but (R) is false.
Explanation: Assertion (A): Taste is one of the primary characteristics that influence the flavor of food. - This is true. Taste, along with smell, texture, and temperature, are all essential components of flavor perception. Taste receptors on the tongue detect basic tastes like sweet, sour, salty, bitter, and umami, which significantly contribute to the overall flavor of food.

Reason (R): A steak has a pleasant flavor primarily due to its texture. - This is false. While texture can play a role in flavor appreciation, the taste of the steak itself (savory, meaty) is a key element. The Maillard reaction, which occurs during cooking, creates additional flavors through browning and caramelization, but these also contribute to the taste component.

56. d) Early astigmatism has a permanent effect on perception.
Explanation: Studies involving individuals with astigmatism early in life suggest that early visual experiences can have a permanent effect on perception. Astigmatism is a refractive error of the eye that results in distorted or blurred vision due to irregularities in

the curvature of the cornea or lens. When astigmatism occurs during critical periods of visual development, such as infancy and early childhood, it can lead to abnormal visual experiences that may have long-lasting effects on perception. During critical periods, the visual system undergoes significant development and refinement, and experiences during this time can shape the neural circuits responsible for processing visual information.

57. d) The sensation of hot is caused by the simultaneous stimulation of both warm and cold receptors.
Explanation: The classic laboratory experiment with two pipes, one with warm water and the other with cold water, braided together revealed that the sensation of hot water is caused by the simultaneous stimulation of both warm and cold receptors. When the warm and cold pipes are braided together and placed on the skin, the sensation experienced by the participant is not simply warm or cold but rather a perception of hotness. This occurs because both warm and cold receptors in the skin are activated simultaneously. The warm water stimulates the warm receptors, signaling warmth, while the cold water simultaneously stimulates the cold receptors, signaling coldness. The brain interprets the simultaneous activation of both types of receptors as a sensation of hotness.

58. d) To describe a complex process in which a neuronal gate in the spinal cord controls the perception of pain.
Explanation: The primary function of the pain-gating theory in understanding the perception of pain is to describe a complex process in which a neuronal gate in the spinal cord controls the transmission of pain signals to the brain.
According to the pain-gating theory, the perception of pain is not solely determined by the amount of tissue damage but is also influenced by neural mechanisms that modulate pain signals. The theory proposes that there is a neural “gate” in the spinal cord that can open or close to regulate the transmission of pain signals to the brain. When the gate is open, pain signals are transmitted more freely, leading to increased pain perception. Conversely, when the gate is closed, pain signals are inhibited, resulting in reduced pain perception.

59. b) Stimulating the injured portion of the body
Explanation: According to the pain-gating theory, stimulating axons in the skin, especially those related to non-painful sensory input, can help close the pain gate and block painful stimuli from getting through. This phenomenon is known as “gate control” and plays a crucial role in modulating pain perception. When non-painful sensory input, such as touch or massage, is applied to the injured portion of the body, it activates large-diameter nerve fibers (A-beta fibers) that carry non-painful sensory information to the spinal cord. These

A-beta fibers synapse with inhibitory interneurons in the spinal cord, which then inhibit the transmission of pain signals carried by small-diameter nerve fibers (A-delta and C fibers) to the brain. As a result, the perception of pain is reduced or blocked.

60. b) Perceptual set is influenced by our expectations, while perceptual context is influenced by the appearance of ambiguous figures.
Explanation: Perceptual set and perceptual context both play important roles in influencing our perception:
Perceptual set: Perceptual set refers to a predisposition or readiness to perceive stimuli in a particular way based on our expectations, beliefs, past experiences, and motivations. It is influenced by our expectations and can shape how we interpret incoming sensory information. For example, if we expect to see a certain object or pattern in a visual scene, we may be more likely to perceive it even if it is not actually present.
Perceptual context: Perceptual context refers to the influence of surrounding stimuli or context on the perception of a focal stimulus. It is influenced by the appearance of ambiguous figures or the overall context in which stimuli are presented. For example, the interpretation of an ambiguous figure, such as the Rubin's vase-face illusion, can be influenced by the context in which it is presented or by surrounding stimuli.

61. a) The Canadian Cree Indians had better acuity for vertical and horizontal lines due to their environmental differences.
Explanation: The clue lies in the mention of the Canadian Cree Indians' environment. This suggests the researchers were investigating the potential influence of visual experience on visual acuity. Vertical and horizontal lines are prominent features in natural environments, especially for cultures that live in open spaces with trees and horizons. This finding supports the idea of experience-dependent plasticity in the visual system. Our brains are constantly adapting to the environment we live in.

62. a) Both (A) and (R) are true and (R) is the correct explanation of (A).
Explanation: Assertion (A) states that sensory receptors in the skin can produce sensations like itching, vibration, and tickling. This statement is true. Sensory receptors in the skin, including various types of mechanoreceptors and specialized receptors for temperature and pain, can indeed produce a wide range of sensations in response to different stimuli.

Reason (R) states that most researchers believe that the skin contains many types of receptors, and the type of sensation depends on the pattern produced by the stimulation of different receptors. This statement is also true and provides a correct explanation for

Assertion (A). The skin contains various types of sensory receptors, each specialized for detecting specific types of stimuli, such as pressure, temperature, pain, or vibration. The specific pattern of stimulation of these receptors determines the type of sensation experienced by an individual.

63. c) just noticeable difference
Explanation: The just noticeable difference (JND), also known as the difference threshold or differential threshold, refers to the smallest amount of change in a stimulus that can be detected by an observer. It represents the minimum difference in stimulation required for a person to perceive a change in sensation. It is the threshold at which a stimulus is perceived to have changed "just noticeably" from its previous level.

64. b) Brightness
Explanation: In terms of light, the psychological property that corresponds to amplitude is brightness.
Amplitude refers to the intensity or magnitude of a light wave. A higher amplitude corresponds to a greater intensity of light, while a lower amplitude corresponds to a lower intensity of light. Brightness is the perception of the intensity of light by the human visual system. It is influenced by the amplitude of the light waves reaching the eye. Higher amplitudes are perceived as brighter, while lower amplitudes are perceived as dimmer.

65. d) The purity or homogeneity of light
Explanation: In the context of light, the term "saturation" refers to the purity or homogeneity of light.
Saturation describes the intensity or vividness of a color in relation to its purest form. A fully saturated color appears vivid and intense, while a desaturated color appears more muted or washed out. Highly saturated colors contain very little white light or gray, while less saturated colors contain more white light or gray, making them appear less vivid. Saturation is one of the three components of color perception, along with hue (the specific color) and brightness (the intensity of light). It is related to the amount of white light mixed with a pure hue.

66. c) 380 to 760 nanometres
Explanation: The range of wavelengths that the human eye can perceive as different hues or colors is approximately 380 to 760 nanometres. This range covers the visible spectrum of electromagnetic radiation, which corresponds to the colors of the rainbow. At the shorter end of the spectrum, around 380 nanometres, we perceive violet or blue-violet hues. As

the wavelength increases, we perceive a range of colors including blue, green, yellow, orange, and red. Beyond the visible spectrum, wavelengths shorter than 380 nanometres are ultraviolet and are not visible to the human eye, while wavelengths longer than 760 nanometres are infrared and are also not visible.

67. b) Frequency, amplitude, and complexity
Explanation: Similar to light waves, sound waves have three important characteristics:
Frequency: Frequency refers to the number of cycles or vibrations per unit of time and is measured in hertz (Hz). In sound waves, frequency corresponds to pitch, with higher frequencies associated with higher-pitched sounds and lower frequencies associated with lower-pitched sounds.

Amplitude: Amplitude refers to the magnitude or intensity of a sound wave and is related to the loudness or volume of the sound. It represents the height of the wave and is measured in decibels (dB). Greater amplitude corresponds to louder sounds, while smaller amplitude corresponds to softer sounds.
Complexity: Complexity refers to the presence of multiple frequencies or harmonics within a sound wave. It determines the quality or timbre of the sound, which allows us to distinguish between different types of sound sources or musical instruments.

68. c) 20 to 20,000 Hz
Explanation: The range of frequencies that humans can hear, known as the audible range, is typically considered to be from 20 to 20,000 hertz (Hz). Frequencies below 20 Hz are known as infrasound and are typically felt rather than heard. Frequencies above 20,000 Hz are known as ultrasound and are also not audible to most humans, although some individuals, particularly younger individuals, may be able to perceive slightly higher frequencies.

69. d) Pinna
Explanation: The pinna, also known as the auricle, is the visible part of the outer ear. It is responsible for funneling sound waves into the ear canal. The pinna helps to collect sound waves from the surrounding environment and directs them into the external auditory canal. Its unique shape and structure help to localize and amplify sounds, particularly those coming from in front of the listener. Once sound waves are collected by the pinna and funneled into the ear canal, they travel toward the tympanic membrane (eardrum), initiating the process of auditory transduction.

70. d) By simultaneous stimulation of different skin receptors.

Explanation: Tickling is a complex sensation that involves the simultaneous stimulation of different types of skin receptors, including:
Meissner's corpuscles: These are sensitive to light touch and are particularly concentrated in areas such as the fingertips, palms, and soles of the feet.
Free nerve endings: These are sensory receptors that respond to pressure and touch and are distributed throughout the skin.
Ruffini corpuscles: These are stretch receptors that respond to deep pressure and skin stretching.
Hair follicle receptors: These respond to movements of hair, such as light brushing or air movement.

71. d) They respond to touch.
Explanation: Pacinian corpuscles, also known as lamellar corpuscles, are a type of mechanoreceptor found in the skin and other tissues of the body. Their primary function is to detect mechanical pressure and vibration. Pacinian corpuscles are sensitive to changes in pressure and are particularly responsive to rapid vibrations or changes in pressure. They consist of a specialized structure of layers of connective tissue and nerve endings encapsulated within a membrane. When pressure is applied to the skin, the layers of the corpuscle deform, causing changes in the electrical potential of the nerve endings, which then transmit signals to the brain.

72. d) By attaching to tiny pores in the tongue's surface.
Explanation: The tongue's surface has numerous small bumps called papillae. Within these papillae lie taste buds, which house taste receptor cells. These receptor cells have tiny pores on their surface. When we eat or drink, food and beverage molecules come into contact with the tongue. The key step is that taste molecules can fit into specific binding sites on the taste receptor cell pores. This binding triggers a signal transduction process within the taste cell. The cell releases neurotransmitters, which travel through nerves to the brain. The brain interprets these signals as the different tastes we experience (sweet, sour, salty, bitter, and umami).

73. d) They affect the psychological perception of pain.
Explanation: Both acupuncture and placebos are believed to influence the psychological perception of pain rather than directly affecting physiological processes like blocking pain receptors, interfering with pain signals to the brain, or stimulating endorphins. Acupuncture involves the insertion of needles into specific points on the body, which may trigger physiological responses such as the release of endorphins or activation of neural

pathways involved in pain modulation. However, the psychological aspect, including the patient's belief in the treatment's efficacy and the relaxation induced during the procedure, plays a significant role in pain relief. Placebos, despite having no active pharmacological ingredients, can lead to pain relief through the placebo effect. The patient's belief in the treatment's effectiveness, coupled with the context of receiving care, can activate endogenous pain modulation systems and influence the perception of pain.

74. d) Pain
Explanation: The sensory system of pain is considered the most puzzling and not yet fully understood in terms of its receptors and mechanisms. Pain perception involves a complex interplay between various types of receptors (nociceptors) and neural pathways.

75. c) To impose logic and order on sensations
Explanation: Perception refers to the process of organizing, interpreting, and making sense of sensory information received from the environment. While sensation involves the detection of physical stimuli by sensory receptors and the transmission of this information to the brain, perception goes beyond mere detection. Its primary function is to impose logic and order on sensations by integrating, interpreting, and giving meaning to sensory input.

76. d) Sensation involves detecting light and dark, while perception involves detecting colors.
Explanation: Sensation refers to the process of detecting external stimuli (such as light), which is primarily about detecting basic sensory information like light intensity (light and dark).
Perception is the interpretation of those sensory signals, allowing the brain to recognize and differentiate more complex elements such as colors, shapes, and objects.

77. a) Gustav Fechner
Explanation: Gustav Fechner, a German philosopher and physicist, is credited with introducing the concept of the absolute threshold in the early 19th century. He is known for his work in psychophysics, the study of the relationship between physical stimuli and the sensations and perceptions they evoke. Fechner's pioneering research laid the groundwork for understanding the quantitative relationship between physical stimuli and psychological experiences, including the determination of the absolute threshold, which refers to the minimum intensity of a stimulus required to detect it reliably.

78. c) Subjects were instructed to detect a dim dot of light that became progressively brighter.

Explanation: In Gustav Fechner's experiment to determine the absolute threshold for light, subjects were typically presented with a dim dot of light and instructed to detect it as it became progressively brighter. This method, known as the method of limits, involved gradually increasing the intensity of the light stimulus until the participant was able to perceive it reliably. By identifying the point at which the light stimulus transitions from being undetectable to detectable, researchers could determine the absolute threshold for light perception.

79. c) The potential rewards and costs associated with a response
Explanation: According to the signal detection theory, an observer's response bias is influenced by the potential rewards and costs associated with a response. Response bias refers to the tendency of an observer to favor one response over another when detecting the presence of a stimulus. This bias can result from factors such as the observer's motivations, expectations, and the consequences of making different types of responses.

80. d) A correct decision not to respond when a signal is absent
Explanation: In signal detection theory, "correct rejection" refers to the accurate identification by an observer that there is no presence of a signal or stimulus. It means correctly deciding not to respond when there is no meaningful stimulus to detect. This is crucial because it reflects the observer's ability to distinguish between signal and noise, thereby minimizing false alarms or false positive responses. For example, in a noise detection task, if an observer correctly identifies the absence of a faint sound in a quiet environment and refrains from pressing a button to indicate detection, it is considered a correct rejection. This demonstrates the observer's ability to maintain vigilance and discriminate between signal and background noise accurately.

81. c) The JND increases as the reference stimulus grows larger.
Explanation: Weber's law states that the just noticeable difference (JND), which is the minimum difference between two stimuli required for an observer to detect that they are different, is proportional to the magnitude of the reference stimulus. In other words, as the magnitude of the reference stimulus increases, the JND also increases. This implies that larger differences are needed to perceive changes in larger or more intense stimuli compared to smaller or less intense ones. For example, if you have a reference weight of 10 grams and you can detect a difference of 1 gram (JND), according to Weber's law, if the reference weight increases to 100 grams, you would need a larger difference, say 10 grams, to notice a change.

82. c) Edwin Boring
Explanation: Edwin Boring, an early psychologist, recognized the picture illustrating perceptual set as an example of this phenomenon. Perceptual set refers to a predisposition or readiness to perceive certain aspects of sensory information and ignore others, based on past experiences, expectations, or context. Boring contributed significantly to the understanding of perception and its various phenomena.

83. d) Eyewitness identification reliability
Explanation: The application of the role of expectancy in perception is particularly relevant in understanding eyewitness identification reliability. Expectancy or prior beliefs can significantly influence how individuals perceive and interpret events, including the appearance of people and objects. In eyewitness identification, individuals may be influenced by their expectations or biases, leading to inaccuracies in identifying perpetrators or recalling details of an event. Research has shown that eyewitnesses may be susceptible to suggestion or leading questions, which can create false memories or distort their recollection of events.

84. b) perception
Explanation: Perception is the process by which sensory information is organized, interpreted, and consciously experienced by an individual. While sensation involves the detection of sensory stimuli by sensory receptors and the transmission of this information to the brain, perception goes beyond mere detection to include the interpretation and understanding of sensory input. During perception, the brain integrates and processes sensory information from various sensory modalities, such as vision, hearing, touch, taste, and smell, to form meaningful perceptions of the external world. This process involves cognitive processes, past experiences, expectations, and context, all of which contribute to shaping our perception of the world around us.

85. d) timbre
Explanation: Timbre refers to the sound quality or tone color of a sound, which is influenced by various factors such as the frequency, amplitude, and timing of the sound wave. While pitch refers to the perceived frequency of a sound wave (how high or low a tone sounds), timbre encompasses additional characteristics that distinguish one sound from another. For example, two musical instruments playing the same note at the same pitch and volume may still sound different due to differences in timbre. Timbre allows us to perceive the unique characteristics of different sounds, such as the difference between a piano and a violin playing the same note.

86. b) Pheromones
Explanation: Pheromones are chemical messages that are frequently exchanged between two members of a species to convey information about their reproductive status, territory, social status, or other aspects of behavior. These chemical signals play a significant role in communication and social behavior among animals, including mating rituals, territorial marking, and recognition of kin. Hormones, on the other hand, are chemical substances produced by glands in the body and released into the bloodstream to regulate various physiological processes, such as growth, metabolism, and reproduction.

87. b) good continuation
Explanation: According to the principle of good continuation, we tend to perceive continuous, smooth lines instead of disjointed or jagged ones. This principle suggests that when elements are arranged in a way that suggests a continuous pattern or direction, our perception favors interpreting them as such. Good continuation is one of the Gestalt principles of perceptual organization, which describe how we perceive and interpret visual stimuli. These principles highlight the tendency of the human mind to organize sensory information into meaningful patterns and structures. In the case of good continuation, our perceptual system seeks to maintain the smoothness and continuity of visual elements, even if they are interrupted or obscured.

88. d) invicticule
Explanation: The vestibular system is responsible for maintaining balance, spatial orientation, and coordinating eye movements. It includes several structures within the inner ear:
a) Horizontal canal: One of the three semicircular canals that detect rotational movements of the head about the horizontal axis.
b) Anterior canal: Another one of the three semicircular canals that detect rotational movements of the head about the vertical axis.
c) Saccule: One of the two otolith organs in the inner ear that detects linear acceleration and head tilt in the vertical plane.

89. a) It suggests that color vision is based on three types of cones in the retina.
Explanation: The Young-Helmholtz trichromatic theory, proposed by Thomas Young and later refined by Hermann von Helmholtz, suggests that color vision is based on three types of cones in the retina, each sensitive to different wavelengths of light. These cones are primarily sensitive to short (blue), medium (green), and long (red) wavelengths of light. According to this theory, all colors in the visible spectrum can be created by combining

various levels of stimulation of these three types of cones. This theory has been widely accepted and forms the basis for our understanding of color vision.

90. d) By exciting specific cones sensitive to red, green, or blue light
Explanation: According to the Young-Helmholtz trichromatic theory, different colors are perceived by exciting specific cones sensitive to red, green, or blue light. This theory suggests that the human retina contains three types of cones, each primarily sensitive to a different range of wavelengths: short (blue), medium (green), and long (red). When light enters the eye, it stimulates these cones to varying degrees depending on its wavelength. By comparing the relative activation levels of these cones, the brain perceives different colors. For example, a mixture of light that primarily stimulates the red and green cones but minimally stimulates the blue cones would be perceived as yellow.

91. c) Afterimages are produced when receptors are negatively stimulated after positive stimulation.
Explanation: The opponent-process theory suggests that color perception is based on three pairs of antagonistic color channels: red-green, blue-yellow, and black-white. According to this theory, cells within these channels oppose each other in their responses to different wavelengths of light. For example, if you stare at a red object for an extended period, the red receptors in your retina become fatigued. When you look away, the green receptors, which are relatively less fatigued, produce an afterimage of the complementary color, green. This occurs because the opponent process (in this case, between red and green) is still active even though the original stimulus (the red object) is no longer present. Similarly, staring at a green object may produce an afterimage of red.

92. d) Absolute limen
Explanation: The term “absolute threshold” refers to the minimum level of stimulus intensity needed to detect a stimulus at least 50% of the time. This threshold varies depending on the type of stimulus and the individual’s sensory abilities. It represents the point at which a sensation becomes consciously perceptible to an observer.

93. a) Hallucination
Explanation: Hallucination typically refers to the perception of something that is not present or occurring. In contrast, the other options describe various phenomena related to the perception of movement:
b) Phi phenomenon: This refers to the illusion of movement created by a rapid succession of still images or stimuli, such as the perception of movement in a sequence of flashing lights.

c) Apparent movement: This occurs when a stationary object appears to move due to the sequential presentation of similar stimuli, as seen in animations or the movement of objects in a sequence.
d) Stroboscopic movement: This phenomenon involves the perception of continuous movement in a series of slightly varied images presented in rapid succession, commonly experienced in movies, animation, or stroboscopic lights.

94. a) Both (A) and (R) are true and (R) is the correct explanation of (A).
Explanation: Assertion (A): Retinal disparity is a binocular cue used to estimate the distance of nearby objects. - This is true. Retinal disparity refers to the slight difference in the image of an object on the left and right retinas due to the horizontal separation of our eyes. This disparity is more significant for closer objects, and our brains use this information to perceive depth and estimate distance.

Reason (R): Retinal disparity involves the slight difference in the location of an object on the retinas of each eye, and the brain uses this difference to determine depth and distance. It requires the use of both eyes. - This is a correct explanation of retinal disparity. The slight difference in image location is precisely why we need two eyes for this depth cue to work. By comparing the images from both eyes, the brain can calculate the disparity and use it to create a three-dimensional perception of the world.

95. c) Sensory adaptation
Explanation: Sensory adaptation refers to the process by which sensory receptors become less responsive to an unchanging stimulus over time. In this scenario, Ayesha, who lives near the cattle plant, has likely experienced the odor repeatedly. As a result, her olfactory receptors have adapted to the smell, causing her to become less sensitive to it. Meanwhile, her houseguests, who are not accustomed to the odor, perceive it more strongly. Sensory adaptation allows individuals to focus on new or changing stimuli while filtering out constant, unchanging ones.

96. b) Sensory Interaction
Explanation: Sensory interaction refers to the process by which different sensory systems interact and influence each other's functioning. In the case described, taste buds and olfactory receptor cells work together to enhance the perception of flavor. This interaction occurs because both taste and smell contribute to the overall sensory experience of flavor. When combined, the information from taste buds (for taste) and olfactory receptor cells (for smell) results in a more complex and nuanced perception of the food or substance being

consumed. Therefore, sensory interaction plays a crucial role in the integration of sensory information to create a cohesive perceptual experience.

97. a) Both (A) and (R) are true and (R) is the correct explanation of (A).
Explanation: Place theory is indeed used to explain how people discriminate high-pitched sounds with frequencies greater than 5000 Hz. According to place theory, the perception of high-frequency sounds is based on the identification of specific locations on the basilar membrane of the cochlea where hair cells are stimulated. Different regions of the basilar membrane vibrate preferentially in response to different frequencies, allowing us to distinguish high-pitched sounds. Therefore, the reason provided (R) correctly explains why place theory is relevant for discriminating high-pitched sounds, making it the correct explanation for assertion (A).

98. a) reading by light that is three times brighter than the rest of the room light.
Explanation: Engaging in activities such as avoiding high-fat food, turning off loud music after a certain duration, and avoiding spicy food can contribute to protecting your senses. However, reading by light that is significantly brighter than the rest of the room light can strain your eyes and potentially lead to eye fatigue or discomfort. Therefore, it is not recommended as a way to protect your senses.

99. a) Perceptual Context
Explanation: Perceptual context refers to the influence of surrounding information or context on the perception of an ambiguous figure. It suggests that our interpretation of sensory information is influenced by the context in which it is presented. When presented with an ambiguous figure, such as the famous “duck-rabbit” illusion, the way we perceive it can be influenced by factors such as surrounding visual cues, past experiences, and expectations, all of which contribute to the perceptual context.

100. b) Children saw figures as food more often before eating.
Explanation: R. N. Sanford’s study explored how hunger influences the perception of ambiguous figures in children. The findings showed that children who were hungry were more likely to perceive ambiguous figures as food-related objects before eating. This demonstrates the impact of physiological states, such as hunger, on perceptual processes, highlighting how our needs and motivations can shape the way we interpret sensory information. This study underscores the concept that perception is not only a product of sensory input but also influenced by our internal states and motivations.

101. b) Difference threshold
Explanation: The term “just noticeable difference” (JND) is synonymous with “difference threshold” in the context of sensory thresholds. The JND refers to the minimum amount of change in a stimulus that can be detected 50% of the time. This concept is central to understanding sensory discrimination and is crucial in fields such as psychophysics, where researchers study the relationships between physical stimuli and the sensations and perceptions they produce. The difference threshold is not to be confused with the absolute threshold, which is the minimum intensity of a stimulus that can be detected.

102. b) The ratio of change in stimulus intensity to intensity
Explanation: Weber’s Law states that the just noticeable difference (JND) between two stimuli is proportional to the magnitude of the stimuli. The Weber fraction, which is also known as the Weber constant, measures this proportion. It is defined as the ratio of the change in stimulus intensity (ΔI) needed to produce a JND to the original intensity (I) of the stimulus. Mathematically, this can be expressed as:

$$k = \frac{\Delta I}{I}$$

where k is the Weber fraction or constant. This law highlights that the ability to detect differences in stimulus intensity is relative rather than absolute, meaning it depends on the proportionate change rather than the absolute change in intensity. For example, in the context of weight, if the Weber fraction is 0.02, a person might just notice the difference between 100 grams and 102 grams, or between 500 grams and 510 grams. This principle is widely applicable across different sensory modalities, including vision, hearing, and touch.

103. b) Internal factors and the intensity of the signal
Explanation: Signal Detection Theory (SDT) suggests that the ability to detect a stimulus depends not only on the intensity of the signal but also on internal factors, such as the observer’s expectations, motivations, and decision criteria. SDT is used to explain how we discern between important stimuli and background noise, and it incorporates the idea that detection involves a complex interaction of sensory and cognitive processes. SDT posits that there are four possible outcomes when attempting to detect a signal: hit (correctly detecting a present signal), miss (failing to detect a present signal), false alarm (detecting a signal that isn’t there), and correct rejection (correctly identifying that no signal is present).

104. a) Accommodation is the change in the curvature of the lens; Near-sightedness
Explanation: Accommodation in the context of vision refers to the process by which the eye’s lens changes its curvature to focus on objects at different distances. This adjustment allows the eye to focus light correctly onto the retina, ensuring a clear image. The lens

becomes more curved to focus on near objects and less curved to focus on distant objects. Near-sightedness (myopia) is a visual acuity problem associated with the focusing of images in front of the retina, rather than behind it. However, farsightedness (hyperopia) is associated with the focusing of images behind the retina, which occurs when the eye's lens does not accommodate enough to bring near objects into focus.

105. b) At the point where the optic nerve leaves the eye; Our eyes are always moving
Explanation: This region lacks photoreceptors (rods and cones), meaning it cannot detect any visual information. As a result, any image that falls on this part of the retina is not perceived, creating a "blind spot."
However, we are typically unaware of this blind spot for several reasons:
Binocular Vision: We have two eyes, and each eye has a blind spot in a different location. The visual fields of both eyes overlap, so the blind spot of one eye is covered by the vision of the other eye.
Constant Eye Movements: Our eyes are constantly moving in small, rapid movements called saccades. These movements help to fill in the blind spot with surrounding visual information.
Brain Compensation: The brain uses information from the surrounding area and from the other eye to "fill in" the missing information, creating a seamless visual experience.

106. c) Occipital lobe
Explanation: The optic nerve transmits visual information from the retina to the occipital lobe in the brain. The occipital lobe, located at the back of the brain, is primarily responsible for processing visual information. When light hits the retina, photoreceptor cells convert it into electrical signals. These signals are then transmitted via the optic nerve to the visual cortex in the occipital lobe, where they are interpreted and processed to form visual perceptions. This process allows us to understand and respond to the visual stimuli in our environment.

107. c) Ganglion cells process color in opposing pairs.
Explanation: Hering's opponent-process theory proposes that color perception is based on the activity of neurons that are arranged in opposing pairs. Specifically, these pairs are:
Red-Green Pair: Neurons in this pair are excited by red light and inhibited by green light, or vice versa.
Blue-Yellow Pair: Neurons in this pair are excited by blue light and inhibited by yellow light, or vice versa.
Black-White Pair: This pair is involved in the perception of brightness and contrast.

108. b) By the location stimulated in the inner ear
Explanation: According to place theory, our perception of pitch is determined by the specific location along the basilar membrane in the cochlea that is stimulated by sound waves. The basilar membrane varies in width and stiffness along its length, with different regions responding to different frequencies of sound:
High frequencies: These sounds stimulate the base of the cochlea, where the basilar membrane is narrow and stiff.
Low frequencies: These sounds stimulate the apex of the cochlea, where the basilar membrane is wider and more flexible.

109. b) Kinesthesis
Explanation: Kinesthesis, also known as proprioception, refers to the sense that allows us to perceive the position, movement, and orientation of our body parts. It provides information about the relative position of body parts to each other and to the environment, even when the eyes are closed. This sense is essential for tasks that require coordination, balance, and spatial awareness. The vestibular sense is responsible for detecting changes in the position and movement of the head, as well as maintaining balance and spatial orientation. It involves structures within the inner ear, including the semicircular canals and otolith organs.

110. c) Olfactory mucosa in nasal cavities
Explanation: In olfaction, airborne molecules interact with sensory receptors located in the olfactory epithelium, which is part of the olfactory mucosa in the nasal cavities. This olfactory epithelium contains specialized receptor cells called olfactory receptor neurons (ORNs), which detect odor molecules in the air. These molecules bind to receptors on the surface of the ORNs, triggering neural signals that are transmitted to the brain for processing and perception of smell.