3. Explain the basic thrust of signal-detection theory.

3-1. The major idea behind signal detection theory is that our ability to detect signals depends not only on the initial intensity of a stimulus, but also on other sensory and decision processes as well. One factor that is particularly important here is the criterion you set for how certain you must feel before you react (what are the gains from being correct and what are the losses from being incorrect). What other factor is particularly important here?

3-2. Thus, according to signal detection theory, the concepts of absolute thresholds and JNDs need to be replaced by the notion that the probability of detecting any given stimulus will depend on all of the above factors; this is called the concept of ____________________.

4. Describe some evidence on perception without awareness, and discuss the practical implications of subliminal perception.

4-1. Answer the following questions about the study conducted by Jon Krosnick and his colleagues:

(a) What two different kinds of emotion arousing subliminal stimuli accompanied the slides of the target person?

(b) Which group rated the target group in a more favorable manner?

4-2. What general conclusions can be drawn from the research on subliminal perception with respect to its potential persuasive effects?

5. Discuss the meaning and significance of sensory adaptation.

5-1. Which of the following examples best illustrates what is meant by sensory adaptation?
(a) You are unable to clearly hear the conversation at the next table even though it sounds intriguing, and you are straining to listen.

(b) The strawberries you eat at grandma’s farm at the age of 20 seem not to taste as good as when you ate them at the age of 6.

(c) The wonderful smell you encounter upon first entering the bakery seems to have declined considerably by the time you make your purchase and leave.

If you answered c to the above question you are right on track and understand that sensory adaptation involves a gradual _______ in sensitivity to prolonged stimulation. This automatic process means that we are not as likely to be as sensitive to the constants in our sensory environments as we are to the ________

OUR SENSE OF SIGHT: THE VISUAL SYSTEM

6. List the three properties of light and the aspects of visual perception that they influence.

6-1. Before we can see anything, _______ must be present. There are three characteristics of lightwaves that directly effect how we perceive visual objects; match each of these characteristics with its psychological effect.

   ____ (a) wavelength 1. color
   ____ (b) amplitude 2. saturation (or richness)
   ____ (c) purity 3. brightness

7. Describe the role of the lens and pupil in the functioning of the eye.

7-1. Getting light rays entering the eye to properly focus on the retina is the job of the _______. It accomplishes this task by either thickening or flattening its curvature, a process called _______. Controlling the amount of light entering the eye is the job of the _______. It accomplishes this task by opening or closing the opening in the center of the eye called the ________

8. Describe the role of the retina in light sensitivity and in visual information processing.

8-1. The structure that transforms the information contained in light rays into neural impulses that are then sent to the brain is called the _______. All of the axons carrying these neural impulses exit the eye at a single opening in the retina called the optic ________. Since the optic disk is actually a hole in the retina, this part of the retina cannot sense incoming visual information, and for this reason it is called the ________ spot.
8-2. The specialized receptor cells that are primarily responsible for visual acuity and color vision are called the _______. The cones are mainly located in the center of the retina in a tiny spot called the _______. The specialized receptor cells that lie outside of the fovea and towards the periphery of the retina are called the _______. The rods are primarily responsible for peripheral vision and for _______.

8-3. Both dark and light adaptation are primarily accomplished through ___________ reactions in the rods and cones. This chemical reaction occurs more quickly in the ________, so they are quicker to show both dark adaptation and light adaptation.

8-4. Light rays striking the rods and cones initiate neural impulses that are then transmitted to _______ cells and then to _______ cells. From here the visual information is transmitted to the brain via the axons running from the retina to the brain, collectively known as the _______ nerve.

8-5. The processing of visual information begins within the receiving area of a retinal cell called the _______ field. Stimulation of the receptive field of a cell causes signals to be sent inward towards the brain and sideways, or _______, to nearby cells, thus allowing them to interact with one another. The most basic of these interactive effects, lateral antagonism, allows the retina to compare light falling in a specific area against the general lighting. This allows the visual system to compute the (relative/absolute) levels of light.

9. Describe the routing of signals from the eye to the brain and the brain’s role in visual information processing.

9-1. Visual information from the right side of the visual field (Figure 4-13 in the text) exits from the retinas of both eyes via the optic nerves and meet at the _______ chiasm, where it is combined and sent to the _______ side of the brain. Visual information from the left side of the visual field follows a similar pattern, meeting at the optic chiasm, and then on to the _______ side of the brain.

9-2. After leaving the optic chiasm on their way to the visual cortex, the optic nerve fibers diverge along two pathways. Fill in the missing parts of the pathways below.

Main pathway
(a) Optic chiasm __________ Visual cortex __________

Secondary pathway
(b) Optic chiasm __________ Visual cortex __________

9-3. The main pathway is subdivided into the magnocellular and parvocellular pathways that simultaneously extract _______ kinds of information from the same input.

(a) Which channel handles the perception of color?
(b) Which channel handles the perception of brightness?

9-4. Because the cells in the visual cortex respond very selectively to specific features of complex stimuli, they have been described as detectors. There are two major types of cells in the visual cortex: simple cells and complex cells. Identify them from their descriptions below.

(a) These cells are particular about the width and orientation of a line but respond to any position in their receptive field.

(b) These cells are very particular about the width, orientation, and position of a line.

9-5. After processing in the primary visual cortex, the signals diverge into two separate streams. The ventral stream processes the details of objects are out there and the dorsal stream processes the objects are located.

9-6. As signals move further along in the visual processing system the neurons become specialized as to what turns them on, and the stimuli that will activate them become complex. For example, cells in the temporal lobe along the “what” pathway best respond to pictures of human

10. Discuss the trichromatic and opponent process theories of color vision and the modern reconciliation of these theories.

10-1. The trichromatic theory of color vision, as its name suggests, proposes three different kinds of receptors (channels) for the three primary colors: red, and . The opponent process theory of color vision also proposes three channels for color vision, but these channels are red versus , yellow versus , and black versus

10-2. These two theories of color vision can be used to explain different phenomena. Use T (trichromatic) or O (opponent process) to indicate which theory best explains the following phenomena.

 _____ (a) The color of an afterimage is the complement of the original color.

 _____ (b) The different kinds of color blindness suggest three different kinds of receptors.

 _____ (c) Any three appropriately spaced colors can produce all other colors.

 _____ (d) People describing colors often require at least four different names.
10-3. The evidence is now clear that both theories are (incorrect/correct). Each is needed to explain all of the phenomena associated with color vision. Three different kinds of cones have been found in the retina which are sensitive to each of the three primary colors; this supports the ____________ theory. It has also been found that visual cells in the retina, the LGN, and the visual cortex respond in opposite (antagonistic) ways to complementary colors, thus supporting the ____________ theory.

11. **Distinguish between top-down processing and bottom-up processing.**

11-1. The same visual stimulus can result in radically different perceptions, and thus our perceptions of the world are (subjective/objective). We perceive what we expect to perceive (perceptual set) and we may not perceive the unexpected, a phenomenon called ____________ blindness.

11-2. Answer the following questions regarding top-down and bottom-up processing:

(a) Which process appears to assume feature analysis, the process of detecting specific elements in visual input and assembling them into a more complex whole?

(b) Which process appears to account for our ability to rapidly recognize and read long strings of words?

(c) What does the text conclude about which theory is correct?

12. **Explain the basic premise of Gestalt psychology, and describe Gestalt principles of visual perception.**

12-1. The Gestalt view of form perception assumes that form perception is not constructed out of individual elements; rather the form, or whole, is said to be ____________ than the sum of its individual elements. The illusion of movement, called the ____________ phenomenon, is used to support the Gestalt view of form perception because the illusion of movement (is/is not) completely contained in the individual chunks of stimuli that give rise to it. In other words, the illusion, or whole, appears to be ____________ than the sum of its parts.
12-2. Five Gestalt principles of visual perception are illustrated below. Match each illustration with its correct name.

<table>
<thead>
<tr>
<th>Proximity</th>
<th>Similarity</th>
<th>Continuity</th>
<th>Closure</th>
<th>Simplicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
<td>(d)</td>
<td>(e)</td>
</tr>
</tbody>
</table>

12-3. What Gestalt principle is illustrated by:

(a) The words printed on this page appear to stand out from the white paper they are printed on?

(b) Things moving in the same direction together get grouped together?

13. Explain how form perception can be a matter of formulating perceptual hypotheses.

13-1. The objects that surround us in the world outside of our bodies are called __________ stimuli; the images the objects project on our retinas are called __________ stimuli. When perceived from different angles or distances, the same distal stimulus projects (similar/different) proximal images on the retina. This forces us to make perceptual __________ about the distal stimulus.

Answers: 13-1. distal, proximal, different, hypotheses or guesses.

14. Describe the monocular and binocular cues employed in depth perception and cultural variations in depth perception.

14-1. There are two general kinds of cues that allow us to perceive depth. They are easy to remember because one kind involves the use of both eyes and is called __________ cues; the other kind requires the use of only one of the eyes and is called __________ cues. Depth perception (does/does not) require the use of both binocular and monocular cues.
14-2. Here are examples of two different kinds of binocular cues, retinal disparity and convergence. Identify each from these examples:

(a) As a person walks towards you your eyes turn inward.

(b) The images are slightly different on each retina and the differences change with distance.

14-3. There are two general kinds of monocular cues. One kind involves the active use of the eye, such as the accommodation used for focusing the eye. The other general kind is used to indicate depth in flat pictures and thus is called ____________ depth cues.

14-4. Identify the following pictorial cues:

(a) Parallel lines grow closer as they recede into the distance.

(b) More distant objects are higher in the field than nearer objects.

(c) When objects appear to be of the same size, closer ones appear larger than more distant ones.

(d) Near objects block or overlap more distant ones.

(e) Texture appears to grow finer as viewing distance increases.

(f) Patterns of light and dark suggest shadows that can create an impression of three-dimensional space.

14-5. What differences have been found in a few cultures without previous experience in viewing two-dimensional figures and photographs?
15. **Summarize the Featured Study and follow-up research on the perception of geographical slant.**

15-1. After reading the Featured Study you should be able to answer the following questions:

(a) Which method of judgment of geographical slant, verbal, visual, or haptic (based on touch), was the most accurate?

(b) In what way might overestimates of geographical slant by the visual and verbal methods be of value?

(c) In what way might the better accuracy of haptic estimates be of value?

15-2. Answer the following questions regarding the follow-up research.

(a) The overestimates of geographical slant were even more pronounced when the hills were viewed from the top than from the bottom. What functional purpose would this serve?

(b) What effect did fatigue have on the overestimation bias?

16. **Describe perceptual constancies and illusions in vision, and discuss cultural variations in susceptibility to certain illusions.**

16-1. The tendency to experience stable perceptions in spite of constantly changing sensory input is called perceptual ______________. For example, even though the retinal image shrinks as a friend walks away, she continues to appear her usual height. This is an example of ____________ constancy.

16-2. Being fooled by the discrepancy between the appearance of a visual stimulus and its physical reality is what is meant by an optical ______________. Both perceptual constancies and optical illusions illustrate the point that we are continually formulating ______________ about what we perceive and also that these perceptions can be quite (subjective/objective).

16-3. What do the variations in cultural susceptibility to certain illusions tell us about our perceptual inferences?
OUR SENSE OF HEARING: THE AUDITORY SYSTEM

17. List the three properties of sound and the aspects of auditory perception that they influence.

17-1. Name the perceived qualities that are associated with the following properties of sound waves.

<table>
<thead>
<tr>
<th>Physical property</th>
<th>Description</th>
<th>Perceived Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) purity</td>
<td>kind of mixture</td>
<td></td>
</tr>
<tr>
<td>(b) amplitude</td>
<td>wave height</td>
<td></td>
</tr>
<tr>
<td>(c) wavelength</td>
<td>wave frequency</td>
<td></td>
</tr>
</tbody>
</table>

18. Summarize the information on human hearing capacities, and describe how sensory processing occurs in the ear.

18-1. Below are questions concerning human hearing capacities. Match the questions with their correct answers.

<table>
<thead>
<tr>
<th>Answers</th>
<th>Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 90 to 120 decibels (dB).</td>
<td>(a) What is the frequency range of human hearing?</td>
</tr>
<tr>
<td>2. 1,000 to 5,000 Hz.</td>
<td>(b) How loud do sounds have to be to cause damage to human hearing?</td>
</tr>
<tr>
<td>3. 20 to 20,000 Hz.</td>
<td>(c) To what frequency range is human hearing the most sensitive?</td>
</tr>
</tbody>
</table>

18-2. Below is a scrambled sequence of events that occurs when a sound wave strikes the ear. Put these events in their correct order using the numbers 1 through 4.

- Fluid waves travel down the cochlea causing the hair cells on the basilar membrane to vibrate.
- The pinna directs air to the eardrum.
- The hair cells convert fluid motion into neural impulses and send them to the brain.
- The motion of the vibrating eardrum is converted to fluid motion by the ossicles.

19. Compare and contrast the place and frequency theories of pitch perception, and discuss the resolution of the debate.

19-1. One theory of pitch perception assumes that the hair cells respond differentially to pitch depending on their location along the basilar membrane. This is the main idea of the _______ theory of pitch perception. A second theory assumes a one to one correspondence between the actual frequency of the sound wave and the frequency at which the entire basilar membrane vibrates. This is the main idea of the _______ theory of pitch perception.

19-2. Below are several facts uncovered by research. Tell which theory of pitch is supported by each of these facts.
(a) The hair cells vibrate in unison and not independently.

(b) Even when they fire in volleys, auditory nerves can only handle up to 5000 Hz.

(c) A wave pattern caused by the vibrating basilar membrane peaks at a particular place along the membrane.

19-3. The above facts mean that the perception of pitch depends on both ________________ and ________________ coding.

20. Discuss the cues employed in auditory localization.

20-1. The sound shadow cast by the head is in a large part responsible for enhancing two important cues used for auditory localization. What are these two cues?

OUR CHEMICAL SENSES: TASTE AND SMELL

21. Describe the stimuli and receptors for taste, and discuss individual differences in taste perception.

21-1. The stimuli for taste perception are ____________ absorbed in the saliva that stimulate taste cells located in the tongue's ________________. It is generally thought that there are four fundamental tastes; these are: ____________, ____________, ____________, and ____________.

21-2. What accounts for much of the wide variations in taste preferences among people?

21-3. What appears to account for the difference between supertasters and nontasters (is it a learned or genetic characteristic)?

22. Describe the stimuli and receptors for smell, and discuss how well people perform in odor identification tasks.
22-1. The stimuli for the sense of smell are molecules floating in the air. The receptors for smell are hairlike structures located in the nasal passages called. If there are any primary odors, they must be in number. Human sensitivity to smell compare favorably with that of many other animals, although some animals surpass us in this respect.

Ans:

OUR SENSE OF TOUCH: SENSORY SYSTEMS IN THE SKIN

23. Describe processes involved in the perception of pressure and temperature.

23-1. The statements below pertain to either the sense of pressure (P) or the sense of temperature (T). Indicate the correct answers below using the letters P or T.

(a) The somatosensory area of the cortex is the primary receiving area for this sense.
(b) Has receptors specific for either warmth or cold.
(c) The free nerve endings in the skin are in patches that act like receptive fields in vision.
(d) The free nerve endings in the skin fire spontaneously when no stimulus change is being experienced.

24. Describe the two pathways along which pain signals travel, and discuss evidence that the perception of pain is subjective.

24-1. Pain signals travel to the brain by two slightly different pathways. One pathway sends signals directly and immediately through myelinated neurons to the cortex and is called the pathway. The other sends signals to the cortex through unmyelinated neurons and is called the pathway. The pathway mediates lingering, less localized pain.

24-2. Many studies have demonstrated that the perception of pain can be affected by factors such as mood, ethnicity, and culture. Thus, the perception of pain is.

25. Explain the gate-control theory of pain perception and recent findings related to it.

25-1. Answer the following questions regarding the perception of pain:

(a) What phenomenon did the gate-control theory of pain perception attempt to explain?

(b) What effect do endorphins have with respect to pain?
(c) What seems to be the role of the descending neural pathway that appears to originate in the periaqueductal gray (PAG) area in the midbrain?

OUR OTHER SENSES

26. Describe the perceptual experiences mediated by the kinesthetic and vestibular senses.

26-1. The system that monitors the positions of various parts of the body is called the _____________ system. This system sends information to the brain about body position and movement obtained from receptors located in the joints and _____________.

26-2. The system that monitors the body’s location in space is called the _____________ system. The receptors for the vestibular system are primarily hair cells contained within the _____________ canals in the inner ear.

26-3. What point does the text make about the kinesthetic and vestibular systems, and indeed all sensory systems, in carrying out their tasks?

PUTTING IT IN PERSPECTIVE

27. Explain how this chapter highlighted three of the text’s unifying themes.

27-1. The fact that competing theories of both color vision and pitch were eventually reconciled attests to the value of theoretical diversity. Why is this?

27-2. Why must our experience of the world always be highly subjective?

27-3. What do cultural variations in depth perception, taste preferences, and pain tolerance tell us about the physiological basis of perception?