

## Vision Science III Final Examination

Name/PIN \_\_\_\_\_

All questions are 1 pt each, unless otherwise specified.

1. 3 pts When doing a Worth-4-dot test, with the red lens over OD and green lens over OS, the patient sees 2 dots. What is the diagnosis and what color would each of the dots be?

### OS suppression

2. Which of the following best describes confusion?
- a. One object seen in the same oculocentric direction by each eye
  - b. One object seen in different oculocentric directions by the two eyes
  - c. Two objects with different positions seen in the same oculocentric direction by each eye
  - d. Two objects with different positions seen in different oculocentric directions by the two eyes
  - e. Both a and d
3. Which of the following best describes the situation you would expect for a patient with 3.50 diopters of spherical anisometropia?
- a. She will have aniseikonia if the spectacle magnification is not offset by the eye's optics, local-sign symmetry and neurological factors.
  - b. She will have aniseikonia only when corrected by spectacles and if the eyes have the same axial length.
  - c. She will have aniseikonia due to the combined geometric and induced effects.
  - d. She will have aniseikonia due to the difference in spectacle magnification between the eyes.
4. How will a wall in front of a patient appear if he has aniseikonia caused by the following spectacle Rx?
- OD -1.00 -2.00 x 180  
OS -3.00 sphere
- a. Trapezoid base right and the right side will appear farther away
  - b. Trapezoid base left and the left side will appear farther away
  - c. Trapezoid base right and the left side will appear farther away
  - d. Trapezoid base left and the right side will appear farther away

5. How will a wall in front of a patient appear if he has aniseikonia caused by the following spectacle Rx?
- OD -2.00 sphere  
OS plano -2.00 x 090
- Trapezoid base left and the right side will appear farther away
  - Trapezoid base left and the left side will appear farther away
  - Trapezoid base right and the left side will appear farther away
  - Trapezoid base right and the right side will appear farther away**
6. When testing a patient with an eikonometer, the vertical lines appear parallel to the fronto-parallel plane, and the cross appears tilted farther away on the left side. The person has greater
- horizontal mag OD (axis 090).
  - horizontal mag OS (axis 090).
  - vertical mag OD (axis 180).**
  - vertical mag OS (axis 180).
  - overall mag OD.
  - overall mag OS.
7. Which of the following best describes the development of normal binocular fusion in humans?
- It includes a critical period beginning from about 2 months of age, followed by rapid development within the first year.**
  - It includes a critical period beginning at birth, followed by rapid development until age 1.
  - It closely parallels the development of visual acuity from birth to maturity at 8-9 years of age.
  - It includes a critical period with rapid development from birth to maturity at about 2 months of age.
8. At which level in the visual pathways do you first encounter binocular neurons in the normal adult?
- optic chiasm
  - LGN
  - first-order neuron in area V1
  - second-order neuron in area V1**
  - first-order neuron in area V2
9. Which of the following is NOT processed by neurons in the parvocellular pathway?
- coarse-motion stereopsis**
  - fine-static stereopsis
  - color perception
  - high spatial frequencies

10. LGN neuron receptive fields are circular and show spatial antagonism. Scientists hypothesize that LGN neurons with adjacent receptive fields arranged in a straight line probably synapse with a simple cell in the primary visual cortex whose receptive field closely matches the summed LGN fields. This is an example of ...

- a. bottom-down processing.
- b. hierarchal processing.**
- c. correlative dominance.
- d. parallel processing.

11. Which of the following is NOT a technique that has been used to study stereopsis in infants?

- a. visual cliff
- b. random-dot preferential looking charts
- c. VER
- d. Pulfrich effect**

12. When testing a patient with an eikonometer, the cross appears parallel to the fronto-parallel plane, and the vertical lines appear tilted farther away on the left side. The person has greater

- a. horizontal mag OD (axis 090)
- b. horizontal mag OS (axis 090)
- c. vertical mag OD (axis 180)
- d. vertical mag OS (axis 180)
- e. overall mag OD
- f. overall mag OS**

13. Which of the following best describes the development of stereopsis in humans?

- a. It shows a rapid burst of development from no stereopsis to nearly full stereopsis between about 3 to 5 months of age.**
- b. It precedes the development of accurate eye movements and motion perception.
- c. It follows the same time course and pace of development as visual acuity and contrast sensitivity.
- d. Boys tend to develop stereopsis about 1 month before of girls, but girls soon catch up.

14. Most first-order neurons in the primary visual cortex are ...

- a. monocular at birth, but become binocular within the first few months.
- b. monocular from birth and through the rest of life.
- c. binocular at birth, but become monocular as the visual system matures.**
- d. binocular from birth and through the rest of life.

15. Monocular deprivation is most damaging to the development of visual acuity if it occurs ...
- prior to the critical period.
  - within the first six months of the critical period.**
  - within the last six months of the critical period.
  - during the first six months after completion of the critical period.
16. To receive the maximum benefit from reverse occlusion for amblyopia, it should be started ...
- and completed prior to the beginning of the critical period.
  - early in the critical period.**
  - near the end of the critical period.
  - at any time, as long as it is applied full time.
17. Which of the following best describes microstrabismus, also known as monofixation syndrome?
- It is a common cause of eyestrain and headaches.
  - It must usually be corrected surgically.
  - It severely disrupts binocular vision, preventing both central and peripheral binocular fusion.
  - It is a small residual deviation following strabismus surgery.**
18. By prism neutralization and the cover test, you determine that a patient has 7 prism diopters of esotropia OS. He is able to fuse, and subjectively shows zero deviation by the von Graeffe test. Which of the following conditions does he have?
- Eccentric fixation
  - Harmonious anomalous correspondence**
  - Unharmonious anomalous correspondence
  - Normal correspondence
19. While taking a hike in the Ozarks, you sit down on log to rest, enjoying the strong breeze moving the tree tops around above you. As you watch them move, you suddenly feel that you are also moving, even though you're not really. This is an example of
- biological motion.
  - the induced effect.
  - autokinesis.
  - self motion**
20. If you watch a small illuminated ball suspended from the ceiling in a dark room, it may appear to move about on its own. This is an example of ...
- biological motion.
  - the induced effect.
  - autokinesis.**
  - self motion.

21. Based on Teller's rule of thumb, what visual acuity should you expect for a 6-month old baby?

- a. 20/20
- b. 20/60
- c. 20/100
- d. 20/600

22. Name four factors other than a difference in the powers for the OD and OS spectacle lenses that can contribute to the perceived aniseikonia. (4)

**Difference in ocular optics, packing of retinal neurons, post-retinal neural processing, neural adaptation**

23. Neurons from LGN layers 3-6 synapse in which layer of the primary visual cortex?

- a. IVA
- b. IVB
- c. IVC alpha
- d. IVC beta

24. Magnocellular neurons synapse in which of the following tissues?

- a. Layers V and VI of the primary visual cortex.
- b. The thick dark stripes of area V2.
- c. The thin striped region of area V2.
- d. Area V4

25. Which of the following is common among many normal newborn infants?

- a. Unstable fixation with intermittent exotropia
- b. Visual acuity of about 6 cycles per degree
- c. Stereoacuity threshold of about 300 arc seconds
- d. Worth grade 3 fusion

26. 3 pts You do a cover test on a patient and find that he has a LEFT hyper in primary gaze, which increases in RIGHT tilt and LEFT gaze. What is the paretic muscle?

**Left inferior rectus**

27. Monocular deprivation is most damaging to the development of visual acuity if it occurs

- a. prior to the sensitive period.
- b. within the first six months of the sensitive period.
- c. within the last six months of the sensitive period.
- d. immediately after the completion of the sensitive period.

28. What is the difference between anomalous correspondence and eccentric fixation? (3)

Anomalous correspondence manifests itself under binocular viewing conditions  
Eccentric fixation manifests itself during monocular fixation.

29. In Hubel and Wiesel's research with kittens, which of the following resulted in the most normal-looking ocular dominance histogram?

- a. Constant monocular deprivation during the sensitive period
- b. Alternating monocular deprivation during the sensitive period
- c. Binocular occlusion during the critical period
- d. Induced strabismus during the critical period

30. Which of the following is NOT associated with strabismic amblyopia?

- a. Abnormal sense of visual direction
- b. Abnormal space perception
- c. Reduced vernier acuity
- d. Poor contrast sensitivity for low spatial frequencies  
(Comment: See Steinmann p. 285-288.)

31. Patient PL is 50 years old. He has recently had a stroke and says that he cannot see well. You try to measure his visual acuity with Snellen letters, but he cannot tell what they are. He is getting frustrated, and blurts out that he can "see" them clearly, but he doesn't know what they are. This is called

- a. metamorphopsia.
- b. blind sight.
- c. an agnosia.
- d. anisophoria.

32. By prism neutralization and the cover test, you determine that a patient has 15 prism diopters of esotropia OS. He is able to fuse, and subjectively shows 2 prism diopters of eso deviation by the von Graeffe test. Which of the following conditions does he have?

- a. Eccentric fixation
- b. Harmonious anomalous correspondence
- c. Unharmonious anomalous correspondence
- d. Past pointing

33. Which of the following best summarizes top-down processing of visual information according to the Gestalt theory?
- a. The brain interprets and organizes incoming visual data to best-fit preconceived images.
  - b. High and low spatial frequency components are processed in parallel up to the extrastriate level.
  - c. The visual system analyzes image components and reassembles them in the brain before the image is perceived.
  - d. Active processing of visual information does not begin until the primary visual cortex.
34. In figure-ground processing
- a. the visual system tends to focus attention on one object and relegate everything else to the background.
  - b. the visual system rapidly shifts attention between the foreground and background.
  - c. the visual system efficiently minimizes background neural noise, thereby improving the signal-to-noise ratio.
  - d. the magnocellular system compensates for deficiencies in the parvocellular system.