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## Lab 4 Sensory Physiology - Vision, Hearing, Balance, and Smell

### Vision

#### Accommodation

##### Procedure

1. To measure the near point of vision, place the end of a ruler under one eye and extend it. Please be careful when doing this and use in low traffic areas of the lab.
2. Holding an object (pencil, pen, etc), gradually bring the object toward the eye.
3. Record the distance at which the object first appears blurred or doubled

Near point of vision: \_\_\_\_\_ cm (0.2 POINTS)

4. Repeat on the other eye

Near point of vision: \_\_\_\_\_ cm (0.2 POINTS)

#### Questions

1. Define accommodation: (0.2 POINTS)

2. What two structures of the eye are responsible for accommodation? (0.2 POINTS)

\_\_\_\_\_ and \_\_\_\_\_

#### Visual Acuity

##### Procedure

1. Stand 20 feet from the Snellen eye chart, and determine the smallest line you can accurately read.
2. For testing astigmatism, stand 20 from the astigmatism chart.
3. This chart consists of a number of dark lines radiating from a central point, like spokes on a wheel. If astigmatism is present, some of the spokes will appear blurred and lighter because they are coming into focus in front of or behind the retina.

#### Questions

1. What is your visual acuity? Right eye: \_\_\_\_\_ / \_\_\_\_\_, (0.2 POINTS)

2. Left eye: \_\_\_\_\_ / \_\_\_\_\_ (0.2 POINTS)

Over all (With both eyes open): \_\_\_\_\_ / \_\_\_\_\_ (0.2 POINTS)

3. Looking at your overall visual acuity, explain what the numbers mean: (0.4 POINTS)

Numerator: \_\_\_\_\_

Denominator: \_\_\_\_\_

4. Do you have emmetropia (normal), hyperopia, or myopia? (0.2 POINTS)

5. If your vision is 20/10 you have: (circle the correct answer.) (0.2 POINTS)

A) myopia. B) hyperopia. C) emmetropia. D) above average visual acuity.

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## Color vision

### Procedure

1. Use Ishihara's "Design Charts for Color Deficiency of Unlettered Persons" and the series of plates designed as a test for color- blindness.
2. Explanation of tests can be found within the book. Please refer to them how colorblind individuals perceive these tests.

## Examination of the Eye with an Ophthalmoscope

An ophthalmoscope is a device used to observe the inner posterior part of the eye. A mirror positioned at the top of the instrument deflects light at a right angle into the eye, which enables the observer to see the interior of the eye through a small slit in the mirror. Different depths of focus are attained by changing the lenses that are positioned in the slit. The strength of each lens is given in diopters by a plus (+) for a convex lens or a minus (-) for a concave lens, with 0 indicating no lens curvature.

### Procedure:

1. Have your partner sit on a lab chair and have them look directly into the light.
2. Position yourself so that you are close to your partner. Hold the ophthalmoscope with your right hand and use your right eye when observing your partner's right eye.
3. Examine your partner's eye from the front to the back. The appropriate lens selection will vary from person to person.
4. Rotate the wheel counterclockwise to examine the fundus (posterior, inner part of the eye).
5. If a positive (convex) lens is necessary to focus on the fundus, and your eyes are normal, the subject has Hyperopia
6. If a negative (concave) lens is necessary to focus on the fundus, and your eyes are normal, the subject has myopia.
7. Observe the arteries and veins of the fundus and follow them to their point of convergence. This will enable you to observe the macula lutea which is a yellowish region containing a central pit called the fovea centralis. The fovea centralis contains the highest concentration of cones and is an area of high visual acuity.

**Draw or explain what you observed:  
(0.4 POINTS)**

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## Hearing and Balance

### Vestibular Nystagmus

#### Procedure

1. Have your partner sit in a swivel chair with eyes open. Rotate the chair quickly to the right for 20 seconds or (about 10 revolutions). Please be very careful. No need for excessive spinning to elicit a response.
2. Abruptly stop the chair and have the partner open his or her eyes as wide as possible. Note the direction of the nystagmus.

### Questions

1. Describe the eye movement: **(0.2 POINTS)**
2. When the subject is rotated in a swivel chair, in what direction will the cupula bend? \_\_\_\_\_ (same or opposite direction of the person) **(0.2 POINTS)**
3. The condition with *illusion* of movement or spinning is called \_\_\_\_\_. **(0.2 POINTS)**
4. The organ that detects equilibrium is called the \_\_\_\_\_. **(0.2 POINTS)**
5. The structures sensitive to angular acceleration in the three planes are the \_\_\_\_\_. **(0.2 POINTS)**
6. The structures sensitive to linear acceleration are the \_\_\_\_\_ (horizontal) and \_\_\_\_\_ (vertical). **(0.2 POINTS)**

### Deafness

#### Procedure

- Rinne's- conduction deafness
  1. Strike the tuning fork with the palm of your hand, not on your desk.
  2. Place the handle of the tuning fork against the mastoid process of the temporal bone (the bony prominence behind the ear).
  3. As soon as the sound disappears, move the tuning fork near the external auditory meatus. If there is no damage to the middle ear, the sound will reappear.
  4. Simulate conduction deafness by plugging one ear and repeat the test.
  5. Notice in conductive deafness/plugged ear, conduction by bone is more effective than conduction by air.
- Weber's- sensorineural deafness and conduction deafness.
  1. Strike the tuning fork with the palm of your hand, not on your desk.
  2. Place handle of the tuning fork on the top of your head (on the mid-line). Sound is conducted through the skull to the ears.
  3. In conduction deafness, the sound will seem louder in the affected ear, whereas

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in sensorineural deafness, the cochlea is defective and the sound will be louder in the normal ear.

**Question**

What was the outcome when you plugged one of your ears with your finger? Where should the sound be loudest? **(0.4 POINTS)**

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**Smell**

Odor molecules come in contact with small, non-motile cilia that protrude into the nasal cavity and are attached to olfactory receptors by dendritic processes. Nerve axons connect the olfactory cells with the first relay station in the brain (the olfactory bulb). From the olfactory bulb, signals are transmitted to higher centers of the brain where they provide input for responses such as feeding and drinking behavior, emotions, and memory. Many different patterns of activity are produced by stimulating various olfactory receptors, and this is what allow us to discriminate between a large number of different odors.

Odor intensity

The intensity of an odor depends upon the concentration of molecules present for the particular odor.

Two vials, one with and asterisk (\*) and the other with no mark, contain banana oil.

**Question:**

Which one has the higher concentration of banana oil? \_\_\_\_\_  
**(0.2 POINTS)**

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Odor Detection and Identification

How well do you think you will be able to detect, recognize, and identify these odors?  
 Let's see!!!

**(0.2 POINTS for completion of table)**

	<b>Detection</b>	<b>Recognition</b>	<b>Identification</b>	<b>Answer Key</b>
Vial Number	Do you smell anything?	Is the scent familiar to you?	What do you think it is?	Key is at the front of the classroom
	<b>Yes or No</b>	<b>Yes or No</b>	<b>Try to name that odor</b>	<b>Write correct answer</b>
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
<b>Score</b>	<b>(# Yes/10)</b>	<b>(# Yes/10)</b>	<b>(#that match key/10)</b>	

**Questions**

1. How were your results compared to your partner's? By how much? **(0.2 POINTS)**
2. Were you surprised by your results? Explain: **(0.2 POINTS)**

**MAKE SURE YOU ANSWER ALL THE QUESTIONS SO YOU DON'T LOSE POINTS!**

PLEASE RETURN ALL ITEMS TO THEIR APPROPRIATE PLACES!