

**LABORATORY
ACTIVITY NO. 9**

THE SPECIAL SENSES

SCOPE OF THE LABORATORY EXERCISES:

This laboratory activity consists of two exercises:

- Worksheet no. 1 The Eyes and Vision
- Worksheet no. 2 The Ears and Senses of Hearing and Balance
- Worksheet no. 3 The Tongue and the Sense of Taste
- Worksheet no. 4 The Nose and the Sense of Smell

OVERVIEW

Most of the sensory inputs from one side of the body cross to the other side in the spinal cord or brain stem before ascending to the thalamus. Those are called General Senses. But there are those sensory inputs that are ipsilateral or same side, and those are the ones that are confined to the head. They include the sensory systems which respond to visual, auditory, vestibular, gustatory, and olfactory stimulation, and are responsible for the five special senses of sight, hearing, equilibrium, taste, and smell.

OBJECTIVES

After completing this exercise, you should be able to:

1. Identify the major structural components of the eye and ear.
2. Describe the 'blind spot.'
3. Conduct visual acuity testing using the Snellen chart.
4. Give the situations that cause changes in pupil size.
5. Name the extraocular muscles and the eye movement generated by each.
6. Appreciate how to assess extraocular muscle functioning.
7. Appreciate the role of the ears in maintaining balance.
8. Trace the pathway of sound waves as it travels to the receptors of hearing.
9. Recognize the importance of bone- and air-conduction hearing.
10. Identify the receptor sites on the tongue for different tastes.
11. Name the cranial nerves involved in vision and taste.
12. Appreciate the relationship between flavors and odors.

MATERIALS NEEDED

Pen or pencil

Penlight

12 inch ruler or tape measure

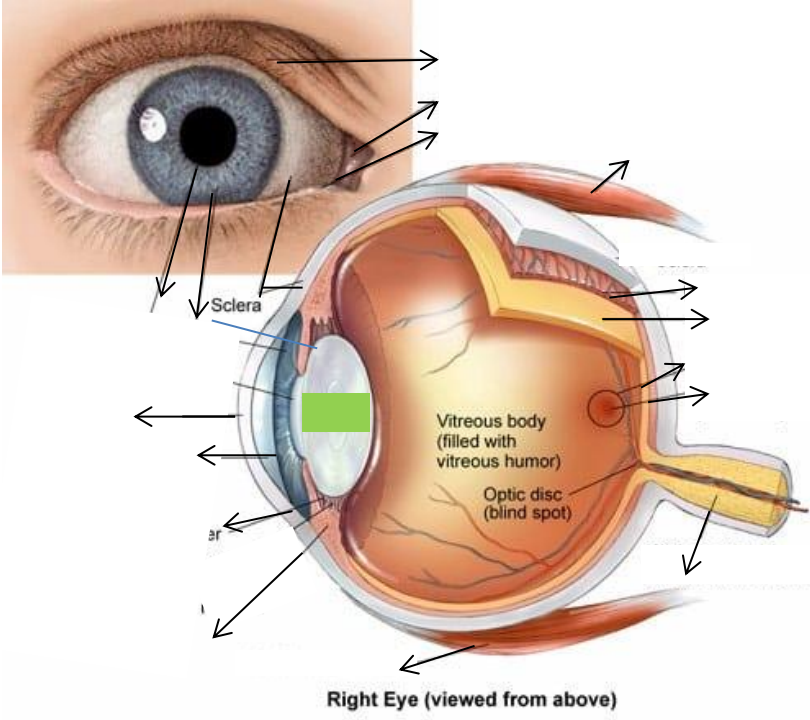
3” x 5” cardboard to be used as eye cover

Downloadable/Printable Snellen Chart

Reference book

LABORATORY EXERCISE 9.1 - The Eye and the Sense of Vision

A. Label the figure of the eye shown here. Identify the appropriate term by writing CAPITAL LETTERS on the blank space provided.

	<p>Choose the correct answer and write the CAPITAL LETTER:</p> <ul style="list-style-type: none"> A. Retina B. Cornea C. Posterior chamber D. Sclera E. Eye lid F. Lateral rectus muscle G. Macula lutea H. Fovea centralis I. Optic nerve J. Lacrimal caruncle K. Choroid L. Tear duct M. Pupil N. Anterior chamber O. Lens P. Medial rectus muscle Q. Iris
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B. **BLIND SPOT:** Hold this page about 15 inches away from your eyes so that the cross is in front of your left eye. Close your right eye. You should be able to see both the cross and the black dot even while the left eye is focused on the cross. Now, slowly bring this page closer to your eyes while keeping your eye focused on the cross. Stop when the black dot disappears from your field of vision. Repeat this procedure with the left eye closed or covered and the right eye focused on the circle this time. Observe the disappearance of the cross as the drawing is brought closer to you.



1. Why did the black dot disappear from your field of vision at some point while you were moving the page closer to your eyes?

2. Name at least 2 circumstances that cause changes in the size of the pupil:

- C. VISUAL ACUITY: View “How to check your patient’s visual acuity”, “Visual Acuity Test with Snellen Chart”, and “Visual Acuity Exam Part 2”, respectively on <https://www.youtube.com/watch?v=kMwy06mAV5U>, <https://www.youtube.com/watch?v=kcULvDBJOVs> and <https://www.youtube.com/watch?v=XNXtLn05ntQ>

Sharpness of vision or visual acuity depends on the number of functioning cones in the retina. The Snellen chart has letters of a certain size that can be identified by individuals with normal visual acuity at specific distances from the chart. Follow the steps:

1. Print the free eye chart on regular 8 1/2 x 11-inch paper, and tape it at eye level to a wall in a well-lit room. Measure 20 feet from the wall and mark the floor with tape. The examinee position is on that mark.
2. Ask the assistance of another person who can be your partner in this activity. Both of you should have watched the teaching videos listed above to oriented of the procedure. The other person may opt not to document the results of his visual acuity, but the student has to write down his/her in the table below:

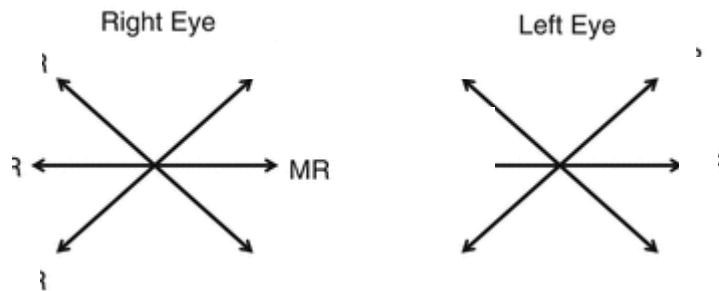
	V = d/D Without glasses	V = d/D With glasses (contact lenses)
Right eye (OD)		
Left eye (OS)		
Both eyes (OU)		

3. Visual acuity, or vision is denoted by V, and has formula $V = d/D$, where d = distance from chart that you could read letters correctly (20 feet) and D = distance that the same letters could be read by a normal eye. For example, at 20 feet, you can only see the large letter “E” that a normal eye can read at 200 feet, you have 20/200 vision.
4. The examiner should stay near the chart with a 12-inch ruler or a piece of stick to be used as pointer, while the client will stay on the designated 20 feet mark from the chart from the start up to the time this examination is finished.
5. Client will have to keep both eyes open but cover your left eye with the 3 x 5 inch card and read the letters on the line pointed by the examiner. The examiner should point line by line randomly, all the letters on the chart as far down as possible.
6. Repeat the procedure testing your left eye, covering your right Repeat the test using both eyes open without cover.

7. If you wear glasses, repeat the test for right and left eyes with your glasses on, covering the eye which is not being tested. The last step is both eyes are without cover and with glasses.
8. Upload a 3 minute long video of you while checking your partner's visual acuity.

D. EXTRAOCULAR MUSCLE (EOM)TEST: There are three ways to assess extraocular muscle function, make that you have watched: <https://www.youtube.com/watch?v=MsBDVW-gdF0>, and <https://www.youtube.com/watch?v=Wf8DGL7WE8U>

1. Six Cardinal Fields of Gaze: With another person 1 meter in front of you, ask him/her to look straight ahead with steady head and only eyes will move to follow your finger as you move it towards the six directions (shown below). While moving your finger, observe the person's eyes moving with coordinated, parallel movements in all directions. Failure to do so means that the responsible eye muscle is defective or paralyzed. Label with name of the EOM involved in the Six Cardinal directions (represented by arrows) below:



2. Corneal Light Function

The alignment of the eyes can be assessed by observing the reflection that appears in both pupils when a light is directed toward a point midway between the two eyes. Ask another person to stay in front of you and look ahead, with both eyes open. Hold a penlight about 15 inches from the face in the midline between the eyes. The bright dot of light reflected in the corneas should be located at the same spot in each eye.

3. Cover and Uncover Test

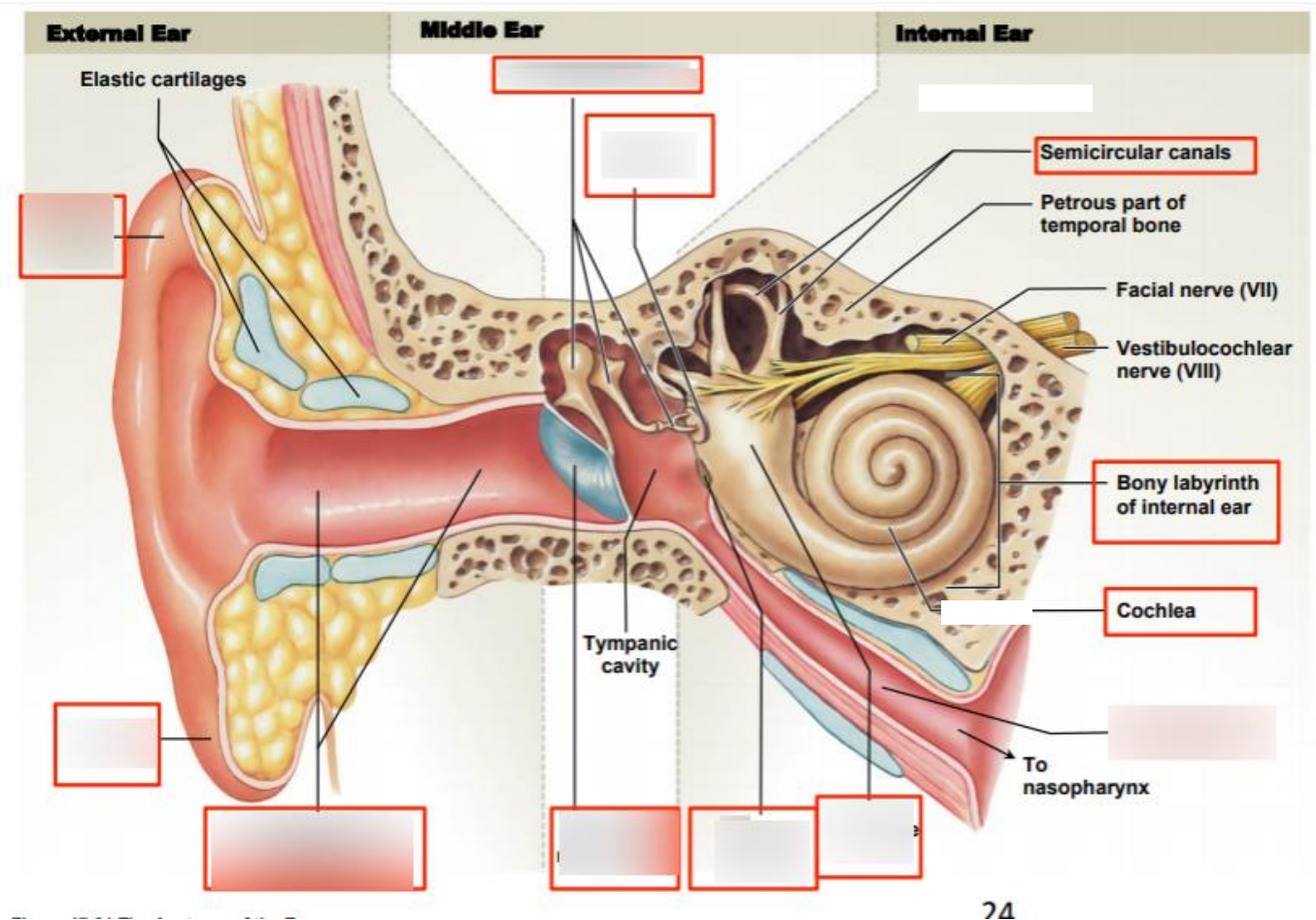
Ask the other person to look straight away at 10 feet with both eyes open. Place a card over one eye and observe the uncovered eye for any movement. The uncovered eye should not move as you place the card over the other eye. Now, remove the card from the covered eye and observe the newly uncovered eye for any movement. The uncovered eye should not move. Do it three times, first on the right, then on the left. Document each finding in the appropriate box. Put N/A for no movement.

	1		2		3	
	Without cover	With glasses	Without cover	With glasses	Without cover	With glasses
Right eye (OD)						
Left eye (OS)						

LABORATORY EXERCISE 9.2 - The Ear and the Senses of Hearing and Balance

Familiarize yourselves with the anatomical structures of the ear selecting from among the choices the correct answer to each ear structure.

Auditory canal	Cochlea	Helix	Semicircular canals
Cochlear nerve	Auricle	Auditory tube	Stapes
Lobule	Malleus	Tympanic membrane	Incus



A. EQUILIBRIUM

MATERIALS NEEDED

<https://www.youtube.com/watch?v=FgF91K7dU8Y>
<https://www.youtube.com/watch?v=FE0sot4OoAE>

Tuning fork 512 Hz

1. The Romberg's Test is a test for the body's ability to have a sense of balance which are the functions of both the dorsal columns of the spinal cord and the vestibule of the ears: Have your

partner stand straight with feet together and eyes closed. Observe your partner for swaying and loss of balance. The Romberg's test is usually done during a neurologic examination.

a. Describe what you observed in your partner when you did the activity above:

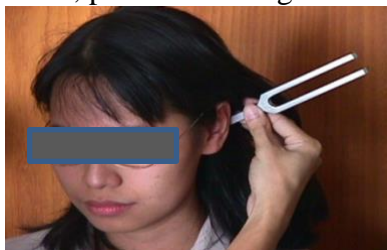
b. What structures in the inner ear are responsible for balance or equilibrium?

c. Trace the pathway sound waves will pass thru when they travel through the ears toward the receptors of hearing: Auricle -

The Weber and the Rinne Tests are usually done on a person together with the results of each combined to determine the location and nature of any hearing losses detected.

2. The Weber can detect a unilateral (one-side) conductive (middle ear hearing loss) and sensorineural (inner ear hearing loss). Start by striking your palm with a tuning fork. While still vibrating, put the handle on top of the head equidistant from the other person's ears on top of thin skin in contact with the bone. It can be placed in the middle of the forehead, also. Ask the person to report in which ear the sound is heard louder.
 - a. Can you hear the tone equally loud in both ears? _____
 - b. If it is louder in one ear, the tone is said to lateralize on one side, conductive, in the side of the ear where the sound is heard louder. A sensorineural defect, in the contralateral ear, where the sound is weaker.

3. In a person with conductive hearing loss, probe further with the Rinne test by comparing bone and air conduction. Normally, Air Conduction (AC) is longer than Bone Conduction (BC). This is a positive Rinne Test. Explain to the other person that you will put the tuning fork on the mastoid process first and quickly move it in front of the ear, with its "U" shaped prongs facing forward. Instruct to say "Stop" when the sound cannot be heard anymore. Strike the tuning fork and place its handle on your partner's mastoid process at the level of the ear canal as shown below, (A). After the person say that there was no sound heard, place the tuning fork in front of the ear canal, (B):




(A)



(B)

- a. In which ear was the sound of vibration heard better? _____
- b. If your answer in letter a, is none, skip this, but if yes, what is the hearing loss called?

LABORATORY EXERCISE 9.3 - The Tongue and the Sense of Taste

	A. Sense of Taste Areas Draw lines to divide the areas of the tongue where receptors for each of the following tastes are concentrated
	<ol style="list-style-type: none">1. Sour2. Salty3. Bitter4. Sweet

B. Which cranial nerves are responsible for the sense of taste?

LABORATORY EXERCISE 9.4 - The Nose and the Sense of Smell

MATERIALS NEEDED: Slices of apple bottle of cologne
Slices of potato oil of cloves or garlic powder

ACTIVITY 1. Fatigue the olfactory mechanism by closing one nostril and with the other smell the oil of cloves in a bottle held close to the nose. Do this while exhaling through the mouth. Take note of the time it took for olfactory exhaustion to occur, that is, when there is loss of the ability to recognize a persistent odor, in this case, the oil of cloves. Once you are unable to smell the cloves, remove it from the nose. This time, determine recovery time by putting the bottle at regular intervals close to the nose until such time as one can smell it again. It would be best to do this activity several times to obtain the average values.

- a. How long did it take for olfactory fatigue to be produced? _____
- b. Recovery time: _____

ACTIVITY 2. Fatigue the olfactory mechanism in the same manner as in Activity 1, but this time use the bottle of cologne. Once fatigued, smell the bottle containing the oil of cloves.

- a. Is it possible to smell the oil of cloves after fatigue with the cologne? _____
- b. Why or why not? _____

ACTIVITY 3. With your eyes closed and the nostrils pinched, have your partner place small pieces of apple or raw potato on your tongue without telling you which. Try to identify whether it is the apple or potato placed on the tongue by taste alone. Do this three times.

- a. Mark with a check (/) the trials which you correctly identified; (x) those which were wrong.

	1	2	3
POTATO			
APPLE			

- b. Why do food seems tasteless when one has a cold?

- c. Where are the receptors for smell located?

- d. Why does sniffing increase discrimination of odors?
