

Name: \_\_\_\_\_ Period \_\_\_\_\_ Date: \_\_\_\_\_

Ms. Randall Anatomy & Physiology

Lab activity: Human Senses (Lab-Aid kit # 8)

### Background:

For hundreds of years, people have been curious about the ways in which living things perceive the world around them, especially the senses: taste, touch, smell, sight, and hearing. Investigators had learned as early as the 17th century that the human eye is a form of camera and that the ear perceives sound by detecting the vibrations of sound waves in the air. The skin was known to be able to respond to pressure.

In the following exercises, you will map your body for sensory perception-smell, touch, pain, heat, cold, pressure, visual perception, blind spot determination, and reflex actions.

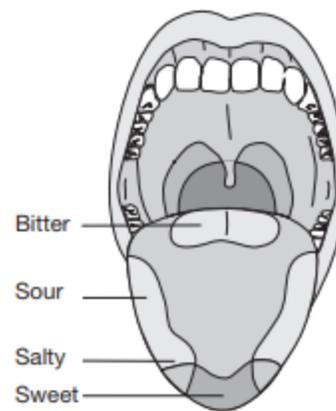
## 1. Chemical Senses

### A. Taste

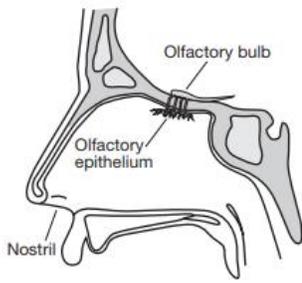
**Materials:** 4 three inch cotton tip applicators, 1 plastic taste solution dish, 1 taste map, 2 bottles bitter solution, 2 bottles salty solution, 2 bottles sour solution, 2 bottles, sweet solution.

### **Procedure:**

1. Pour a small amount of one of the taste solutions into the taste dish so there is enough to cover the bottom.
2. Dip a clean cotton-tipped applicator into the liquid. Drain excess solution from the applicator by pressing it against the side of the dish.
3. Touch the applicator to the tongue of your partner in the regions outlined on the taste map. Tell your partner to place a plus sign (+) on the corresponding area of his taste map if he can sense the taste. If he cannot sense the taste, have him place a minus (-) sign in the appropriate place on the map.
4. After the four areas of the tongue have been tested with one solution, dispose of the cotton swab.
5. Exchange roles with your partner and repeat the test with the same solution.
6. Rinse your mouth with water and rinse out the taste dish.
7. Repeat the procedure with each of the other three taste solutions.



## B. Smell



**Materials:** Plastic inhalers, 2 vials of perfume, 2 vials oil of clove, 2 vials oil of peppermint, stopwatch

### Procedure:

1. Place the plastic inhaler over the spout of the perfume vial.
2. Insert the end of the inhaler into the **lower posterior part of the nostril** while the other nostril is held close. ***DO NOT PUSH THE INHALER UP INTO YOUR NOSE!***
3. Slowly inhale through the nose and attempt to determine the odor.
4. Record your observations:
  
5. Repeat the process, placing the end of the tube in the **upper anterior part of the nostril**. ***DO NOT PUSH THE INHALER UP INTO YOUR NOSE!***
6. Record your observations:
  
7. Which region gives the most distinct olfactory sensation?
  
  
8. Where do you think the olfactory area is located?
  
  
9. Close one nostril and with the other smell the oil of cloves by holding the vial about 1.5cm from your nose. Exhale through your mouth and inhale through your nose. Make sure to keep one nostril closed.

10. Record the time it takes until the smell of cloves is no longer detected. (This is called *olfactory fatigue* or *olfactory exhaustion*). Also, determine the time necessary for recovery. Repeat this procedure three to five times and calculate the average time for olfactory exhaustion and recovery.

*Olfactory Fatigue times:* \_\_\_\_\_

Average: \_\_\_\_\_

*Olfactory Recovery times:* \_\_\_\_\_

Average: \_\_\_\_\_

11. Repeat the process for the peppermint oil and record your results

*Olfactory Fatigue times:* \_\_\_\_\_

Average: \_\_\_\_\_

*Olfactory Recovery times:* \_\_\_\_\_

Average: \_\_\_\_\_

## 2. Skin Senses

**Materials:** paperclips, metal probes, warm water, cold water, ruler

### A. Two-point Discrimination

1. Obtain two paper clips and bend them into a “V” shape.
2. Using a metric ruler, adjust the distance between the ends of the “V-shaped” paper clips so that the two end points are separated by the following distances: 2.0 cm, and 0.5 cm
3. Working in pairs, one student will be the subject and the other student will administer the test.
4. The subject should sit with his or her eyes closed.
5. While the subject’s eyes are closed, obtain the 2.0 cm paper clip and touch your partner’s hand five times using both points of the paper clip and five times using just one point. Mix up the order so that your partner does not notice a pattern.
6. After each touch ask your partner if he or she felt one paper clip point or two. Record the number of points actually used and the number of points felt in the data table.
7. After ten trials are completed using the 2.0 cm paper clip, switch to the 0.5 cm paper clip and the repeat steps for a total of 10 trials.
8. Repeat the steps with both paper clips on the back of the upper arm (tricep area). Record your results.

**Table 1**

**Back of Hand**

**2.0cm**

**0.5cm**

Trial	Points Used	Points Detected	Points Used	Points Detected
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

**Table 2**

**Back of upper arm (Tricep)**

**2.0cm**

**0.5cm**

Trial	Points Used	Points Detected	Points Used	Points Detected
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

9. Based on the results of Tables 1 and 2, does the back of the hand or the back of the arm have more mechanoreceptors (touch receptors)? Explain.

### B. Hot and Cold Sensation

#### Procedure:

1. On the back of your wrist draw a 4 cm square using the washable marker.
2. Place a metal probe in ice water for about 1 minute. Dry it quickly.
3. Have your partner close his/her eyes.
4. With the end of the probe, explore the area marked off for places cold can be felt. **Remember to keep the probe cool!**
5. Mark the location of the wrist with an **X**
6. Immerse the probe in hot water so it gives a sensation of warmth. **DO NOT ALLOW THE PROBE TO BECOME TOO HOT!**
7. Proceed as before, locating the position of the places where warmth can be felt.
8. Determine the frequency of each sensation.  
Warm receptors \_\_\_\_\_/cm<sup>2</sup>      Cold receptors \_\_\_\_\_/cm<sup>2</sup>
9. Reverse roles with your partner and repeat the directions from above.

### 3. Visual Senses

**Materials:** blind spot indicator, straight pin, paper, ruler

#### A. Blind Spot Indicator

**Procedure:**

1. Hold your blind spot determiner (dot on the right of the cross) about 20 inches from your face in front of your right eye.
2. Close your left eye. You should be able to see both the cross and the dot.
3. With your left eye closed and right eye focused on the cross, **slowly**, bring the determiner closer to your face.
4. At a certain distance the circle will disappear from your field of vision. Have your partner measure the distance from the point at which the circle disappears to your eye.

Distance \_\_\_\_\_cm

#### B. Dominant Eye Determination

**Procedure:**

1. Roll a sheet of paper into a tube with a 4 cm diameter.
2. Hold the tube at arm's length. Look through it with both eyes at some object across the room.
3. With the tube held steady, close one eye then the other. Which eye sees the object through the tube?  
\_\_\_\_\_
4. This is your dominant eye. Is it on the same side as your dominant hand? \_\_\_\_\_

**C. Visual Accommodations**-Proper focusing on objects of varying distances requires the eye to accommodate by adjusting both the lens shape and the size of the opening. In the following exercises you will observe some conditions under which these automatic accommodations take place.

**Near Point of Vision:** The distance from the eye to the nearest object can be focused clearly is called the “near point of vision.”

**Procedure:**

1. Place one hand over an eye and focus the other eye on a straight pin held at arm’s length.
2. Gradually bring the pin close to your eye, focusing continually until the pin begins to blur.
3. Have your partner measure the distance from your eye to the pin at the point of blurring. This is your near point of vision.
4. Repeat with the other eye and compare the two.

Right eye \_\_\_\_\_ cm          Left eye \_\_\_\_\_ cm

**Afterimage**

**Procedure:**

1. Look at a bright light for 20 seconds. **DO NOT LOOK AT THE SUN**
2. Now look at the wall or ceiling. Describe what you see.
  
3. Repeat the process and have your partner time the length of the period that the after image stays with you. \_\_\_\_\_secs

**Pupil Reactions**

**Procedure:**

1. Have your partner observe the pupils of your eyes in this exercise and record the results.
2. Allow a strong light from a window or lamp to fall on your eyes. **DO NOT LOOK AT THE SUN**
3. Now look at a dark surface away from the light. What happens to the pupils of the eyes?
  
4. With your partner observing your pupils, place your hand over one eye for a minute. When you remove your hand what happens to your pupils?

- 4. Human Reflexes** Certain reactions can occur automatically. The impulse from stimuli travels a short circuit path which does not at first involve reactions over which you normally have no control.

**Materials:** stool

**Procedure:**

1. Have your partner sit in a stool so that their lower leg can swing freely.
2. Strike a point just below the kneecap with the blunt edge of a ruler or the edge of your hand.

Observe and record what happens.

About how long is the reaction time between striking the knee and the muscle response?

Is it possible for you partner to prevent the muscle response?

3. Try to fool your partner by starting to strike the knee without actually touching it. Observe and record. Is there a response?
4. Have you partner stand resting one knee on a stool or chair. Bend the raised foot forward to stretch the large calf muscle. Tap the Achilles tendon with the edge of your hand. Observe and record what happens.
5. Gently stroke the short hair on the back side of your partner's neck with your finger. Observe the size of the pupils of his/her eyes. Record your observations.