

EXPOSE YOUR NOSE

LESSON PLAN

Title: Expose Your Nose

Setting: In Classroom

Subject: Biology - Neuroscience

Grade Level: K-5

Time Frame: 45 Minutes

Paired Dana Foundation Fact Sheets:

3rd-5th Grade How Do the Senses Work?

Next Generation Science Standards:

Meets K-LS1-1

STUDENT OBJECTIVES

- Learn the pathway for odors once they enter our nose.
- Discover how smells are tied to certain memories.
- Practice observing and gathering scientific observations.

BACKGROUND

Smell, also known as olfaction, is one of the five human senses. In addition to providing important information about the food we taste, olfaction also serves to inform us about hazardous odors in our environment.

This "Expose Your Nose" exercise is interactive, fun, and stimulates lots of fun discussion about our sense of smell.

MATERIALS

- Printed copies of 3rd-5th grade Dana Foundation fact sheet "How Do the Senses Work?" **Downloadable here:** www.dana.org/factsheets/
- Audio and visual capacities for a PowerPoint presentation.
- Blindfolds
- Containers or Ziploc bags
- Banana peel
- Coffee
- Vanilla
- Peppermint
- Chocolate
- Dirt
- This activity requires separating the class into pairs. Make sure to have enough of each item to supply each student group of 2.
- Separate these items into individual containers or Ziploc bags.

EXPOSE YOUR NOSE

TEACHER BACKGROUND INFO

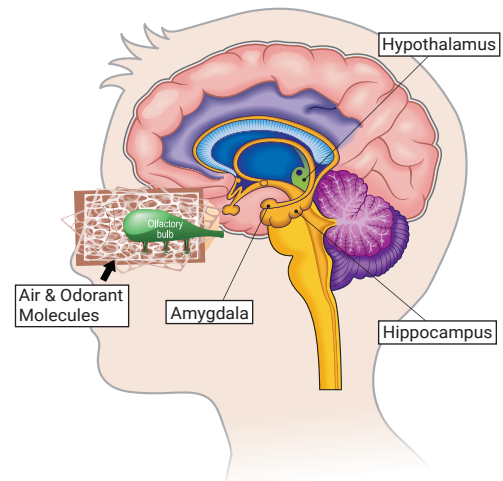
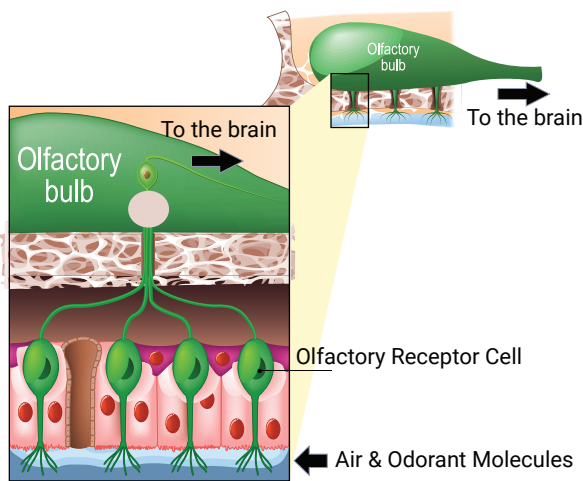
WHAT TO KNOW BEFORE YOU TEACH

* Note: This content is primarily for the instructor's reference; the accompanying PowerPoint presentation will be for the students.

How Does Olfaction Work?

Your sense of smell is part of your chemosensory system as it involves the detection and perception of chemicals in our surroundings. Chemical odors enter our nasal passages and bind to specialized brain cells called olfactory receptor neurons in the olfactory epithelium. Once these neurons detect the odorants, they transmit information to the olfactory bulb. The olfactory bulb contains unique olfactory sensory receptors that send messages to various regions in the brain for processing.

These brain areas include the olfactory cortex and limbic regions such as the hippocampus, amygdala, and the hypothalamus. The limbic system is involved in emotional behavior and memory, which is why certain odors can elicit strong memories.



The hippocampus is the brain region involved in new memory formation, turning short-term memory into long-term memory. The nearby amygdala is critical for processing and remembering emotional events, particularly the ones that cause a fear response. The hypothalamus is composed of distinct regions (nuclei) that maintain homeostasis in the entire body by using hormones to regulate heart rate, blood pressure, body temperature, hunger, thirst, blood pressure, and sleep.

People can detect at least one trillion distinct scents.

**DID YOU
KNOW?**

Reference: Bushdid, C., tv1agnasco, tv1. O., Vosshall, L.B. & Keller, A Science 343, 1370-1372 (2014)

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PROCEDURE

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[1] Each student reads 3rd-5th grade Dana Foundation fact sheet "How Do the Senses Work?" (5-10 minutes).



[2] Briefly introduce the exercise and give a short PowerPoint presentation about the senses, and focus on the sense of smell (10 minutes).



[3] Have class divide into groups of two and distribute a bag of each item to each group (5 minutes).



[4] Instructions for students in groups:

- a. Place blindfold on your partner (2 minutes).
- b. Bring each item up to your partner's nose and allow him/her to smell. Ask the following questions and write down the answer (10 minutes):
 - i. Ask your partner to identify each item.
 - ii. Rate the odor (strong, weak, pleasant, neutral, bad).
 - iii. Describe any memories associated with each smell.
- c. Switch blindfolds with your partner and repeat (10 minutes).

ADDITIONAL RESOURCES

- A collection of neuroscience puzzles and fact sheets for kids in grades K-12 that are available for download (PDF): <https://www.dana.org/share-science/resources-for-educators/>
- More fun experiments and brain facts can be found at the University of Washington website: <http://faculty.washington.edu/chudler/neurok.html>

* The "Expose Your Nose" activity was originally developed by Eric H. Chudler, Ph.D., University of Washington, and was adapted by Elizabeth Weaver, M.S. and Linda Qi Beach, Ph.D. for the Dana Foundation.