

# Your Nose Is for Smelling

## OBJECTIVES

Students explore the nose as the sense organ responsible for smelling.

### The students

- ▶ learn how smells are carried by the air to our nose
- ▶ identify a variety of substances based on their smell
- ▶ discover that, like their other senses, their sense of smell can be fooled

## SCHEDULE

About 40 minutes

## VOCABULARY

nasal cavity  
nostrils  
olfactory nerve

## MATERIALS

### For each student

1 Activity Sheet 10, Parts A and B

### For the class

4 alcohol swabs  
1 btl banana extract  
4 pkts coffee, instant  
12 cotton balls  
52 cups, plastic, 1-oz  
1 marker  
1 btl mint extract  
4 pkts mustard  
52 odor boxes

1 orange\*  
1 roll paper towels\*  
4 pkts relish  
1 btl shampoo  
1 bar soap (hotel-size)  
1 roll tape, masking  
4 tea bags  
1 tube toothpaste (travel-size)  
2 toothpicks  
1 btl vanilla extract  
1 btl vinegar  
water, tap\*

\*provided by the teacher

## PREPARATION

- 1 Make a copy of Activity Sheet 10, Parts A and B, for each student.
- 2 **Odor Boxes Setup:** Before class, prepare the odor boxes as follows:
  - Line up ten odor boxes and label them 1 through 10 with masking tape and a marker. Place one 1-oz cup in each odor box.
  - Pour the contents of one coffee packet into cup 1. Add a small amount of hot water and stir with a toothpick. Do the same with the tea bag in cup 2. Then put mustard in cup 3, toothpaste in cup 4, vinegar in cup 5, shampoo in cup 6, relish in cup 7, plain tap water in cup 8, a piece of soap in cup 9, and an alcohol swab in cup 10.
  - Put the lids on the odor boxes and place the boxes at a distribution station. Make three more sets of odor boxes and place them at distribution stations around the room. You should have a total of 40 odor boxes, 10 at each of 4 distribution stations.

DONE?

READY  
& WAITING

- 3** You will also need to prepare additional odor boxes, labeled A, B, and C, as follows:
- Place a cotton ball soaked in banana extract in a cup in box A, a cotton ball soaked in vanilla extract in a cup in box B, and a cotton ball soaked in mint extract in a cup in box C.
  - Make four sets of odor boxes A–C, but set them aside until Step 6. Do not let students see you prepare these or any of the boxes.

- 4** For this activity, you will need 52 plastic 1-oz cups, 52 odor boxes with lids, some masking tape and a marker to label the odor boxes, 1 orange, 4 packets of instant coffee, 4 tea bags, some hot water, 2 toothpicks, 4 packets of mustard, a small tube of toothpaste, a bottle of vinegar, a bottle of shampoo, 4 packets of relish, a small bar of soap, 4 alcohol swabs, a bag of cotton balls, a bottle of banana extract, a bottle of vanilla extract, a bottle of mint extract, and a roll of paper towels. Each student will need access to all 13 odor boxes at one of the distribution stations.

## BACKGROUND INFORMATION

Although we rely more heavily on our senses of sight and hearing, our sense of smell is nonetheless important. Smells help us tell what's good to eat from what's spoiled. Smells can also warn us of potential hazards, like fire, wet paint, or skunks. Smells help us identify things even before we see or hear them. Like our other senses, our sense of smell provides important information about the world around us.

The nose is the sense organ responsible for smell. The nose contains two **nostrils**, or openings, lined with tiny hairs. The hairs help keep out dust and other small particles when we breathe in. Deeper inside are two dime-size patches of tissue lining the upper part of the **nasal cavity**, above and behind

the bridge of the nose. Each patch contains millions of olfactory (smell) receptor cells. Mucus keeps these tissues moist.

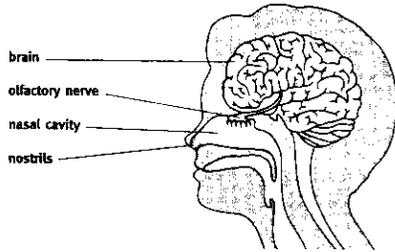
Chemicals enter the nasal cavity through the nostrils (although smells can also begin in the mouth when we are eating). Once they reach sensory receptors deep inside the nasal cavity, they transmit information about smell via the **olfactory nerve** to the brain, which interprets the scent.

For a substance to have a smell, molecules of that substance must enter the air. Liquids that evaporate quickly—rubbing alcohol for example—are easier to smell and can be smelled from farther away. Heating also causes molecules of a substance to enter the air faster, as we know from cooking. Once molecules enter the air, they spread easily. A breeze can make the smell spread even faster.

The human nose can detect over 10,000 odors. Even so, a human's sense of smell is relatively weak compared with that of other animals (for example, a dog's sense of smell is a million times more sensitive than a human's). Human beings rely much more heavily on their senses of sight and hearing. In this activity, students use their sense of smell to identify a variety of substances. From this they will learn that their own sense of smell is pretty good—but not perfect.

▼ Activity Sheet 10, Part A

**Your Nose Is for Smelling**



1. Smell boxes 1–10. Then answer the questions.

Box	What does it smell like?	Do you think it is safe to eat?		Substance name
1	coffee	yes	no	coffee
2	tea	yes	no	tea
3	mustard	yes	no	mustard
4	toothpaste	yes	no	toothpaste
5	vinegar	yes	no	vinegar
6	shampoo	yes	no	shampoo
7	relish	yes	no	relish
8	nothing	yes	no	water
9	soap	yes	no	soap
10	alcohol	yes	no	alcohol

2. Open the box to see what you smelled. If you guessed right, circle the box number above. Answers will vary.

▼ Activity Sheet 10, Part B

**Your Nose Is for Smelling**

Here are three more hidden objects to test your sense of smell.

3. Smell boxes A, B, and C. Then answer the questions.

Box	What do you think is in this box?	Would you like to eat it?	
A	banana (extract)	yes	no
B	vanilla (extract)	yes	no
C	mint (extract)	yes	no

4. Open the box to see what you smelled. If you guessed right, circle the box letter above. Answers will vary.

5. Draw a picture of something you think smells good and is good to eat. Answers will vary.

**Guiding the Activity**

**1** Ask students to name some things that they think smell good. Write their responses on the board under the heading “Smells Good.”

Then ask students to name some things that they think smell bad. Write their responses on the board under the heading “Smells Bad.”

Then ask, **Which of the items in these two lists are safe to eat?** Circle the items on the board. Then ask, **Which of these items are not safe to eat?** Draw a line through those items on the board.

Ask, **Are all things that smell good safe to eat? Are all things that smell bad unsafe to eat?**

Ask, **How do you know the difference between what is safe and not safe to eat?**

**Additional Information**

*Guide students as they distinguish between things that are safe to eat and things that are unsafe to eat. Point out that they should never eat a food if they are unsure whether it is safe to eat.*

*Just because a substance smells good does not mean that the substance is safe to eat. Likewise, just because a substance smells bad does not mean that it cannot be eaten.*

*Point out that we use all of our senses—as well as common sense—to determine whether a substance is safe or not. Students can also ask an adult.*

## Guiding the Activity

2 Ask, **What part of your body do you use to smell things? Where is it located?**

Distribute a copy of **Activity Sheet 10, Part A**, to each student. Draw students' attention to the diagram of the nose at the top of the sheet (see Figure 10-1).

Review the parts of the nose. Ask, **What are the nostrils for?**

Students should know that the **nostrils**—the two openings beneath the tip of the nose—are the openings through which we breathe air in and out of our body. Students probably also know that smells enter the nose through the nostrils.

Tell students that the nostrils are lined with tiny hairs. Ask, **What do you think these hairs are for?**

Ask students to demonstrate how they smell something.

Ask students to look at the diagram again and ask, **Where does the air go after it enters the nostrils?**

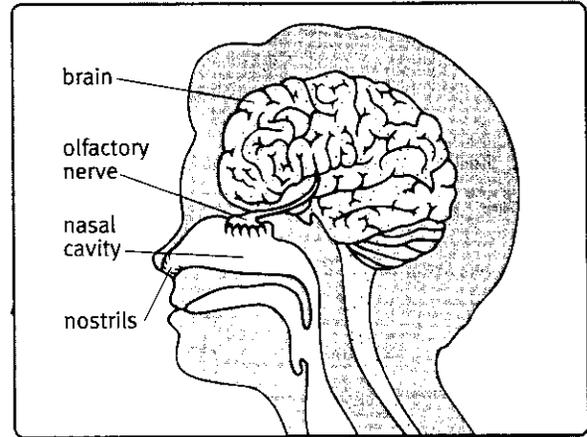
Tell students that air fills the **nasal cavity**, the hollow area behind the bridge of the nose.

Ask, **What is located above the nasal cavity?**

Tell students that the olfactory nerve is located above the nasal cavity. The **olfactory nerve** transmits information about smells to the brain.

## Additional Information

*The nose is the sense organ responsible for smell. The human nose is located in the middle of the face, between the eyes and mouth.*



▲ *Figure 10-1. A cross-section of the human nose.*

*Accept all reasonable responses.*

*The hairs trap dust and other tiny particles that might get drawn into the nose when we breathe in.*

*Students should sniff in air through their nose.*

*the nasal cavity*

*the olfactory nerve*

## Guiding the Activity

Explain that on the roof, or top, of the nasal cavity are two sticky patches that contain special receptor cells. These receptors detect certain smells and send information about the smells to the olfactory nerve. The olfactory nerve passes the information on to the brain. The brain then tells us what we are smelling.

### 3 Next, ask, **How do smells reach our nose?**

Demonstrate how smells travel through the air: Have students close their eyes. ~~Stand in the middle of the classroom and~~ peel an orange. Ask students to raise their hand when they can smell the food you have.

When students detect the smell, ask, **How did the smell get from the orange to your nose?**

Ask, **Could you see the smell as it traveled through the air?**

Explain that smells are caused by tiny particles of a substance that break off and float through the air. These particles, called molecules, are so small that we cannot see them. The particles are carried through the air. Air is always moving. The faster the air moves, the faster the smell travels. We “smell” these particles when they reach our nose and we breathe them in.

Tell students that they are now going to use their sense of smell to try to identify a variety of common substances.

### 4 ~~Draw students' attention to the distribution stations you have set up around the room.~~ Tell students that there are ten odor boxes at each station. Inside each odor box is a substance that they are to identify by smell only. There are holes in the lids of each odor box so that the smell can escape. Students are to hold the boxes close to their nose and sniff (see Figure 10-2).

## Additional Information

*Accept all reasonable answers.*

*The students closest to you will smell it first. If students have trouble detecting the smell, walk around the classroom while peeling the orange.*

*Students should realize that the smell traveled through the air.*

*no*

**Safety Note:** *Students with allergies to any of the foods in Activity 10 should not participate in the odor tests.*

*Warn students not to tip the odor boxes, as the contents may spill. Also tell students to take a deep breath of fresh air (through their nose) before smelling each new odor box.*

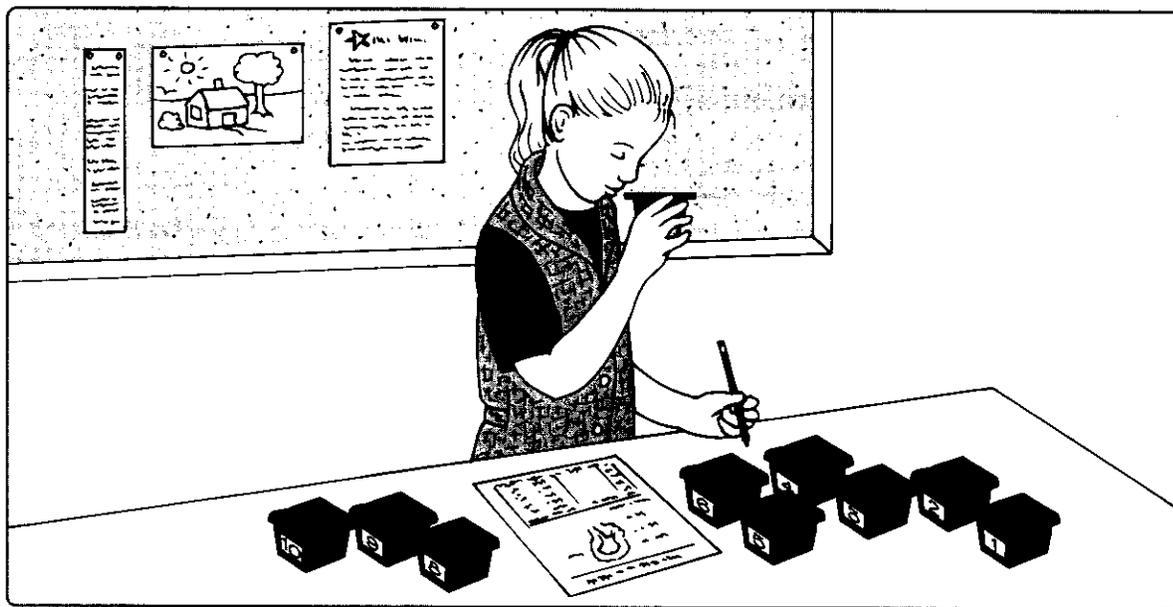
## Guiding the Activity

Divide the class into four teams (one team per distribution station), but tell students to work on their own to identify each substance.

Tell students that they are to complete the first and second columns of the table.

## Additional Information

Assure students that you prepared the boxes and that everything they contain is safe to sniff.



▲ *Figure 10-2. Identifying a substance by smell alone.*

- 5** After all students have had an opportunity to sniff the contents of each box, have students remove the lids to see if they were correct. Provide assistance by showing the original containers of items that might be hard to distinguish, such as the shampoo. Tell students to write the name of each substance in the last column of the table.

Ask, **Were you able to identify all the substances? Were there any that you did not recognize? Were there any that you could not smell?**

*Accept all reasonable answers. Students may have had trouble distinguishing between the shampoo and the soap. And they should not have been able to smell the water.*

- 6** Tell students that their sense of smell is pretty good. Ask them if they would like to try to identify three more smells.

Distribute a copy of **Activity Sheet 10, Part B**, to each student. Place a set of odor boxes A, B, and C at each distribution station. (These odor boxes contain cotton balls soaked in

## Guiding the Activity

banana, vanilla, and mint extracts.) Tell students that they are to sniff each odor box and write down on their activity sheet what they think is in each box and if they would like to eat it.

- 7 After all students have had a chance to sniff the contents of the odor boxes, have a student volunteer bring the boxes to the front of the room. Tell the student to remove the lids from the boxes and tell what is in each box.

Tell students that these cotton balls have been soaked in *extracts*, which are flavorings used in cooking. Often extracts don't taste as good as they smell. The extracts must be combined with sugar or other sweeteners to give them their familiar flavor.

Ask, **Can you always trust your sense of smell?**

*not always*

Have students complete their activity sheets. Tell them that in the next activity they are going to learn about their sense of taste.

## Additional Information

*Students should be surprised to learn that the boxes do not contain candy or fruit but wet cotton balls.*

## REINFORCEMENT

Have students make a bulletin board of animals' noses, showing the variety of shapes and sizes among different species. Discuss the size and shape of each animal's nose and how the animal uses its sense of smell—to identify food, for example, or to learn of an approaching enemy.

## SCIENCE JOURNALS

Have students place their completed activity sheets in their science journals.

## CLEANUP

Discard the empty packets. Collect the odor boxes. Wash the boxes and cups with soapy water, dry them, and return them to the kit. Return the unused cotton balls, marker, and bottles of extract, shampoo, and vinegar to the kit.

## SCIENCE AT HOME

Like all receptor cells, the olfactory cells in our nose can become fatigued when overstimulated. Have students observe this by holding a piece of orange beneath their nose, plugging one nostril, and breathing normally through the other. After about two minutes they should unplug their nose and breathe normally through both nostrils. What do they notice? Does the smell seem stronger to one nostril than to the other?