

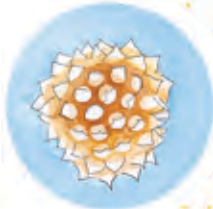
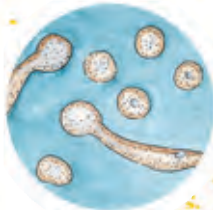


# EXPLORATIONS

for *The Science of Air Teacher's Guide* and *Mr. Slaptail's Secret*



**Can you guess where each thing found in dust comes from?**



The items in the circles are found in dust. Most are so tiny that you need a microscope to see them. The items in boxes are places where these tiny things might be found. Draw a line from each item to the box showing where it comes from.



Look at the clumps of pollen! You need a microscope to see just one grain of pollen.



See page 2 for answers.

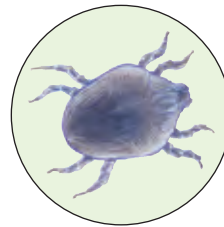
# Let's Talk about...



sprays, smoke from cooking or cigarettes, and fibers from some building materials all can make indoor air unhealthy to breathe.



We often need to keep



doors and windows closed to keep the insides of our buildings cool in the summer or warm in the winter. This can trap pollutants inside for a long time. It also can

provide places for insects, dust mites and molds to live.

Some pollutants of indoor air are so irritating that they can bother anyone who breathes them. These include



paints, asbestos fibers, smoke, cleaners, insect sprays and chemicals used on fabrics.

**Indoor Air Pollution.** When we talk about air pollution, we often think of smog, chemicals produced by factories or exhaust from cars. These are problems that usually affect the air outdoors. But most of us spend much of our lives inside buildings. We go to school or work indoors. We eat our meals, do our homework, play and sleep indoors. All of that time, we breathe the air in the room.

Indoor air can become polluted, or contaminated, by adding harmful things to it, just as outside air can. For example, household cleaners, dust, paints, bug



## Did you know what's in dust? (answers to cover activity)



Spores are made by molds in damp places, like bathtubs.



Amazing! This is a flake of dead skin.



Dust mites like to live in our pillows and mattresses.



Pollen grains are made by flowering or cone-bearing plants. Pollen sometimes gets indoors!



Tiny pieces of dead insects are in dust.

**Allergies.** Other polluters can cause more problems for some people than for others. For example, some people are allergic to things in dust. When they breathe dusty air, people with allergies may start to sneeze or have runny noses and itchy eyes. Once in a while, more serious breathing

# Indoor Air

problems, such as asthma, are caused by dust or other allergens.

## Keeping Our Air Clean and Safe.

How can we keep the air inside our homes and other buildings clean and safe? A little common sense goes a long way. We can be careful about using chemical cleaners, paints, glues and

pesticides, and, instead, use products that don't pollute. We can reduce the amount of dust in the air by changing the filters in our home heating and cooling systems. We can get rid of some sources of indoor air pollution completely. For example, smoking is no longer allowed in many public buildings, such as movie theaters, hospitals and schools.



Most of all, we can remember how important it is to have clean air to breathe inside our homes, schools and offices. Each of us can do something to help keep our indoor air clean.

## Tips for Healthy Living

Try these and use fewer harmful chemicals in your home.

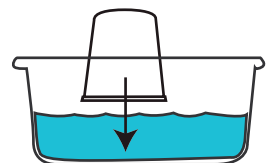
- Mix equal parts of powdered sugar and baking soda or borax. Set the mixture out in a small dish to help eliminate cockroaches.
- Wash your pet with lots of soapy water to drown fleas instead of using chemical sprays.
- Buy pure beeswax furniture polishes and candles.
- Use natural, untreated fabrics.
- Use baking soda as an air freshener for refrigerators, garbage cans and carpets.
- Coat plant leaves with soapy water to kill small insects.
- Mix 1 tablespoon of vinegar with 1 liter (quart) of water to make a cleaner for windows and floors.



## Can We "See" Air?

**Try this in the sink, bathtub or a large bowl of water. Turn a clear plastic cup upside down and push it down into the water. What happens? Is there any water inside the cup?**

**Now, turn the cup slightly on its side. You will see a big bubble rush toward the surface of the water. What do you think the bubble is made of?**

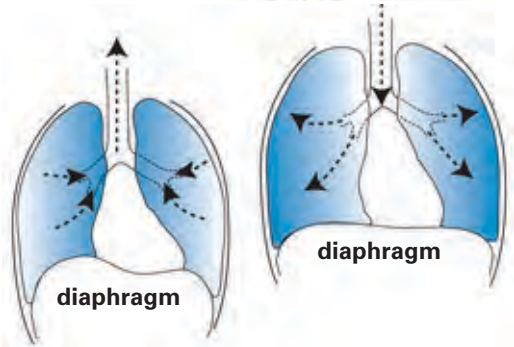


# Breathtaking Fun!



When we are not active, each of us breathes about 10 times every minute. Surprisingly, our lungs have no muscles of their own. So, how can they do the work of breathing?

The work is done by muscles in the walls and bottom of the chest. When these muscles tighten, they make the space inside the chest larger. This lets air rush into the lungs. When the muscles relax, the space becomes smaller and air moves out of the lungs. Try to breathe in and out without moving your chest. IS IT POSSIBLE?



## It's In The Air



Excuse me please,  
I've got to sneeze.  
I feel it coming on!  
Is it the dust  
In this old house

That makes it feel so strong?  
Or maybe pollen from the plants  
Released in spring and fall?  
Or spores produced by all the mold  
On our damp basement wall?  
Or maybe pepper from the can  
I spilled all over there!  
Achoo, achoo, achoo, achoo—  
There's something in the air!

## Try this!

You can make a model that shows how your lungs work. You will need a medium-sized clear plastic bottle (a dishwashing soap bottle or water bottle works well), scissors and 2 medium-sized balloons.

1. Have an adult help you cut off the bottom half of the bottle. The top part of the bottle should be about 6 inches (15 cm) tall.
2. Slide a balloon into the mouth of the bottle and roll the open end over the top edge of the bottle. This will be the "lung" in your model.



3. Cut off the top of the other balloon. Tie a knot in the bottom of the remaining piece. Slide the cut end around the bottom of the bottle.
4. Pull the bottom balloon carefully downward. What happens to the "lung" balloon? This is similar to what happens when you breathe in.

Gently squeeze the sides of the bottle and push the bottom balloon into the space in the bottle. Now what happens? Coughing and sneezing help clean out your airways. Can you make your lung model cough or sneeze?

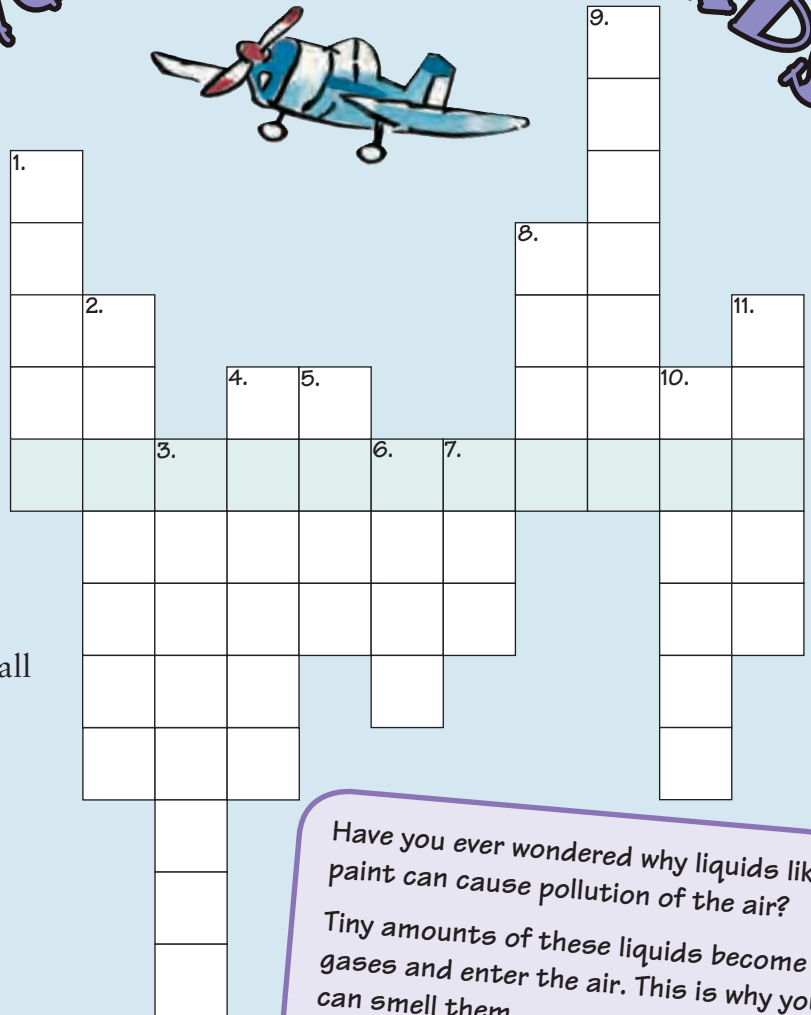


# WORLDLY WORDS



Here is a puzzle for you to solve along with a friend or family member.

Use the clues below to fill in the vertical spaces and find the mystery word in the green boxes. Solutions to all of the clues can be found within this *Explorations*.



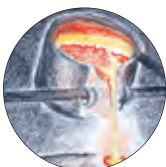
1. When some things burn, this goes into the air.
2. Tiny pockets of the lung.
3. Mineral that breaks up into very small fibers, once used often in building materials.
4. Molds spread by these.
5. It grows on damp things.
6. Name of Rosie's friend.
7. We breathe it.
8. Tiny bits of it float in the air.
9. Main air tubes inside the lung.
10. Many people are allergic to these tiny things produced in flowers.
11. You have two of these inside your chest.

Have you ever wondered why liquids like paint can cause pollution of the air? Tiny amounts of these liquids become gases and enter the air. This is why you can smell them.

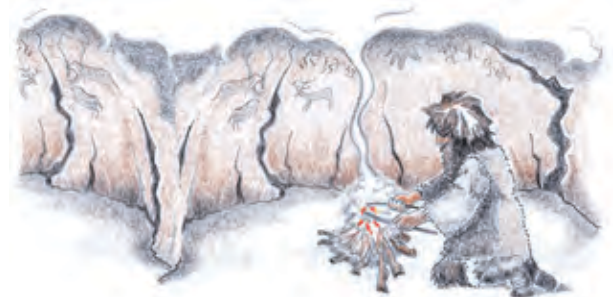
Try filling a clear container with colored water and setting it in a place where it will be undisturbed. Check the water level every day. What happens? What do you think this is called?

## Not Such A New Issue . . .

In 400 B.C., Hippocrates, a Greek scientist, noticed that lead caused serious health problems. Nowadays, this poison can be found in chips and dust from old paint.



“Cave men” must have had problems with smoke in their



homes. Anthropologists have found soot on the ceilings of prehistoric cave dwellings.

# We Can Make A Difference!

We are Mrs. Pineda's third grade class at Rucker Elementary School in Houston, Texas.



We read a story about how Riff and Rosie helped their neighbor, Mr. Slaptail, clean up his house so that he could breathe better. We thought about how we could have less pollution in our houses or at school. We decided to have a "Classroom Clean Air Day." Here are some things we did.

First, Mrs. Pineda opened the air conditioner so we could see the filter. It was packed with dust. All that dust came from the air that we breathe!



We opened the windows to let stale air out and fresh air in.



Why don't you see what you can do to have cleaner air where you live or go to school?

We washed our desks and windows with vinegar and water. It doesn't pollute the air like some cleaners from the store do.



We put soapsuds on the leaves of our plants so we don't have to use poisonous insecticides.



We cleaned our rugs with baking soda. It doesn't have any harmful chemicals.





## Rosie and Riff talk to...

# Cindy Jumper, M.D. Pulmonologist

### *What do you do at your job?*

I'm a lung doctor. People who might have asthma or bronchitis, or lung damage from smoking, come to me. I work in a hospital and teach in a medical school. I also study how pollution affects people's lungs.



### *How did you decide to do this kind of work?*

When I was in school, I volunteered at a hospital. I got to work in the emergency room, and I really liked it. Later I became a nurse. I was one of only a few nurses in a small town, so I learned to do almost everything. But I wanted to do even more, so I decided to become a doctor.

### *Have you always been interested in science?*

Yes, especially in how the body works. I liked chemistry a lot, and I've always thought being in a lab was fun!

### *What do you like most about your work?*

I like having the chance to do so many different things. Sometimes I can help people who are very ill, and that is exciting. I love to be able to keep learning and to teach others.

### *Is there anything else you would like to tell our readers?*

I'd like to say, "Learn to be responsible for yourself. The things you do today can affect you, and maybe even your children, many years from now. If you decide to smoke, for example, think about what it might do to your body. You're still going to be in that same body in 50 years! Take care of it, starting now."



Dr. Jumper is standing in front of a machine that measures how much air a person can blow out of his or her lungs. It is known as a spirometer.

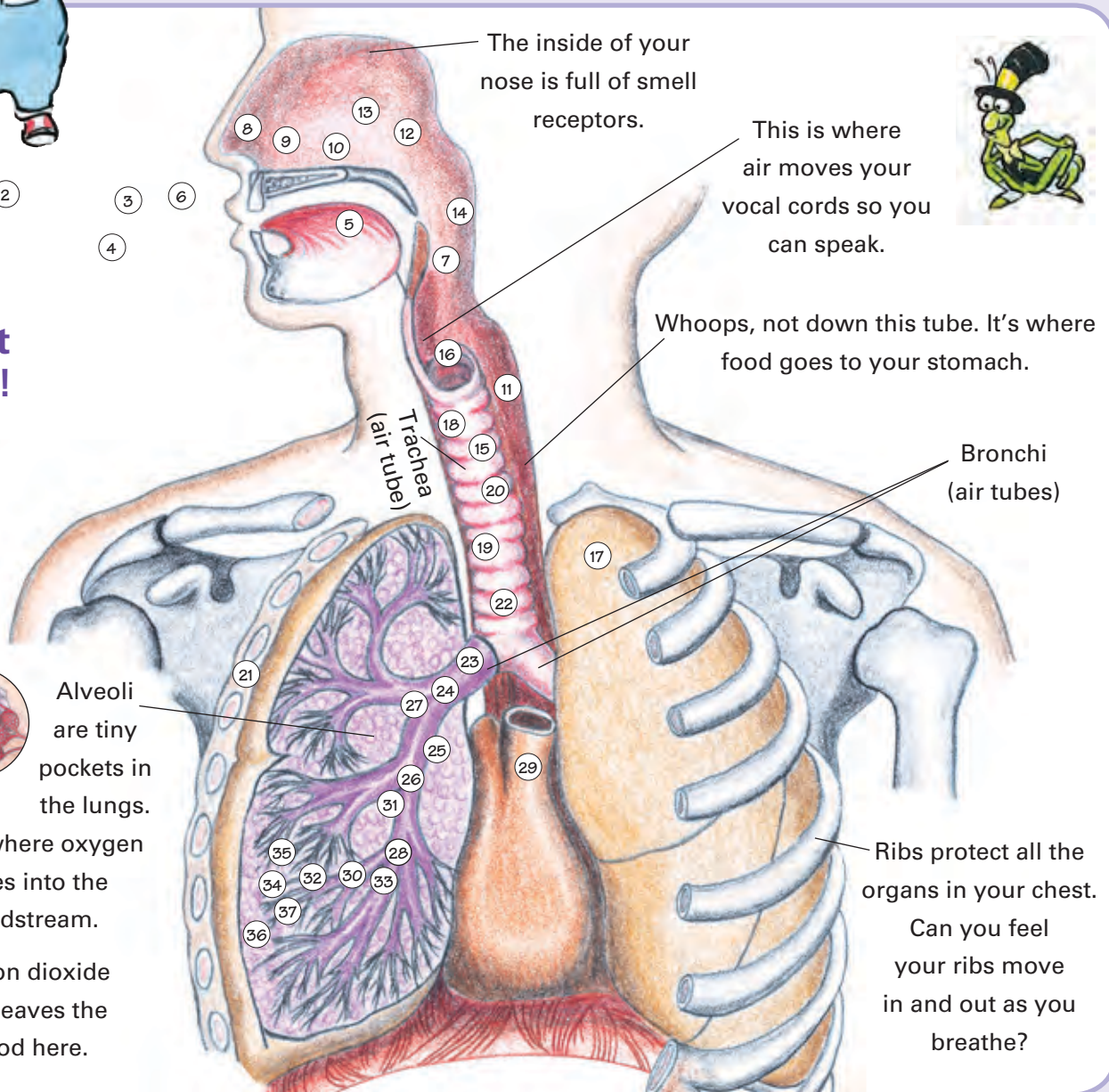


# Where does the air go when you breathe?

Let's look at a path air might take as it travels in your body. Connect the even numbers in order, using a colored pencil, crayon or marker.

- ②
- ③
- ④
- ⑤
- ⑥
- ⑦
- ⑧
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- ⑩
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**Start here!**



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