

Name _____

Date _____

Block _____

LESSON CLUSTER 4: The Air Around Us

Lesson 4.1: Is Air something or nothing?

Air is all around us and all around the earth, but you can't see it. Is air nothing? Or is it something?

Let's try some activities to find out more about air. Collect some air in a small plastic bag by moving it through the air, then twist the top tightly. Answer the following questions.

1. How do you know air is in the bag?

2. Squeeze the plastic bag. Can you feel that there is air in the bag when you squeeze it?



In class, we are going to try another activity. Follow these directions, answering the questions as you go.

1. Put on safety glasses, since we are using glassware.
2. Each pair of students will use one large beaker and one small beaker.
3. Fill the large beaker about $\frac{3}{4}$ full with water.
4. Fold 1 roadrunner into quarters, and use a small piece of tape to secure it to the inside of the small beaker, all the way at the bottom.
5. Make a prediction . . . do you think that the wildcat will get wet when you put the small beaker into the larger beaker? Why or why not?

6. Now, turn the small beaker upside down and push it into the water, keeping it directly up-and-down. Record your observations. What do you see inside the small beaker?

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7. Remove the small beaker by carefully pulling it up, keeping it straight up-and-down. Is the wildcat wet? How can you explain this?

8. You might have noticed that however hard you pushed the glass into the water, you could not fill up the cup with water. Use what you know about molecules to explain this.

9. So . . . Is air something or is it nothing?

In these activities, you experienced that air IS something – it takes up space and, even though you can't see it, air is very much all around you, in the bag, and in the small beaker you used.

Like all gases, air is made of molecules that are rather far apart. That is why you cannot see air.

All the molecules of air are moving all the time, even when there is no breeze. The molecules never stop moving. They are far apart so they move freely, but they bump into each other and into other things, bouncing back and forth. Air is all around us, all the time. Even though you can't feel them, molecules of air are always hitting you. You breathe in molecules of air and breathe them back out.

The air that is all around the earth is called the atmosphere. The atmosphere goes up past the clouds, higher than mountains. As you go higher in the air, the molecules of air get farther and farther apart, and the air gets thinner. If you keep going up, you finally get to space, where there are no air molecules at all.

Clean air is a mixture of different kinds of molecules, including nitrogen molecules (N_2), oxygen molecules (O_2), carbon dioxide molecules (CO_2) and water molecules (H_2O). Air is mostly nitrogen and oxygen – about 4/5 nitrogen and about 1/5 oxygen. Other gases, like water and carbon dioxide, make up only a few percent of the molecules in the air. Often, air has other substances in it, too, like dirt, dust, smoke, bacteria or chemicals we consider pollutants. Most substances you can see in the air, like dust or smoke, are made of solid particles that contain trillions of molecules each; that is why you can see them. But sometimes substances that you can't see also mix with air.