4-H2O
Facilitator Outline

Materials:

Calculators (6)	plastic drinking cups	straws	zip lock bags
Brom Blue	water	plastic wrap	eye dropper
Effervescent tablets	paper towels (for spills)	pencils	crayons (K-2)

Do	Say	Materials	Time
Welcome & Introduction • Break students into groups of three and hand out materials. • Have one student be the tester, one be the assistant tester and one be the reporter.	"Today we are going to learn what happens when CO2 builds up in the atmosphere." (Read at the top of page 5)	For each group: Cup straws	5 min
Part 1: The Effect of Gases • Helpers should go around to each group and pour water in the cups. They add a dropper full of ***brom blue***, cover with plastic wrap. For younger groups you may not want to hand out the straws until the solution is mixed. DO NOT	"There are many things that produce CO2. When we exhale, we also produce CO2 and release it into the atmosphere. Let's see what that looks like." "Water has oxygen in it. We can use a special chemical to detect the oxygen. We will now put a dropper-full of this chemical in your cup of water. What happens? What is the chemical	Water Eye dropper Brom blue	15 min

LET STUDENTS DRINK THE SOLUTION THROUTH THE STRAW! • After the students blow into the water, have the reporters describe what they see. • Add a second "blower." Have the reporter describe what they see. • Sometimes the students all really want to blow into the solution. Go ahead and let them; that is why each student has a straw.	telling us?" "Now, we will come around and cover your solution with plastic wrap. One person should unwrap their straw and blow into the water. ONLY BLOW!" "The other two need to watch and see what happens. What do you see?" "Now let's have a second person blow into the cup of water at the same time. "What is happening? Water has oxygen in it, just like our atmosphere. When we put too much CO2 into the atmosphere, it takes over the oxygen. Fish use their gills to get oxygen out of water. If there is too much CO2 in their water, they will die."		
Part 2: Greenhouse Gas Buildup Each group gets 3 plastic bags and 4 effervescent tablets. Have one student hold the bag while facilitators go around and put in the water and ½ tablet following the directions on page 6. Be sure the air is out of the bag when	"What happens when CO2 builds up in our air? Let's find out."		20 min

you seal it up. Repeat the bag assembly with a whole tablet, again as described on page 6, then a third bag with two tablets. Have students observe and talk about what is happening.	"The plastic bag represents the earth's ability to capture greenhouse gasses and allow them to build up." "The tablets represent our carbon foot print, or, the amount of carbon we produce from different activities that we do every day. The bigger our carbon footprint (the more tablets) the more gasses are produced (the amount of build-up in the bags.)"		
Part 3: Lower your Carbon Footprint This activity is geared toward older students, but can be adapted someone for younger ones. For K-2 Discuss ways to make the human impact on the environment smaller. Have students look at their footprint graphic, then color the blank footprint graphic to show a happier, positive footprint."	"A foot print leaves behind evidence that you have been somewhere. A carbon footprint is evidence that you have been somewhere and have made a difference in the amount of carbon in the air." For K-2 "There are many ways we can use less carbon and make our footprint better and happier for the earth. What can we do?"		10 min (or so)

For 3rd and 4th graders, go through the equations on pages 10-12. Have calculators on the tables so that those who want to do the equations may do so, but don't require it. Do the math on a calculator with them. The idea is not necessarily to test how well they can multiply, but to see the magnitude of the impact. This is the last activity, so only do what you have time for.	For 3rd and 4th Grade "There are many things we do that have an impact on the environment. There is a way to calculate that impact. It is called the 'carbon footprint.' We can calculate our carbon footprint with some multiplication. Let's do that."		
Conclusion Have everyone place their materials in the middle of the table. Dump out the water after students have left; bags can be dried out and reused. Ask the students to think about one thing at home they might do, or do differently.	"Put everything in the middle of the table." "Pick one thing you will do differently. Tell your group."		5 min