Lesson 5: Climate Change and You

Snapshot

This lesson explores climate change. Students learn what causes climate change and how we can participate in reducing the harmful effects of climate change.

Preparation and Materials:

- Posters 1–5, Take-Home Talk
- Flip chart and markers
- Black or white board
- Select six students for this activity: five to act as the sun, one to act as the Earth. You will need a relatively large space for this activity.
- Two dozen removable circular stickers to represent gases
- Read Walrus Case Study located under Additional Resources and print enough copies for the class

Objectives—Students will be able to:

- explain what the sun is;
- explain the rotation and revolution of the earth around the sun;
- explain what our atmosphere is and what it does; and
- explain how climate change impacts them and the simple steps that they can take to help reduce greenhouse gases.

Vocabulary: climate change, greenhouse gases, and atmosphere

Procedure:

1. Introduction and the Earth's Orbit Activity *(18 minutes)*
   Optional Activity: Planting Seeds or Seedlings *(15–25 minutes)*
2. Defining Terms and Greenhouse Effect *(18 minutes)*
   Optional Activity: Walrus Case Study *(20–25 minutes)*
3. Close and Take-Home Talk *(8 minutes)*

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1. Introduction and the Earth's Orbit Activity *(18 minutes)*

Review

Ask several students to share something that they remember from the previous lesson.

Prompts: What did you learn that you didn't know before? What did we talk about that you already knew? What surprised you from our last lesson? What are some of the new words that you learned from our last lesson? What can you do to positively impact the issue we learned about?

Do
Ask

*[Show **Poster #1** (four photos—extreme closeup images of the sun or sun flares).]*
We looked at these when we talked about sun smarts—who can tell me what this is?

Explain

This is our sun. Someone remind the class what the sun is and some cool facts about it.

Prompts: The sun is the star at the center of our Solar System. The sun is 109 times larger than the Earth and primarily consists of hydrogen and helium (gases).

Explain

We want to think of the sun as a humongous power plant that is throwing off heat energy. We can experience the sun's energy because the core of the sun is more than 28 million degrees. Today, we will talk about another environmental health issue that involves the sun: climate change. Before we talk about climate change and how we need to protect ourselves from the sun, let's think about our Solar System a little more.

Explain
Do

*[Ask for six volunteers: five to represent the sun, one to represent the Earth. Show **Poster #2** (image of the planets and their orbits).]*The sun is the center and the anchor of our Solar System and, like the other seven planets in our system, the Earth moves, or orbits, around it along a pathway. It takes a full year for the Earth to travel this pathway one time. Let's see if we can demonstrate this.

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1. Introduction and the Earth's Orbit Activity *(continued – page 2)*

Explain

Tell the class that the five students representing the sun will link arms and act as the sun. The student representing the Earth will revolve around the sun using the orbit image as a guide. Ask the student representing the Earth to start revolving around the sun students.

Do
Ask

[Let the student revolve around the sun one time.] If the Earth went around the sun this way, wouldn't *[insert child's name]*'s arm always be getting the sun's rays and wouldn't *[his or her]* other arm always be in the dark?

Prompts: What about night and day? If the rays are streaming toward the Earth, can they curve around the Earth?

Explain
Do

While the Earth is moving along this pathway, it's also spinning, or rotating, extremely fast. And as it spins, the sun hits different parts of it, giving us night and day. It takes 24 hours for the Earth to spin around completely. *[Tell the Earth student to continue on the pathway, but to now spin/rotate while doing it.]*

Ask

[Let the student revolve around the sun once while rotating for night and day.] What about the seasons? If the Earth is revolving and rotating, we should have the same weather all the time, right?

Prompts: Do we have the same weather all the time here? Does any part of the world have the same weather all of the time?

Explain
Do

Well, the Earth doesn't stay straight up and down, it tilts throughout the year, and as it tilts, some parts of the Earth get more sun. During which season does the Earth get more sun? *[Summer.]* Less sun? *[Winter.] [Tell the Earth student to continue on the pathway while spinning and tilting.]*

Ask

How many times would the earth need to rotate/spin for each one revolution around the sun?

Explain

365 times! A rotation is 1 day, which gives us night and day, and a revolution is 1 year, which gives us the seasons.

Explain

The heat energy we get from the sun as we orbit and rotate and tilt is part of a delicate balance.

Optional Activity: Planting Seeds or Seedlings *(15–25 minutes)*

Explain

We just learned about how important the sun is to life here on earth and how our planet is constantly changing in relation to the sun. Now let's see the sun in action. We are going to decorate these planters and then plant *[insert what you will be planting]* in them. We will set the plants in the sun and watch them grow and respond to the sun. We'll be able to see the plants actually seek out the sun by how they move.

Do

Pass out planters and decoration supplies, including crayons, markers, paint, stickers, glue, etc.

Ask

As students are decorating the planters, lead a loose discussion on growing things.

Prompts: How many of you keep plants at home? Have you ever grown anything to eat? How big/tall do you think these plants will get? Why will we be able to see them move toward the sun?

Do

Help students put potting soil and seedlings or seeds in their pots and place them in a sunny window.

2. Defining Terms

(18 minutes)

Ask

Why do we need the sun? What does it provide us?

Prompts: Would we have plants without the sun? Food? Would we be able to live if the weather got extremely cold or extremely hot?

Explain

The Earth and all of its animals and plants work together as a system to sustain all of the trillions of living things. It's a careful balance and if one thing changes, it's going to have a ripple effect across the entire system. The warming of the Earth's overall temperature is one big ripple!

Ask

Have you heard of the Greenhouse Effect? What does this mean?

Prompts: Have you ever seen a greenhouse before? What do they do? Or think about what happens to a car on a hot summer day. When you get inside, what is it like? Often it's hotter inside the car then outside, right?

Explain Do

*[Show **Poster #3** (photos of a greenhouses).]* Most greenhouses look like small glass houses and are used to grow plants, especially in the winter. Greenhouses trap heat from the sun. The glass panels of the greenhouse let in light energy but keep heat energy from escaping. This causes the greenhouse to heat up, much like the inside of a car parked in sunlight, and keeps the plants warm enough to live in the winter. The Earth is kind of like a giant greenhouse.

Explain Do

*[Show **Poster #4** (The Greenhouse Effect #1 – overview).]* The sun sends heat and light energy our way and it enters our atmosphere. The Earth and crops and people absorb the energy. The heat is also absorbed by our atmosphere.

Ask

What does ***atmosphere*** mean?

Prompts: Can you see it? Can you taste it? Can you hear it?

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2. Defining Terms *(continued – page 2)*

Explain

The atmosphere is the air that we breathe, the molecules bouncing off each other. It's all around us and it helps protect us from the sun. This giant sun powerhouse sends so much energy our way that it would be extremely dangerous if it came directly to the Earth's surface. The gases that make up the atmosphere act like the glass on a greenhouse and let most of the light and the heat in, but filter out some of it so that it's safer for us. These gases also help to keep the Earth warm when one part of the Earth is rotating away from the sun—at night. Our atmosphere is a mix of gases that do different things. If we change the mixture of gases, how could our planet change?

Explain
Do

*[Show **Poster #5** (The Greenhouse Effect #2 – detail of the rays hitting the atmosphere and use removable stickers to represent gases).]* Since it's difficult to see the atmosphere we're going to use these stickers to represent different gases in the atmosphere that are all around us. *[Place the removable stickers on the Greenhouse Effect #2 Poster and tell students what gases they represent.]* Explain that the gases help keep the heat around us like a blanket.

Explain

These gases also help to keep the Earth warm when one part of the Earth is rotating away from the sun at night. Our atmosphere is a mix of gases that do different things.

Ask

If we change the mixture of gases, how could our planet change?

Prompts: Different gases do different things. What if we had a lot of gases in the atmosphere that made it really, really hot or blocked the sun's good effects? If the temperature rises, what might happen to plants? To snow? To ice? To fish in the ocean?

Explain

Remember, we said that this system of ours is a balance. Well, what happens if we have more and more of these greenhouse gases in our atmosphere?

Prompts: Would it get hotter or colder? More greenhouse gases in our atmosphere means that more heat stays close to the Earth and the temperature rises. The temperature of the Earth has risen 1 degree Fahrenheit over the last 100 years, and it's projected to get hotter.

Explain
Ask

So, when people talk about the Greenhouse Effect, they mean the rise in temperature that the Earth is experiencing because gases in the atmosphere trap the energy—the heat—from the sun. What is good about this? What is bad about it? Have you heard people talking about this issue?

Ask

Why do we have more greenhouse gases than we used to?

Prompts: What do we use more of today that we didn't use 100 or 200 years ago?

Explain

Greenhouse gases are released when we burn gas and oil and coal to power our cars, factories, planes, and trains, and provide power/energy to the places where we live and go to school and work.

Ask

What happens if the Earth gets warmer? What or who would be affected?

Prompts: Would ice stick around if it got hotter? Would ocean temperatures rise? What about our seasons, would they be impacted?

Explain

If the temperature continues to rise, it can have a huge ripple effect. One of the big things that would be impacted would be weather. A hotter Earth would mean more rain and more severe weather like hurricanes, snowstorms, and even droughts. This would happen because melting ice would make more water in the oceans and they would rise. The hotter air would create more precipitation that would collect in the clouds and cause more rain in some areas. And what happens if the oceans rise? Have you seen a beach? Think about all the people who live by the water—what would happen to their homes? Everyone and everything would have their environment changed drastically.

Explain Ask

What would be the impact on children? Remember that we talked about how children and adults interact with their environments differently. Well, climate change also affects children and adults differently. As the Earth gets warmer, and we create more greenhouse gases, air pollution increases from these greenhouse gases and ground-level ozone—that's another name for smog—increases. Young children's lungs, and your lungs, too, are still developing, so exposure to this pollution can have long-term effects. We get ground-level ozone when vehicle exhaust, fumes from factories, pollution from power plants, and other chemicals in the air mix with high temperatures.

Ask

During the summer, when it gets really hot, have you ever heard the newscaster say that it's a Code Orange day or a Code Red day? That's a measure of how healthy the air is to breathe. On days when air pollution is high, it is good to stay inside and not do a lot of exercise outside.

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Optional Activity: Walrus Case Study *(20–25 minutes)*

Do

Read the case study included in this lesson to the students and lead a discussion about the impact of climate change on the walrus.

Prompts: A moment ago, I said that climate change had a ripple impact. Let's think about these walruses and this idea of a ripple impact. Have any of you ever thrown a stone into some water? What happens? One action, you throwing a stone, causes all these ripples, all these other actions, that are connected. What happens if there are fewer walruses?

Explain
Ask

So, what can we do to make sure that our system stays in balance? *[Make a list of all of the suggestions. Be sure to prompt students to think of local examples of saving energy.]*

Prompts: What are some ways that we can reduce the amount of greenhouse gases that we generate daily and help to reduce ground-level ozone?

- Turn off lights at home and at school.
- Walk, carpool, or take public transportation to get where you need to go.
- Buy things that are locally made or grown and don't have to travel very far to get to you.
- Turn off and unplug your appliances—like computers, TVs, cell phones, and MP3 players—when you're not using them.
- And recycle, recycle, recycle! All of our trash in landfills mingles and releases greenhouse gases as well. The less you put in, the better.
- Take a short shower instead of a bath—a 10-minute shower uses less water, and thus less energy, than a bath.
- Tell your friends and family about saving energy. Encourage them to use ENERGY STAR® products, like CFL (compact fluorescent lightbulbs), and other products that save energy.

3. Close and Take-Home Talk

(8 minutes)

Explain Do

Close your eyes and take a nice deep breath. We've covered a lot today. We talked about the sun and why we need it. We had a demonstration of the orbit, rotation, and tilt of the Earth. We talked about ***greenhouse gases***. Raise your hand if you can tell the class what greenhouse gases do and how they are created. *[Call on a student.]* We talked about what might happen if the Earth continues to warm. And we talked about some simple things that you can do to reduce the amount of greenhouse gases. Who can name a few of these things? *[Call on a student.]* You can open your eyes now.

Take-Home Talk

The coolest part about learning something new is sharing the knowledge. Tonight, when you get home, I want you to talk with your family about the things we learned today. Look for ways that you can use less energy in your home and talk with your family about how you can all help generate less greenhouse gases. Can you and your family commit to making some simple changes to help reduce greenhouse gases?

Explain Do

*[Pass out **Take-Home Talk**.]* This Take-Home Talk sheet has some things that you can share with your family and some activities that you can do at home. See what you can accomplish on the sheet and we'll talk about it the next time we meet.