



This segment will help students understand how pollution affects the environment and how to reduce their pollution to help conserve natural resources.

**Student Science Performance**

**Grade or course:** Third Grade

**Title:**

**Topic:** Pollution and Conservation

What Can I Do to Help?

**Performance Expectation for GSE:**

**S3L2. Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.**

- a. Ask questions to collect information and create records of sources and effects of pollution on the plants and animals.
- b. Explore, research, and communicate solutions, such as conservation of resources and recycling of materials, to protect plants and animals.

**Performance Expectations for Instruction:**

After examining pollution in their area, students will

- understand that changes in environments can happen naturally or be influenced by humans.
- give examples to support the idea that some environmental changes are good, some are bad, and some are neither good nor bad.
- explain that pollution is a change in the environment that can influence the health, survival, or activities of organisms (including humans), and give examples of pollution.
- understand that plants and animals live in a variety of habitats, and that change in those habitats affects the organisms living there.
- give examples of human activities in agriculture, industry and everyday life that have had major effects upon the habitats of organisms.
- explain ways that individuals (including themselves) and communities can do things to help protect the Earth's resources and environments.

[Additional notes on student supports](#)

**Materials:**

For **Air Pollution Activity**: Construction paper, broken-down cardboard boxes, plastic wrap, wax paper, aluminum foil, scraps of fabric, coffee filters, index cards, paper plates, paper cups, petroleum jelly, corn syrup, tape, glue, coat hangers, string, rulers, scissors, 1 centimeter squares cut from transparency film [cm grid paper template](#) (1 per group), and hand lenses.

For **Water Pollution Activity**: a 2-liter bottle cut in half for each group, and an assortment of small rocks, gravel, sand, cotton balls, paper towels, screens, fabric scraps, coffee filters or any items that you might have to filter water.

*Students will continuously obtain, evaluate, and communicate information. This is not a linear process. Students will communicate through writing and discussions to allow for formative assessment. This benefits the teacher, student, and whole group to guide instruction to clarify misconceptions or extend content.*

*Engaging Learners*

**Phenomenon**

Show the Rubber Duck Race PowerPoint (located in Teacher Resource Link)

	<p><i>Obtaining</i> Possible questions to ask: “We only have a small percentage of water on the Earth that is safe to drink. If we get that water dirty, can we still use it? Can the animals live in it?” “Is there a way that we could clean up what we have dirtied? How might we clean up a mess like this (point to the last slide of the PowerPoint)?”</p> <p>As a class, brainstorm a list of questions about what types of pollution affects our earth’s water and how we can locate the sources of pollution. Students will research different types of water pollution.</p> <p><i>Evaluating</i> If possible, locate sources of water nearby and look for pollution. Using the data they have collected from their outside fieldwork, students will work in teams of 3-4 to identify sources of pollution and brainstorm solutions. If digital cameras are available, the groups can use them to document sources of pollution to use later in the presentations. If an outside body of water is not available, then students may just research different types of water pollution.</p> <p><i>Communicating</i> Students will design a pamphlet, poster, slide presentation, or product of their choice to illustrate sources of water pollution and possible solutions. Share products with the class as they are finished.</p>
<p><b>Exploring</b></p>	<p><i>Obtaining</i> Show students a picture of <a href="#">factory smokestacks</a> putting pollutants into the atmosphere. Ask, “What is happening here? This is a different type of pollution: air pollution. Do you think that we have this type of pollution here in our area? How can we check?” Lead students to decide that if they built something ‘sticky’ and hung it outside that it would catch particulates in the air. “Let’s be scientists and build an air monitor! We have all these materials (see materials section). Your job is to build something that will catch particles in the air, protect your pollution indicator from wind and rain, and attach it outside where it can catch air particles.” Have students work in groups of 3-4. Allow them to design their group pollution indicator. They may record their design on the Making an Air Pollution Indicator student sheet. <a href="#">Air Pollution Indicator-- Making and Data Sheet</a></p> <p>Each group will share their design with the class. The class can point out good areas and problems with each design. Let the students evaluate their design, make changes, and then build their model. When the models are completed, hang them outside for about three days. Then, bring them in, examine what they caught, and record the data.</p>

	<p>Explain that when numbers are too big for a scientist to count, such as with stars in the sky or ants in an ant mound, scientists take a “sample”. Give each group a 1-centimeter square of transparency film. Ask the students to take a “sample” from their air pollution indicator by dropping the square onto the indicator, tracing around the square, and examining and counting what is inside the square. Do that five times, recording the data on the Air Pollution Indicator Data Sheet.</p> <p>Note: Place magnified images of pollen, dust, dirt and any other items that were collected in the Air Pollution Indicator on a chart at the front of the room so that the students can match up images.</p>
	<p><i>Communicating</i></p> <p>Lead a Scientist’s Roundtable where students discuss the results of what they collected in the Air Pollution Indicator. Only one person may speak at a time. People may disagree but must be respectful about others work. Have students ask questions, such as:</p> <ul style="list-style-type: none"> <li>● <i>How did I revise my design after the class looked at your original design?</i></li> <li>● <i>What materials can I use to build my design?</i></li> <li>● <i>Did the Air Pollution Indicator work? What could I change to make it better?</i></li> <li>● <i>Grown-up scientists that build things are called engineers. Do engineers plans always work the first time?</i></li> <li>● <i>What makes a design work well?</i></li> <li>● <i>How can I share my results from the Air Pollution Indicator?</i></li> <li>● <i>What did I catch the most of? Why did I catch more of that item?</i></li> <li>● <i>How can I figure out what I caught on the Indicator?</i></li> <li>● <i>What items on your indicator are natural factors? Which items are caused by human factors?</i></li> <li>● <i>How does this pollution affect a plant or animal?</i></li> </ul>
	<p><i>Evaluating</i></p> <p>Students will continue to add to their design of a pamphlet, poster, Power point, or product of their choice to illustrate sources of air and water pollution and possible solutions. Share products with the class as they are finished.</p>
<p><b><i>Formative Assessment of Student Learning</i></b></p>	
<p><b><i>Explaining</i></b> Finalizing Model</p>	<p><i>Obtaining</i></p> <p>Another type of pollution is the pollution that we find on land. Have you ever seen a garbage dump? Where does all that stuff come from? Read a book about garbage and recycling.</p> <hr/> <p><i>Evaluating</i></p> <p>Discuss with the students the types of items that people can recycle. In advance, ask fellow teachers if your students can come take their bag of trash out of their trash can. Send each group of students to a different room to obtain their trash sample. Give each student an old newspaper and a pair of gloves.</p>

	<p>(Note: check for latex allergies if using latex gloves.) Have the students spread out the garbage, put into piles of paper, plastic, metal and “other”. They should record their findings on the <a href="#">Garbage Assessment Sheet</a>.</p>
	<p><i>Communicating</i> Each group should report out what they found. Discuss:</p> <ul style="list-style-type: none"> <li>• <i>What items could we use that are recyclable instead? For instance, a plastic water bottle was not thrown into the garbage if a non-disposable container was used. (Introduce the term ‘reduce.’)</i></li> <li>• <i>What items could have been recycled?</i></li> <li>• <i>What items could we use for a different purpose? (Introduce the term ‘reuse.’)</i></li> </ul>
<p><b><i>Elaborating</i></b> Applying Model to Solve a Problem</p>	<p><i>Obtaining</i> Students will go outside with their journals to collect evidence of pollution and how it is affecting plants and animals in their schoolyard. (Have students repeat this at least 3 times, and students can also get information from their own yards.)</p> <p><i>Teacher Notes: Digital cameras used to take pictures for use in later lessons will enhance the project.</i></p> <p><i>Evaluating</i> Using the data they have collected from their outside fieldwork, students will work in teams of 3-4 to identify sources of land, water, and air pollution and brainstorm solutions. If digital cameras are available, the groups can use them to document sources of pollution for use later in the presentations. Encourage student questions, such as:</p> <ul style="list-style-type: none"> <li>• <i>Would some regions in Georgia have more of a problem with pollution than others? Explain.</i></li> <li>• <i>What can you do to conserve natural resources and lesson pollution?</i></li> </ul> <p><i>Communicating</i> Students will continue working on their pamphlet, poster, Power point, or product of their choice to illustrate sources of pollution and possible solutions. Share products with the class as they are finished.</p>
<p><b><i>Evaluation</i></b></p>	<p style="text-align: center;"><b><i>Assessment of Student Learning</i></b></p> <p style="text-align: center;"><a href="#">Pollution Project Evaluation Rubric</a></p>
<p><b><i>SEP, CCC, DCI</i></b></p>	<p style="text-align: center;"><b>Science Essentials</b></p>
<p>Science and Engineering Practices</p>	<ul style="list-style-type: none"> <li>• Asking questions and defining problems</li> <li>• Obtaining, evaluating, and communicating information</li> </ul>
<p>Crosscutting Concepts</p>	<ul style="list-style-type: none"> <li>• Systems and System Models</li> <li>• Patterns</li> <li>• Cause and Effect</li> <li>• Stability and Change</li> </ul>



Disciplinary Core Ideas	From <a href="#">A Framework for K-12 Science Education</a> : <ul style="list-style-type: none"> <li>● ESS3.C: Human Impacts on Earth Systems</li> <li>● ESS3.A: Earth and Human Activity</li> <li>● LS4.C: Adaptation</li> </ul>
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**Additional Supports for struggling learners:**

**The following supports are suggestions for this lesson and are not the only options to support students in the classroom. These supports target students that struggle with science material, this lesson or a previous lesson. These are generalized supports and do not take the place of IEP accommodations as required by each student’s Individualized Education Program.**

**General supports for the following categories:**

<u>Reading:</u>	<u>Writing:</u>	<u>Math:</u>
<ol style="list-style-type: none"> <li>1. The teacher can have students match letters prior to reading to remind them of the alphabet.</li> <li>2. The teacher can have students identify words that they know in the text as the class reads.</li> <li>3. The teacher should remind students to use strategies when they are reading.</li> </ol>	<ol style="list-style-type: none"> <li>1. The teacher can provide practice for students in the area of writing both in context and practicing just letters.</li> <li>2. The teacher can provide a sentence starter for the students.</li> <li>3. The teacher should continually give encouragement to the students.</li> <li>4. The teacher can provide constructive positive feedback during the writing process to help students understand the expectations.</li> </ol>	<ol style="list-style-type: none"> <li>1. Provide students with opportunities to interact with numbers.</li> <li>2. The teacher can provide manipulatives to allow the students to count and interact with materials.</li> </ol>

**Supports for this specific lesson if needed:**

**Performance expectations for instruction:**

1. The teacher should provide information to students in various formats to reach as many students as possible.
2. The students should be given adequate time to complete each part of the lesson.
3. The students should be allowed to express their knowledge in various formats.
4. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material.

**Engage:**

1. The teacher may need to show the PowerPoint more than once. The teacher could consider finding a video of the duck race to show students as well.
2. The teacher should consider asking students questions about the environment before and after the duck race.
3. The teacher should have clear and consistent guidelines for class discussions. These guidelines should help students feel more comfortable and be more likely to participate.
4. The teacher should consider giving students question stems to help the students brainstorm.
5. The teacher should consider providing students with resources to use in their research.
6. The teacher should use intentional and flexible grouping to group students. Best practice is to use data to drive student grouping.
7. The teacher should consider having students draw the changes in the water that they see.
8. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. This could include labeling images, drawing pictures, writing or verbally explaining.
9. Students may need additional time to complete their assignment.
10. The teacher should consider providing students with multiple formats to share their work. These formats could include using technology, gallery walks or presentations.

**Exploring:**

1. The teacher should consider showing videos and images to engage students with the material.
2. The teacher should have clear and consistent guidelines for class discussions. These guidelines are meant to help students feel more comfortable and be more likely to participate in the discussion.
3. The teacher should use intentional and flexible grouping to group students. Best practice is to use data to group students.
4. The teacher should consider providing students with an organizer to begin their design.
5. The teacher should consider providing students with multiple formats to share their work. These formats could include using technology, gallery walks or presentations.
6. The teacher should be prepared to repeat directions as needed.
7. Students may need additional time to revise their work.
8. The teacher may need to use guiding questions to help students make revisions that are beneficial to their design.
9. The teacher should consider providing students with some sample questions that they can ask during the round table discussion.

**Explaining:**

1. The teacher should consider leaving the book out for students to access and use as a resource.
2. The teacher should have clear and consistent guidelines for class discussions. These guidelines should help students feel more comfortable and be more likely to participate in the discussion.
3. The teacher should consider providing students with an organizer to record their finds in the trash.
4. The teacher should consider making up “bags of trash” for students to use rather than going to other classrooms.
5. The teacher should consider having multiple formats to share their work. These formats could include using technology, gallery walks or presentations.

**Elaborating:**

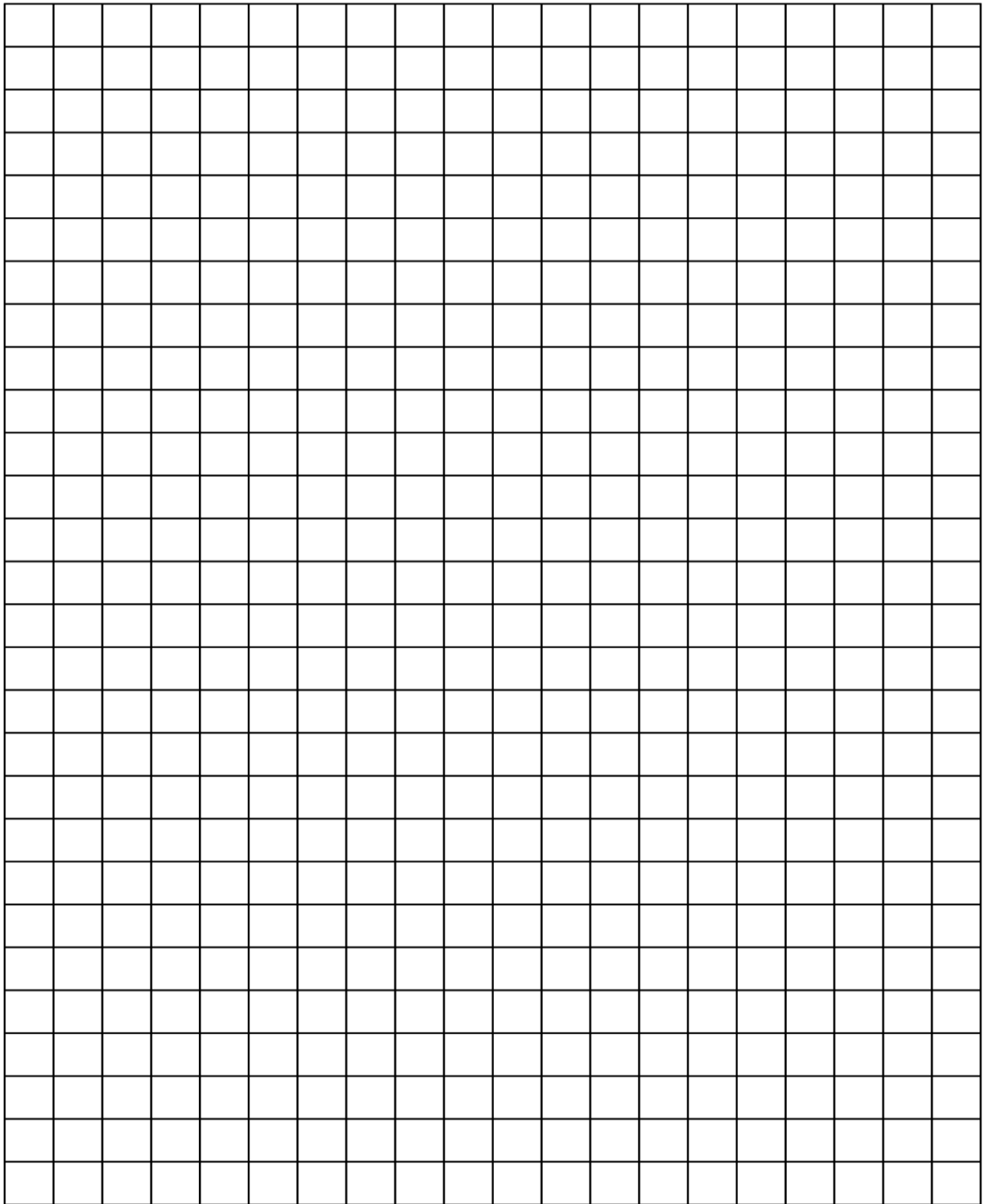
1. The teacher should consider having students draw their observations of pollution outside.
2. The teacher should use intentional and flexible grouping to group students. Best practice is to use data to drive student grouping.
3. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. This could include labeling images, drawing pictures, writing or verbally explaining.
4. Students may need additional time to complete their assignment.

**Evaluating:**

1. Students may need additional time to complete their assignment.
2. The teacher should be sure to provide multiple ways for the students to communicate their knowledge of the material. This could include labeling images, drawing pictures, writing or verbally explaining.



## Grid Paper Template



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## Factory Smokestacks



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## **Making an Air Pollution Indicator**

Members of the Group: \_\_\_\_\_

Your scientist group needs to design an Air Pollution Indicator to catch particles from the air. The Air Pollution Indicator must have a flat area about ten centimeters square that will catch the particles, a way to keep the device safe from rain or wind, and a way to attach the Indicator to something secure so that it does not get carried or blown away.

Design your Air Pollution Indicator below. Label the materials that you will be using. When you are done, you will be presenting your design to your fellow scientists, and they may make suggestions. You may redesign the Indicator if you have new ideas after the presentation.

Our Design:



## Air Pollution Indicator Data Sheet

Group Members: \_\_\_\_\_

Drop your square onto your indicator five times. Using a pencil, draw a line around the square, and then label it as #1 the first time, #2 the second time, and continue until you do all five drops. Use a hand lens to look at what you caught and record your results. Use a tally mark each time you find an item. You may not find five different things and have extra blanks, or you may have more than five and need to write more information on another sheet of paper.

Sample #1:

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Sample #2:

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Sample #3:

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?



**Air Pollution Indicator Data Sheet (page 2)**

Sample #4:

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Sample #5:

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

Item found: \_\_\_\_\_ How many?

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## **Garbage Assessment Sheet**

Group Names: \_\_\_\_\_

Empty your bag of trash carefully onto the newspaper. Wearing gloves, carefully sort the trash into paper, plastic, metal, and “other” groups. Record what is in your bag below.

Paper:

Plastic:

Metal:

Other:

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**Pollution Project Evaluation Rubric**

Team Members: \_\_\_\_\_

Indicator/Points	20 Points	15 Points	10 Points	5 Points
The student team identified areas with pollution in their schoolyard or home.	The student team correctly identified water, land and air pollution, and collected data on all three areas.	The student team correctly identified only two types of pollution or collected data on only two areas.	The team correctly identified only one type of pollution or collected data on only one area.	The student team incorrectly identified pollution or failed to collect data.
The student team identified the sources of the pollution they found.	The team gave reasonable suggestions for where each type of pollution originated.	The team gave reasonable explanations for where 1-2 of the types of pollution originated.	Explanations given for the pollution origination were not plausible.	The team failed to give suggestions for where the pollution originated.
The student team relayed how the pollution affected the plants and animals.	The team explained how the pollution affected both the plants and the animals.	The team explained how the pollution affected only the plants or only the animals.	Explanations were present, but one or more of the explanations were incorrect.	The team failed to give explanations for how the plants and animals were affected.
The student team had suggestions on how they can reduce pollution in their schoolyard/home.	Suggestions given included - conservation of resources, - recycling -cleaning their environment	Two of the three suggestions are given.	Only one of the three suggestions are given.	The team failed to give suggestions for reducing pollution.
The student team communicated their findings clearly to others.	The students: -displayed data -presented evidence -made a claim based on evidence -kept a scientific demeanor	Three of the four were present during the presentation.	Two of the four were present during the presentation.	Only one of the four were present during the presentation.

Comments:

Grade: \_\_\_\_\_

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