Clean Air FOR SCHOOLS Engines OFF!

AMERICAN LUNG ASSOCIATION® IN COLORADO

Elementary School Lesson Suggestions (Grades K-2)

Essential Questions
- How do my actions affect the environment?
- How is the health of the environment connected to my personal health?
- What can I do to help make a healthier environment for me, and for those in my community?

Outcomes
- Students will be able to define and demonstrate the concept of idling.
- Students will investigate the connection between idling, air pollution and personal health.
- Students will analyze idling habits in their school community.
- Students will interpret findings in graph formats.
- Students will build awareness with their families about the harmful health effects of idling.

Common Core State Standards English Language Arts – Reading & Writing
- CCSS.ELA-Literacy.RI.2.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
- CCSS.ELA-Literacy.W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

Service Learning Components
The CASEO Carbon Cruncher program meets all of the following Service Learning standards: meaningful service, youth voice, link to curriculum, reflection, progress monitoring, duration & intensity. (For more information on standards, see http://www.nylc.org/k-12-service-learning-standards-quality-practice.)

Materials & Preparation
- coffee stirrers (small straws) for breathing investigation
- Vaseline, chart paper, ribbon, magnifying glasses for Pollution Catcher experiment. For preparation instructions, see http://www.raftbayarea.org/readpdf?isid=394
- Print microscopic view of pollutants (or share via a computer) http://www.teachengineering.org/collection/cub_/lessons/cub_air/cub_air_lesson02_pollutants.pdf
- Large container of vinegar, large bowl for invisible pollution investigation
- Print “Rear View Mirror Hang Tags” on cardstock. Hole punch, cut and affix ribbon.
- Parent volunteers for experiments
- Review Inquire, Investigate and Act activity suggestions. Review Suggested Reading List. Plan and prepare according to selected activities.

Vocabulary
air quality, asthma, carbon emissions, carbon monoxide, environment, idling, pollution activities

Inquire (1 class period)

Ask student pairs to create a drawing depicting the environment. Building upon student drawings, ask students to define the term **environment**. The environment is "...the air, water, minerals, organisms, and all other external factors surrounding and affecting a given organism at any time."
(source: http://dictionary.reference.com/browse/environment?s=t)

Highlight the concept that clean air is a fundamental part of a healthy environment for humans. Ask students to recall whether they've heard about the Air Quality Index on the news. Or if they've heard the weatherperson recommend staying indoors, due to poor air quality. Ask students to work together to create a class list of things that contribute to clean air (e.g. trees, walking instead of driving to school, etc.) Also, create a list of things that pollute the air (e.g. fires, car exhaust, etc.) Explain to students that car **idling** (keeping the car running without moving) is a major cause of air pollution.

To demonstrate the concept idling for younger students, play "Carbon Cruncher Says". Tell students that the game is played just like "Simon Says", and when "Carbon Cruncher" says, "Idle!" students run in place. To solidify students' understanding, play the game in an open space. Give commands such as "Carbon Cruncher says run towards the tree," followed by "Carbon Cruncher says idle." etc. Once students have an understanding of idling, ask for examples of where cars might idle (e.g. in a drive-thru, in traffic, while waiting to pick someone up, etc.)

Inform students they are going to investigate the connection between idling, the environment, and student health. Ask students what they would like to find out. Capture and post for the class.

Investigate & Analyze (1-3 class periods, + 15 minute small group data collection for 5 days)

Based on students' questions and prior knowledge, choose from the activities below, and utilize the Suggested Reading List for background information.

- **Breathing Investigation** Discuss with students the connection between air pollution in our environment and asthma. Air pollution can trigger asthma. Describe for students how asthma causes restricted airflow, making it difficult to breathe. Ask students to inhale/exhale as they normally would. Then, give each student a drinking straw. Ask students to plug their noses as they try to breathe through the straw. Have student pairs discuss their thoughts about the experiment. Was it easier or more difficult to breathe through the straw? What might it be like to have asthma?
- **Guest Speaker** Invite the school or district nurse to come speak to students about asthma. Additionally, a child with asthma could share their experiences, if they are so inclined. Prepare student questions for guests ahead of time.
- **Pollution Experiment** Break students into teams. Have each team make a "Pollution Catcher" and place in various locations around the school to catch pollution for one week. (source: http://www.raftbayarea.org/readpdf?isid=394) Number each "Pollution Catcher." Create a class list of the "Pollution Catchers" and their locations. Have students predict what sort of pollution the Catchers will catch and which Catcher will catch the most and the least pollution. (Analyze results after one week.) While students are making Catchers, have student groups rotate through a center where they can examine a microscopic view of air pollutants: http://www.teachengineering.org/collection/cub_/lessons/cub_air/cub_air_lesson02_pollutants.pdf

- **Invisible Pollution** Google "air pollution" or select air pollution images from picture books to share with class. Explain to the class that while some air pollution is *visible*, other pollution is *invisible*. Ask the class to turn to the back of the room. Poor vinegar into a large bowl. Walk around the class. Have students share with their neighbors whether they can smell something in the air, and whether or not they can see it. Explain to students that some pollutants in the air, such as carbon monoxide (CO), are both *invisible* and *odorless*. Have students brainstorm why pollutants that are invisible and odorless may be especially dangerous to our health (e.g. we might not know it's there, reason for carbon monoxide detectors in homes, etc.) Share with students that CO at high levels is toxic to all living things, and that a primary source of CO in our environment comes from vehicle emissions.
- **Air Quality Index (AQI) Analysis** As a class, visit www.airnow.gov, and then they search by zip code to determine air quality for the day. Track AQI for one week. Keep track of AQI on class calendar (or individually) by recording the AQI color for the day. (If participating in the CASEO program, use the website to determine what color of flag to display each day to alert the community to the AQI.)
- **Before and After Idling Poll** Assign "Idling Interview" homework to students. Ask students to interview their parents (or other driver) at the beginning of the unit. Tally and graph results. At the end of the unit, have students explain (verbally, visually or in writing) what they've learned about idling, and then have the students interview the same driver again. Tally and graph results. Compare before and after graphs.

Idling Interview

"How likely are you to idle the car when you are waiting to pick me up?"
_____ Likely _____Not Likely

Act (1 class period)

- **Rear View Mirror Hang Tags** Ask students to use what they have learned about idling, air pollution and asthma to create Rear View Mirror Hang Tags for their family vehicles. (Use Hang Tag printable.) Students may design slogans or draw pictures to encourage drivers not to idle.

Extension

- If students are Carbon Crunchers in the CASEO program, they can utilize the scientific method to hypothesize, experiment, and track and analyze data found regarding idling at their school. Students can also chart and make a graphic representation of the data to share with the entire school community.