

IMPROVING KIDS' ENVIRONMENT



Smart Schools Don't Idle Middle School Lesson Plan¹

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Related Indiana Science Standards

Grade Level	Content Area	Standard Identifier	Standard
6 th	Nature of Science and Technology	6.1.9	Explain how technologies can influence all living things.
6 th	Living Environment	6.4.8	Explain that in all environments, such as freshwater, marine, desert, grassland, mountain, and others, organisms with similar needs may compete with one another for resources, including food, space, water, air, and shelter. Note that in any environment, the growth and survival of organisms depend on the physical conditions.
7 th	Living Environment	7.4.14	Explain that the environment may contain dangerous levels of substances that are harmful to human beings. Understand, therefore, that the good health of individuals require monitoring the soil, air, and water as well as taking steps to keep them safe.
8 th	Nature of Science and Technology	8.1	Students design and carry out increasingly sophisticated investigations. They understand the reason for isolating and controlling variables in an investigation. They realize that scientific knowledge is subject to change as new evidence arises. They examine issues in the design and use of technology, including constraints, safeguards, and trade-offs.
8 th	Physical Setting	8.3	Students collect and organize data to identify relationship between physical objects, events, and processes. They use logical reasoning to question their own ideas as new information challenges their conceptions of the natural world.
8 th	Physical Setting	8.3.6	Understand and explain that the benefits of the Earth's resources, such as fresh water, air, soil, and tress, are finite and can be reduced by using them wastefully or by deliberately or accidentally destroying them.

NOTE:

This lesson plan includes the Three Paper Experiment. This experiment was recommended in the EPA's Clean School Bus Teacher's Toolkit. As provided by the EPA, the experiment offered no guidance for how long the papers need to be exposed to the air.

¹ Lesson plan materials drawn from U.S. EPA and Clean School Bus USA Idle-Reduction campaign. For more resources and classroom materials, see www.epa.gov/cleanschoolbus

If you still choose to do the Three Paper Experiment, it would likely be best to have students prepare the Three Paper Experiment activity (description below) **a week or two before you plan for today's lesson**. Having results for today's lesson will make the activity much more meaningful, showing students the differences among the quality of air in various school locations.

If you choose NOT to do the Three Papers Experiment, another activity is suggested beneath the lesson plan.

Do Now:

- Define the word “idling.” Give an example of something that idles.
- Discuss Do Now
- Have students stand up at their desks. Have students run in place for one minute.
- Ask the following questions in a classroom discussion (or have students quickly answer the questions in small groups):
 - Have you moved?
 - Was this a good exercise for you?
 - But did you move anywhere?
 - What if you were a car? What else do cars do when they are “running”? (They pollute!)
 - Do cars ever idle? When? Do they idle at school?
 - When cars idle at school, does it affect the environment and us? How?

Engage:

- Remind students of the Three Paper Experiment that you setup last week. Ask students to recall their predictions for the “experiment.” (Alternatively, if you are using the School Pollution Observations Activity, skip to the steps laid out within the description of the activity below and return to this Engage exercise at the third of the five questions.)
- Display the results of the Three Paper Experiment. (The remainder of the Engage portion of the lesson assumes there are observable differences – paper near buses is dirtiest – among the three papers.)
- Ask students the following questions in a class-wide discussion (alternatively, you could have students answer the questions in small groups, then share out as a class):
 - Rank the order of papers from dirtiest (#1) to least dirty.
 - Why are the papers in that order?
 - Where on school grounds would you want to breathe and where wouldn't you?
 - Is it fair that you have to worry about breathing near the buses at school? Should the school fix that problem?
 - What could the school do differently to make sure that no one has to worry about breathing unhealthy air at school?

Direct:

- Tell students that they will be completing a persuasive essay to convince the school community to quit idling.
- If desired, pass out the graphic organizer students could use to organize their essays. Regardless of whether you use the organizer or not, inform students that they need to have a clear message, or thesis, in their essay – what do they want people to do? They must have three reasons why people should do what they want. And, for each reason, they must have three supporting details. (It would be helpful to give students an example of how this – one reason supported by three supporting details – works.) The paragraph should include five paragraphs – an introductory paragraph, a main body consisting of one paragraph per reason, and a concluding paragraph.
- With or without graphic organizer, have students prepare for their essays. They could complete the essay for homework or in-class the following day.

Three Paper Experiment

Materials Needed: Three pieces of heavy paper or index cards (with location and date marked on each piece), Vaseline, string or duct tape, and magnifying glasses.

Time: 20 -30 minutes

Activity: Collecting particulate matter from various areas around school campus will allow students to visibly analyze where and why accumulation is greatest. Prior to the experiment, have the class predict the outcomes.

Coat each paper with Vaseline. Hang one near the bus parking area, place the second in the school, and put the third paper in a drawer or closet. After a specified time, remove the papers and compare them with a magnifying glass.

School Pollution Observations

Materials Needed: Optional: Handout for students to record pollution observations. Otherwise, just blank paper.

Time: 20-30 minutes of homework.

Activity: For previous class day's homework, instruct students to observe three distinct areas of the school grounds. Ensure that students understand the term "pollution." They should know that garbage pollutes the land, car exhaust and smoke pollute the air, trash and chemicals can pollute our water, etc.

Brainstorm possibilities for places for students to observe – cafeteria, gym, parking lot, classrooms, maintenance department headquarters, etc. In each area, students are to look for pollution. They need to find at least one source of pollution for each location. For all three locations they should list the sources of pollution they find, what pollution is being produced – garbage, gases/smoke/exhaust, chemicals, etc – and why each form of pollution is being produced.

Engage:

- Ask students to take out the observations they made for homework.
- Take volunteer students or call on students to share their observations.
- For various school locations – for example, cafeteria, classrooms, parking lot, etc. – have students share the type of pollution they observed.
- Ask students the following two questions (then continue with the third question of the five questions to finish the Engage portion of the lesson):
 - In which part of the school grounds did you observe the most pollution?
 - In which part of the school grounds did you observe the least pollution?



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