GET SMART!

GRADES 9–12

In this lesson, students will participate in activities at three smart mobility-related learning stations; examine the impact of smart mobility on their lives, their communities, and the global energy picture; research the science behind and the personal, environmental, and economic benefits of one aspect of smart mobility; and write an 30-second elevator pitch to persuade others in the school community to drive "smarter."

Lesson Printable: Smart Mobility IQ Test

Objectives:

- Students will draw logical conclusions about how their driving behaviors impact fuel efficiency and "smarter mobility," based on a series of challenges.
- Students will research the specific science behind a "smarter mobility" behavior, as well related statistics and personal benefits.
- Students will write and perform a 30-second elevator pitch to persuade someone to change one driving behavior related to Smart Mobility.

Alignment with National Standards: Science, Technology, Engineering, Math

Skills: Research and investigation, measurement, synthesis, experimentation, computation, reasonable prediction, data interpretation and analysis, design, evaluation

MATERIALS

(Enough for groups of two to three students each)

- Internet access
- Printable "Smart Mobility IQ Test" (PDF), one per student
- Three large index cards with tasks for each station (see "Directions" below) written on them
- Materials for Station 1: Flip chart, calculators
- Materials for Station 2: Toy car, masking tape, measuring tape, small weight

Time Required:

Learning stations and reflection: 45–60 minutes
Research/speech development: 60–90 minutes
(possible time outside of class)

(cont.)

DIRECTIONS

1. Divide students into three groups that will rotate through a series of three stations, allotting about 10 minutes for each station. Descriptions of required materials and the task for each station are below. At each station, the group should read and complete the required task on the index card (see materials list). Then they should answer each station's reflection questions, individually or with other group members, on a sheet of paper or in a journal.

STATION ONE:

Materials

- In 2010, there were 309 million people living in the United States
- In 2010, 138 billion gallons of gasoline were burned by vehicles.
- The average amount of CO2 released by one gallon of gasoline is 19.6 lbs.

Task

- Calculate the amount of gasoline used on average per person in 2010.
- Calculate the amount of carbon released into the atmosphere by gasoline in 2010.
- Calculate the amount of carbon released into the atmosphere per person in 2010.

REFLECTION QUESTIONS:

What are your thoughts about carbon emissions and their effects on the atmosphere? What surprised you during these calculations? What behaviors could you change to reduce the amount of carbon that you or your family members release into the environment?

STATION TWO:

Materials

- Pull-back toy vehicle
- An object to weigh down the car, e.g., clay
- Masking tape (place a strip on the floor to use as a starting line) Tape measure (tape down perpendicular to the masking tape so students can measure distance from starting line to finish

Task

- Practice using the pull-back mechanism to get the toy car to move forward.
- Once you have the technique down, conduct two different trials.
- In the first trial, place the toy car on the starting line and pull back the string about halfway. Measure distance. Next place the toy car back on the starting line and pull back the string all the way. Again, measure distance.
- In the second trial, place a weight on the toy car and pull back the string all the way. Measure and compare distance to the first trial.
- Write down your observations.

REFLECTION QUESTIONS:

How do these trials relate to fuel efficiency and the cars we drive? What lessons could you learn from these trials?

(cont.)

STATION THREE:

Materials

- Copy of "Smart Mobility IQ Test" for each student
- Copy of Smart Mobility IQ Test Answer Key (facedown)

Task

- Answer the questions to the best of your ability to show your Smart Mobility IQ!
- When all group members are finished, have one student flip over the answer key and share answers.
- Score your IQ test.

REFLECTION QUESTIONS:

What does the term "smarter mobility" mean to you? Based on the IQ test, what are some initiatives you could take to get "smarter mobility"?

2. Once student groups have rotated through all three stations, come back together and share the results. Compare answers to the reflection questions. Specific answers will vary, but you may want to guide students toward the following conclusions: For Station 1, students should realize that a large amount of carbon emissions released into the atmosphere is directly related to the number of gallons of gasoline we use. Obviously, if we can find ways to reduce the amount of gasoline we use by driving less or more efficiently, we will reduce the negative impact on the environment. For Station 2, the trials represent fuel efficiency. Fuel efficiency is defined as the amount of energy that goes into the vehicle divided by the distance it moves. Fuel efficiency measures the energy used by a vehicle. The distance the vehicle traveled can be equated to miles per gallon. With more weight, the vehicle was not as efficient. For Station 3, students should conclude that smarter mobility means making sound decisions so that all of us have the energy we need, balanced by a clean environment, now and in the future. Note: You may want to ensure that students know that mobility is all about the flow of people, goods, and services moving from place to place. Students can contribute to smart mobility in many ways including vehicle upkeep and maintenance, sustaining proper air pressure, limiting weight in the vehicle, keeping windows up, not idling, limiting rapid acceleration and braking, and filling up with high-quality gasoline.

3. Ask students how smarter mobility directly relates to their lives. Share with students that in most developing countries, mobility accounts for between 6% and 12% of the Gross Domestic Product. And in many developing countries, mobility is the key that will unlock economic growth and opportunity. Given those facts, why is smart mobility also important economically and environmentally across the globe?

4. List the following behaviors on the board and poll students to see which ones they or the other drivers in their homes do regularly:

a. Idling

b. Speeding/rapid acceleration

c. Not keeping up tire air pressure

d. Driving with extra weight

e. Using overdrive gears

5. Ask students if they know how each behavior relates to fuel efficiency/smart mobility. Would they be willing to change behaviors to save money, save fuel efficiency, or help protect the environment? What might persuade them to do so?

(cont.)

6. Divide students into small groups and have each group select one of the smart-mobility behaviors on the list that they would like to persuade others to do (or not do). Direct them to do the following:
   - **a.** Explain the relationship and scientific reasons/principles between the behavior and smart mobility.
   - **b.** Research at least two statistics related to the behavior.
   - **c.** Define one personal benefit, one environmental benefit, and one economic benefit of changing the behavior
7. Once groups complete their research, challenge them to write an elevator speech (30 seconds/80–90 word speech) that would persuade someone they meet in an elevator to change their behavior in an effort to achieve smarter mobility! Their speech must be concise, to the point, persuasive, and creative! It must include the science related to smart mobility, at least one statistic, and a personal, environmental, and economic benefit to changing the behavior.
8. Finally, have students simulate an elevator ride with another student where they use their speeches to change behavior related to smart mobility.

ADDITIONAL RESOURCES

- U.S. Department of Energy: Fuel Economy Information
  www.fueleconomy.gov
- Shell: Smarter Mobility Site
  http://www.shell.com/home/content/innovation/smarter_mobility/

Visit www.shell.us/energizeyourfuture to learn more about how alternative energy resources will help provide energy for the future..