



Teacher's Guide

About nanotechnology:

Nanotechnology is the study and design of systems at the nanoscale, the scale of the atom.

"Nanotechnology is concerned with materials and systems whose structures and components exhibit novel and significantly improved physical, chemical, and biological properties - and that enable the exploitation of novel phenomena and processes - due to their nanoscale size." - *National Nanotechnology Initiative*

Silicon chips, gigabyte disk drives, and light-emitting diodes - devices that are based on atomically engineered materials - are all around us. These everyday wonders that we depend on would not be possible if we did not understand how to "see" and manipulate materials at the most basic level, the individual atom.

Source: Internships in Public Science Education
<http://mrsec.wisc.edu/edetc/IPSE/nanotech.html>

About scientific research and the law:

- The legislature has the ability to break down (or build) barriers to the use of new technology.
- The more people use a new technology, the more money will be contributed to the continued development of that new technology.
- Individuals and special interest groups often pressure the government to create laws that support their beliefs about certain areas of scientific research (think stem cells).

Hints and ideas to help students having trouble with their worksheet:

Environmentalists

- Increased fuel efficiency means less air pollution
- Less wear and tear on highways means fewer resources and less energy goes into repair
- If cars last longer, cars will end up in the landfill at a slower rate
- Nanocomposites are more recyclable, which will also reduce the need for landfills

Industry and Local Businesses

- Increased fuel efficiency means less money spent on gas, less money for gas station owners
- Less wear and tear on highways means fewer construction workers needed to make repairs
- If cars last longer, cars will be sold at a slower rate
- Less demand for cars, fuel, and repairs could mean fewer jobs for the people of Nanoville.

Health and Safety Workers

- Less pollution means less asthma and other diseases caused or aggravated by bad air
- Less demand for medical services could mean fewer jobs for health and safety workers
- Nanocomposites could be used to reinforce the passenger compartments of a car to protect the passengers

Residents

- Students should compare the cost of nanocomposites to the cost of plastic, the cost of gasoline, and the cost of medical expenses
- Fewer jobs means less money to spend on necessities and luxuries
- If people have less money, they will be more likely not to buy an expensive new car

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Nanocomposite Manufacturers

- Students should attempt to persuade their classmates that a nanocomposite factory in their city is a good thing
- Economies of scale and improving technology will make mass-produced cars cheaper than individually produced cars
- Lighter cars will be more fuel efficient, handle better, and brake faster, though what happens in an accident depends on what part of the car contains nanocomposites
- Creating a nanocomposite industry in Nanoville will create jobs for people

Want more information? Try these web sites:

- Internships in Public Science Education - <http://mrsec.wisc.edu/edetc/IPSE/>
- The Macrogalleria: A cyberwonderland of polymer fun - <http://www.psrc.usm.edu/macrog/index.htm>

The JASON project has created a simulation to demonstrate the effects of creating a marine sanctuary on the wildlife and on the human community. Additional background and classroom activities are also available.

- “Marine Reserves: Where do *you* fit in?” - http://www.jason.org/digital_labs/CINMS/