The Magic School Bus: The Climate Change

Recommended for grades K-2

ABOUT:

The Magic School Bus Play is based on *The Magic School Bus and the Climate Challenge*, a book written by Joanna Cole and illustrated by Bruce Degen.

The Book is about Mrs. Frizzle's students who are putting on a play about global warming, and they need some cold, hard facts. The Friz knows just where to find them! A hop on the Magic School Bus takes the kids on a whirlwind tour. From the Arctic to the Equator, they see telltale signs of climate change. But to get the really big picture, the class has to get really small—so they can see exactly what is in the air and why it is making the world warmer. What they find gives them a real cause for concern! The author empowers the reader by explaining how one can help solve the crisis of global warming through conservation, recycling, and use of alternative energy.

Joanna Cole, the author of *The Magic School Bus* book series, has collaborated with Bruce Degen, the illustrator, for twenty years, bringing humor and true kidlike curiosity to science and learning. Two *Magic School Bus book* series have been named *School Library Journal* Best Books of the Year, and the authors have won countless state book awards, from New York to Nebraska.

Joanna Cole begins each *Magic School Bus* book with in-depth research. She does extensive reading, visits museums, and talks with experts. Once she's collected enough information, she synthesizes the facts into a dummy book with sketches, ideas and text for the story, speech balloons, and school reports "written" by Ms. Frizzle's students. She also writes the jokes found in every book.

Bruce Degen starts the work on illustrations, once Joanna Cole's dummy book has been reviewed and approved by specialists. Bruce examines the dummy book Joanna has prepared; he looks at all the research books and notes, and then he prepares a series of sketches showing how every page of the book will look. Then the two of them meet to talk about the story line and decide whether the art work matches the action and science in the story.

Degen's favorite part of illustrating is Ms. Frizzle's weird outfits. Fans have come to enjoy the wacky dresses, shoes, and accessories, and they especially look forward to seeing Ms. Frizzle's outfit near the end of the book — it usually gives a clue to the next Magic School Bus adventure! Degen is convinced that a line of Ms. Frizzle clothing could be very popular, "especially the shoes." Degen also loves drawing Ms. Frizzle's students. They are all based on children who lived in his old neighborhood in New York.

Climate is the average weather in a place over many years. While the weather can change in just a few hours, climate takes hundreds, thousands, even millions of years to change. According to the scientists, the earth is getting warmer. In fact, for the past 100 years, the earth's temperature has risen by about 1°F. Scientists predict that the earth will continue to warm by about 2–6°F over the next 100 years. That may not sound like much, but think about this: During the last Ice Age, the earth was only 9°F cooler than it is today, and large sheets of ice called glaciers covered large parts of North America! The warming of earth's climate is called global warming.

Scientists cannot predict exactly what will happen as Earth's temperatures continue to rise. They believe a rapid

climate change could upset the balance of the ecosystem, causing some land and marine life to become extinct. As temperatures rise, the world's glaciers will melt into the ocean, causing sea levels to rise between several inches to three feet during the next 100 years. Higher sea levels could cause flooding of coastal lands. Warmer ocean water could cause increased storm activity on the coasts while areas away from the coasts may experience droughts. These are just a few of the possible effects of global warming.

Want to Stop Global Warming? Here Are Some Ways You Can Help!

Reduce the amount of meat you eat. The biggest single contributor to global warming is meat and the meat industry.

- One ham sandwich has a carbon footprint of 14 to 34 grams of CO_2.
- By eating less meat you reduce the amount of methane gas produced.
- By eating less meat you also reduce the destruction of wildlife habitat, and help to save endangered species.

Conserve water.

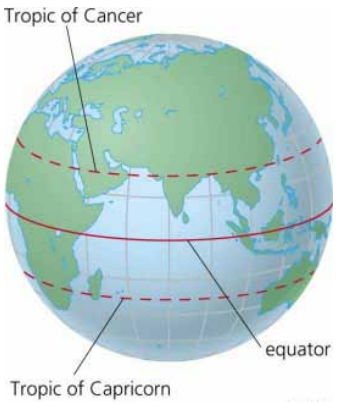
- Check household faucets for leaks. Just think, 15 drips per minute add up to almost 3 gallons of water wasted per day, 65 gallons wasted per month, and 788 gallons wasted per year!
- Keep showers to 5 minutes or less in length. A five-minute shower takes 10 to 25 gallons of water.
- Keep a pitcher of water in the refrigerator. Then you won't have to run tap water to cool it.
- Use a broom to sweep your driveway, garage, or sidewalk instead of using water.
- Use a bucket of water to wash your bike or the family car and rinse quickly with a hose.
- Water your lawn in the evening or in the early morning to avoid evaporation. Be careful to water only the lawn and not the sidewalk or street.
- Use water only when you need it. Don't leave water running; be sure to turn it off when you are finished.

Recycle glass, metals, paper, and plastic.

- Glass can be recycled virtually forever. It never wears out.
- For every 2,000 pounds of glass that is recycled, we save more than 2,000 pounds of other resources (1,330 pounds of sand, 433 pounds of soda ash, 433 pounds of limestone, and 151 pounds of feldspar).
- The energy saved by recycling just one bottle could light a 100-watt bulb for 4 hours.
- Recycling an aluminum can saves 95% of the energy needed to make aluminum from bauxite ore.
- In the United States, the amount of steel that is discarded and not recycled every year is enough to build all the new American-made cars each year.
- Paper made from recycled paper uses 70% less energy.
- Americans use 4 million plastic bottles every hour, but only 25% of plastic bottles are recycled.

Use alternative energy—wind, biomass, hydro power, geothermal energy, solar energy.

- One wind turbine can produce enough electricity to power up to 300 homes.
- In Iowa and Wisconsin, biomass energy from landfills and dairy farms is being used to make electricity.
- In southern Iowa, a power plant is using a crop called switchgrass to make electricity.
- Water power has been used for grinding grain for more than 2,000 years.
- Worldwide, water is the most commonly used renewable energy resource, providing enough power to meet the needs of 28.3 million consumers.
- Hydro power currently provides about 10 percent of the electricity in the United States.
- Use geothermal energy from underground hot springs to heat water.
- More than 10,000 homes in the United States are powered entirely by solar energy.
- Enough sunlight falls on the earth's surface every hour to meet world energy demand for an entire year.
- John Herschel, a British astronomer, used a solar collector box to cook food during an expedition to Africa.
- Albert Einstein won the Nobel Prize in 1921 for his experiments with solar power and photovoltaics.



The Equator is an imaginary circle around the earth midway between the North Pole and the South Pole. The temperature of the equatorial regions is hot throughout the year, with a very low temperature range usually of less than 37 degrees Fahrenheit (3 degrees Celsius). It is also a very wet climate with annual precipitation often more than 78.74 inches (2000 mm).

These hot and wet conditions are ideal for the growth of plants so the vegetation is both dense and varied. Typically in Britain there would be 4 or 5 species of trees in a forest, whilst in the same area near the Equator there may be about 500 species. The equatorial rainforests also have an extremely diverse fauna. The rainforest in the equatorial regions produce very distinctive scenery. From the air it looks like a green carpet with the occasional taller tree (emergent) sticking up. There are also numerous rivers due to the heavy rainfall totals.

Some of the animals that live in the Equator include mammals (chimpanzee, gorilla, tiger, sun bear, pygmy hippo, okapi, jaguar, orangutan, gibbon, slow loris, and porcupine), reptiles (caiman, komodo dragon, green iguana, alligator, boa, vine snake, crocodile and gavial) and birds and insects (toucan, African gray parrot, dragonfly and butterfly).

The Arctic, on the other hand, is a very cold, windy, and often snowy biome located around the North Pole. Although there is no land at the North Pole, the icy Arctic Ocean is teeming with life ranging from the microscopic to the huge.

There is also a lot of land within the Arctic Circle, which is called the tundra, and it supports less life because of the cold temperatures, strong, dry winds, and permafrost (permanently-frozen soil). Long periods of darkness (in the winter) and light (in the summer) also affect Arctic life. Animals that live in the Arctic are adapted to extreme conditions. Some have coats that thicken and change colors to white during the winter as camouflage in the snow; some animals hibernate during the cold season; some animals spend summer months in the Arctic and migrate to warmer area during the winter months, returning again the following summer.

TEST YOUR KNOWLEDGE

Of the following arctic animals listed below, can you identify which camouflage, hibernate, and migrate? (Use C for Camouflage; H for Hibernate; and M for Migrate)

Alaskan Malamute _____
Arctic Fox _____
Arctic Hare _____
Arctic Tern _____
Arctic Wolf _____
Beluga Whale _____
Lemming _____
Polar Bear _____
Moose _____
Musk Ox _____
Killer Whale _____
Dall Sheep _____
Ermine _____
Greenland Shark _____
Harp Seal _____
Wolverine _____
Walrus _____

Can you name another Arctic animal?

_____

RESOURCES:

Environmental Protection Agency :
http://www.epa.gov/climatechange/kids/index.html

Weather Facts:
http://www.sciencekids.co.nz/sciencefacts/weather.html

Complete biography on Joanna Cole and her books:
http://www.answers.com/topic/joanna-cole-children-s-author

INTERESTING FACTS:

- The highest temperature ever recorded in Antarctica is 14.6 °C (59 °F), recorded on January 5, 1974.
- The most rainfall ever recorded in one year is 25.4 meters (1000 inches) in Cherrapunji, India.
- The highest snowfall ever recorded in a one year period was 31.1 meters (1224 inches) in Mount Rainier, Washington State, United States, between February 19, 1971 and February 18, 1972.
- The fastest wind speed ever recorded is 484332 km/h (301320 mph). This was a 3 second gust recorded by a Doppler on Wheels (DOW) radar unit in Oklahoma City on May 3, 1999.
- The USA has more tornadoes than any other country in the world, averaging around 1200 a year. This is due largely to its unique geography, which forms an area in the central USA called "Tornado Alley" which is frequently hit by tornadoes.
- Without water, the earth would look like the moon.
- All living things need water to live. People can live several weeks without food, but only a few days without water. We should drink six to eight glasses of water each day!
- Water makes up 83% of our blood, 70% of our brain, and 90% of our lungs. Overall, our bodies are 70% water.
- A tomato is about 95% water. An apple, a pineapple, and an ear of corn are each 80% water.

LESSON/UNIT PLANS:

On Weather (Grades K-2)
http://teachingtoday.glencoe.com/lessonplans/what-is-weather

Units on Global Warming (K-12)
http://science.lotsoflessons.com/globalwarming.html

LEARN MORE:

About Joanna Cole?
GO TO: http://marlaroundtree2.tripod.com/id8.html

About Bruce Degen?
GO TO: http://bjwaddell.tripod.com/jamberry/jamberry/brucebio.html

About the Artic?
GO TO: http://www.enchantedlearning.com/coloring/arcticanimals.shtml

About the climate change?
GO TO: http://climate.nasa.gov/kids/

About how to conserve water?
GO TO: http://www.fcwa.org/story_of_water/html/facts.htm

About how to recycle?
GO TO: http://www.chevroncars.com/learn/wondrous-world/recycling-facts

About newable energy?
GO TO: http://www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/022403

THEATER ETIQUETTE:

DO:

- Enter the theatre quietly and take your seat immediately.
- Stay seated during the performance.
- Use the restroom before the performance.
- Turn off your cell phone.
- Show appreciation for the performers by applauding at appropriate times.

DON'T:

- (DON'T) Eat during the performance.
- (DON'T) Photograph or videotape during the performance.
- (DON'T) Wear strong perfume.
- (DON'T) Talk during the performance.

REMEMBER:

A live performance is not like watching TV or a movie. The actors on the stage are real people who can see and hear you. Be respectful by being silent and attentive.

State Farm Educational Arts Experience

The State Farm Educational Arts Experience is a pilot program generously sponsored by State Farm to bring arts education to the region's K-12 students through the Valley Performing Arts Center.

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