

Daily Planet: Science and the City

Natural Phenomena

Teacher's Guide

Grade Level: 6-12

Curriculum Focus: Physical Science

Lesson Duration: Three class periods

Program Description

Clouds – Explains what clouds are made of and how precipitation is formed. *Sound* – Discusses what sound is and how sound waves travel to the ear. *Fire* – Illustrates that fire needs heat, fuel, and oxygen in order to burn. *Polymers* – Demonstrates properties of different types of polymers, including polystyrene and rubber.

Discussion Questions

- How does physical science help us to understand natural phenomena?
 - How do the physical and chemical properties of matter help scientists to classify different substances?
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Video Index

Segment 1: Clouds

Description

It's something we have all done in our childhood: looking up in the sky and imagining ourselves in the clouds, wondering what they are, and what they feel like. Alan Nursall answers these questions at West Edmonton Mall as he creates some clouds for the crowds.

Pre-viewing question

Q: What do you think clouds are made of?

A: Answers will vary.

Post-viewing question

Q: What are clouds made of?

A: Clouds are made up of water droplets and ice crystals. The water condenses on dust particles, called condensation nuclei.

Segment 2: Sound

Description

Science North's Alan Nursall returns. He's taking science to the streets to see what the average person knows about sound ...

Pre-viewing question

Q: What do you think sound is?

A: Answers will vary.

Post-viewing question

Q: Why can't sound travel in space?

A: Sound cannot travel in space because sound waves must travel through a medium. For example, they can travel through air or string. Space is a vacuum, with no medium for sound travel.

Segment 3. Fire

Description

In this installment of Science and the City, host Alan Nursall conducts explosive demonstrations on a crowded street. The hot topic this time is fire ...

Pre-viewing question

Q: What are the different causes of fires?

A: Answers will vary.

Post-viewing question

Q: What three elements does fire need to burn, and what three products does fire produce?

A: Heat, fuel, and oxygen are needed to produce fire. A fire produces heat, light, and flame.

Segment 4: Polymers

Description

Ever wonder how to make a bouncy ball out of household materials? If so, then stay tuned as Alan Nursall tours the mall to tell people all about polymers.

Pre-viewing question

Q: Do silk, rubber, and hair have any properties in common?

A: Answers will vary.

Post-viewing question

Q: What is a polymer?

A: A polymer is a long chain of repeating molecules. Polymers can be natural (e.g. cellulose, rubber) or synthetic (e.g. polystyrene, plastics).

Lesson Plan

Student Objectives

- Develop understanding of the structure and properties of different types of matter



- Demonstrate understanding of natural and synthetic polymers
- Develop skills important to successful scientific inquiry, such as research, investigation, communication, and collaboration

Materials

- *Science and the City: Natural Phenomena* video and VCR, DVD and DVD player, or CD-ROM and computer
- Computer(s) with Internet access (optional)
- Print materials on natural and synthetic polymers
- Art materials for students to create information booklets (e.g. construction paper, white paper, glue, markers, magazine pictures, scissors, staplers)

Procedures

1. Watch the *Polymers* video segment and discuss it with the class. What are polymers? What examples of polymers were shown in the video segment? Which of these polymers are everyday items? What properties did the different polymers have? Ensure that students have a basic grasp on the video segment's explanation of what polymers are.
2. Tell students they are going to learn more about polymers by conducting research and creating an information booklet. They will work individually to find out more about the polymers we encounter in our daily lives.
3. Explain the research task to the class. Students, working individually, will conduct research on polymers and find five different polymers to describe in an information booklet. Students must find examples of both natural and synthetic polymers. For each substance, they should find information on the following topics:
 - Name of substance
 - Natural or synthetic polymer and its source
 - Uses (where or how it is used)
 - Properties (e.g. color, texture, absorbency, rigidity)
 - Interesting facts about this substance
 - They should also look for pictures of the substance to include in their booklets.
4. Provide students with materials (print and/or Internet) that they can use to conduct their research. The following Web sites will provide useful information:
 - Polymers: They're Everywhere! (National Geographic Society)
<http://www.nationalgeographic.com/resources/ngo/education/plastics/index.html>
 - Polymer (Wikipedia, the Free Encyclopedia)
<http://en.wikipedia.org/wiki/Polymer>
 - The Polyquarium (Polymer Science Learning Center)
<http://www.pslc.ws/macrog/kidsmac/sea/>



- Faces in Polymers (Chemical Heritage Foundation)
<http://www.chemheritage.org/EducationalServices/FACES/poly/home.htm>
 - Polymer (Answers.com)
<http://www.answers.com/polymer>
5. Once students have adequate information, they should assemble their information into short booklets. Provide them with paper and art materials. Encourage them to be creative, including pictures and making their booklets interesting to read.
 6. Once students have completed their booklets, divide students into groups of four to share their booklets. If possible, share these booklets with another class or display them for other students to see.
 7. As a class, discuss what students have learned about polymers. How many different polymers did the class find? Which ones were most interesting? Which ones are the most commonly used? What kinds of properties do polymers have? What remaining questions do students have?

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- 3 points: Students participated actively in class discussions; worked successfully at independent research; and created a detailed and attractive information booklet addressing all of the assigned topics.
- 2 points: Students participated somewhat in class discussions; worked with some success at independent research; and created an adequate information booklet addressing most of the topics.
- 1 point: Students did not participate actively in class discussions; worked with little success at independent research; and created an incomplete information booklet addressing a few of the topics.

Vocabulary

compound

Definition: A pure substance made up of more than one type of atom that cannot be separated by physical means

Context: A polymer is a compound made up of molecules linked together.

molecule

Definition: A tiny particle composed of two or more atoms that is the smallest particle of a substance

Context: A polymer is made up of many molecules linked together in a long chain.

polymer

Definition: A long chain of repeating molecules

Context: A polymer may be a natural or a synthetic material.

property

Definition: A characteristic trait or quality of a substance

Context: One physical property of rubber is its ability to stretch and return to its original shape.

synthetic

Definition: Made artificially, rather than naturally

Context: Polystyrene is a synthetic polymer, while rubber is one that appears in nature.

Academic Standards

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/compendium/browse.asp>

This lesson plan addresses the following national standards:

- Physical Sciences: Understands the structure and properties of matter

National Academy of Sciences

The National Academy of Sciences provides guidelines for teaching science in grades K-12 to promote scientific literacy. To view the standards, visit this Web site <http://books.nap.edu/html/nses/html/overview.html#content>

This lesson plan addresses the following national standards:

- Physical Science: (5-8) Properties and changes of properties in matter; (9-12) Structure and properties of matter

Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>