



GRACE Education Curriculum Gravity	
Teachers	Grades K-2
Science & Lang Arts	

Popular Pop-Ups

Background Information: Gravity is the invisible force between objects that makes them attracted to each other. The attraction is called gravity. The more massive the object, the stronger the gravitational pull. Since the earth is very big it has a strong gravitational pull. Everything, no matter how big or small, possesses gravity. Without gravity the atmosphere and oceans would float away into outer space.

GRACE is a pair of science satellites that will collect information from space. This pair (two) satellites, are sometimes called twins. GRACE will orbit the earth measuring the gravitational field of the Earth. It will continuously collect data about gravity and how it affects many different aspects of the Earth. GRACE will look for areas that have more or less gravity. If GRACE goes over a mountain, it will slow down because the mountain has more gravity than the field around it. GRACE will try to find out why gravity changes. Scientists on earth will analyze the data collected to see if they can come up with some of the answers to questions about the Earth's gravitational field. Pop-up books are books which have some picture, or feature, which pops up (show students an example).

Objectives: At the end of the lesson, students will be able to:

- Define gravity.
 - Give examples of how gravity works.
 - Describe GRACE.

Standards: Science: unifying concepts and processes; earth and space science; science as inquiry; science and technology; science in personal and social perspectives.

Language Arts: Students employ a wide range of strategies as they write to communicate with a variety of audiences.

Vocabulary:	Gravity	Gravitational pull	Atmosphere
	Attraction		

Materials:	Construction paper (8.5 x 11)	Scissors
	Glue	Markers
	Space pictures or images	Art supplies for decoration
	Reference books	Computer / Internet access

Directions to the Teacher:

1. Review the background information. Show students an example of a pop-up book. Also show students images of GRACE from the website: <http://www.csr.utexas.edu/grace> .
2. Ask students to brainstorm some questions that they would like to have answered about GRACE and gravity. Assist students if necessary. Work with the class to choose 5 questions to answer. Use the Internet and reference books to find the answers if needed. Write questions and answers on the blackboard.
3. Divide the class into five groups (one question per group). Show students pop-up book sample.
4. Give each group or student (depending on ability level) two pieces of construction paper. Fold the construction paper in half. Have student write the question on the front of one paper and set aside.
5. On the other folded paper, have students place a dot in the middle of the fold. Take a ruler and draw a line about 2 inches long horizon to the folded edge. Cut where the pencil line was drawn. Fold two triangles and then open the paper. Place the paper like a tent on the table and then push the cut area through the fold and crease it. When you turn it over, this is your pop-up.
6. Glue the page with the question to the outside of pop-up. When you open the folded paper, you will see the pop-up. Write the answer to the question on the construction paper below the pop-up.
7. Use art supplies to draw a picture or decorate the pop-up. The picture or decoration should have something to do with the question or answer. Students can print images from the computer and glue them to the pop-up.
8. Display pop-up "Tell Me Why" books in the classroom.

Extensions:

Students will make a pop up for another activity or event.

Students will bring an example of a pop up from home – either a book or a card – and share it with the class.

References / Resources:

- Ardley, Neil. Dictionary of Science. Dorling Kindersley Books, NY:NY, 1994.
- Gibson, Ray and Somerville, Louisa. How to Make Pop-Ups. Usborne, 1990.
- VanCleave, Janice. Gravity. John Wiley and Sons: Canada, 1993.
- Walker, Niki. Satellites and Space Probes. Crabtree:NY, 1998.

Websites:

- <http://www.csr.utexas.edu/grace>
- <http://www.ExploreScience.com>
- http://www.nasa.gov/hqpao/q_a_subject.html
- <http://www.npac.syr.edu/textbook/kidsweb>
- <http://www.nasa.gov/gallery/photo/index.html>
- <http://www.makersgallery.com/joanirvine/howto.html>

