Teacher Guide

Cool Career

Mechanical Engineer
Aprille Ericsson
NASA Goddard Space Flight Center

Help from Far Away

How do satellites that orbit hundreds of kilometers above Earth help us? Ask Aprille Ericsson, who puts some of those satellites into orbit. She has worked on spacecraft that study tropical rainfall, the origins of the Universe, and the effects of solar flares on our planet. "The hardware that I build produces scientific data that allow us to understand the Universe and our environment better and help us in our daily lives and communities," she says.

Puzzling and Questioning

Aprille grew up in the projects in Brooklyn. There her mom and grandfather, both engineers, prodded her to use her mind—and her hands. "Picking apart and looking at things around you, asking questions, and then trying to put the puzzles together were all important skills that I learned as a kid," she says. "I've been able to apply them all in my career."

Big to Small

At Howard University, Aprille studied how big structures, such as space stations, flex and vibrate in orbit. It's like architecture, but for stuff that moves. Then she wrote software programs to control the orbits of smaller satellites. Now she manages the design of the instruments, such as X-ray cameras, that go on these cosmic cruisers.

A mechanical engineer designs, builds, and tests machines and structures. Aprille manages the teams of scientists and engineers who build instruments for satellites. **Other mechanical engineers**

- build rovers that explore planets.
- make cars safer in crashes.
- test models of bridges and skyscrapers.
- use computer-aided design (CAD) software.

Aprille reviews the construction and testing of a NASA satellite.

After you read about Aprille Ericsson, do these activities.

Egg-citing Activity

With a team, design and construct a "spacecraft" to protect a delicate "instrument," an egg, from a fall. Each team gets one raw egg. Here are some ideas for materials to use for your spacecraft.

- Fabric
- Paper or plastic bags
- Balloons
- Straws
- Craft sticks
- Paper
- String
- Masking tape
- Paper clips

Brainstorm ideas for a spacecraft design. Sketch your design, and then get to work! Build your spacecraft and secure your egg inside it. Ask your teacher to test-drop each spacecraft from the same height. As a class, discuss the results. Which spacecraft protected the egg best? Why?

STANDARDS ALIGNMENT

NGSS

MS-ETS1.B.1: Developing Possible Solutions: A solution needs to be tested, and then modified on the basis of the test results, in order to improve it.

MS-ETS1.C: Optimizing the Design Solution: Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign process—that is, some of those characteristics may be incorporated into the new design.

CCSS

RTS.6-8.3: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

RST.6-8.2: Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.

Teacher note: *To conduct this activity, divide students into teams of three. Students should brainstorm a design for constructing a "spacecraft" that will protect their egg when it is dropped. They may also suggest other materials such as Styrofoam, milk containers, cotton, paper towel rolls, and newspaper. Remind students that they may not alter the egg in any way. When teams are finished, take them to the "drop" site. Following the last drop, have each team review its results, revisit its hypothesis, and analyze why the "spacecraft" performed well or poorly. As a group, discuss which shapes and materials were successful, and why.*

Career Clues

What important skills did Aprille Ericsson learn as a child that have helped her in her career as a mechanical engineer? *[As a child, Aprille enjoyed looking at things, picking things apart, asking questions, and putting puzzles together—all skills that have helped her develop satellites in her career as a mechanical engineer.]*

Describe a skill that you have and explain how it might someday help you in a career.

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