

## Rusty Rocket's Last Blast

### Program Summary

Rusty Rocket has one final mission to command: an introductory tour of the solar system for a new class of rocket rookies. Along the way, Rusty highlights the wide variety of environments in the solar system, the great distances between the planets, and the spacecraft that explore them.

### Tennessee Science Standards

See [www.adventuresci.com](http://www.adventuresci.com) to find specific Grade Level Expectations (GLE).

#### EMBEDDED TECHNOLOGY AND ENGINEERING

E.2 Recognize new tools, technology, and inventions are always being developed.

E.4 Recognize the connection between scientific advances, new knowledge, and the availability of new tools and technologies.

#### PHYSICS / CONCEPTUAL PHYSICS STANDARD 1 – MECHANICS

Conceptual Strand 1: *Laws and properties of mechanics are the foundations of physics.*

#### STANDARD 6 – THE UNIVERSE

Conceptual Strand 6: *The cosmos is vast and explored well enough to know its basic structure and operational principles.*

#### STANDARD 11 – MOTION

Conceptual Strand 11: *Objects move in ways that can be observed, described, predicted, and measured.*

#### STANDARD 12 – FORCES IN NATURE

Conceptual Strand 12: *Everything in the universe exerts a gravitational force on everything else.*

### Objectives

1. Name at least three objects in the solar system and describe at least one characteristic of each object.
2. Name the four planets in our solar system known to have rings and give one example of how they are different.
3. Describe two spacecraft that have explored our solar system, what planets they visited, and at least one discovery.

### Pre-Visit Activities

1. Invite students to invent creative ways for remembering the names of the planets.
2. Build a scale model of the solar system focused on the distances between the various objects. The model can be small enough to fit in a pocket or as long as a football field. Give the actual distances in miles or kilometers. Older students can calculate distances to the planets based on scale: one toilet paper square, one floor tile, or one foot equals xx many miles.
3. Compare the relative sizes of the planets and the Sun. Examine why it is a challenge to make a scale model of sizes and even harder to do both size and distance in the same model.

### Post-Visit Activities

1. Download the monthly star chart from our website [SudekumPlanetarium.com](http://SudekumPlanetarium.com). Encourage students to locate the constellations and any planets visible in the evening sky. Extra points for observing planets in the predawn sky.

### Vocabulary

ammonia  
 asteroid  
 atmosphere  
 carbon dioxide  
 Cassini  
 composition  
 core  
 extreme  
 Galileo  
 gravity  
 helium  
 hydrogen  
 launch pad  
 methane  
 microgravity  
 Moon  
 moon  
 orbit  
 planet  
 poisonous  
 radiation  
 rings  
 rocket  
 spacesuit  
 sulfur  
 sulfuric acid  
 toxic  
 volcanoes

- Build a scale model of the solar system. See pre-visit activities and web links for references.
- What *about* Pluto? Compare the dictionary definition of a planet to the one from the International Astronomical Union. How has our knowledge changed since Pluto was discovered in 1930? How many "dwarf planets" are there now? What is the status of the New Horizons spacecraft set to fly past Pluto in 2015?
- Have students learn about other objects in the solar system: moons, asteroids, comets, TNOs, KBOs, etc.
- An example of how our knowledge is constantly expanding is the number of moons orbiting the planets. How many are there now? How are they discovered?
- Follow our newest explorer on Mars: What is Curiosity doing today? <http://mars.jpl.nasa.gov/msl/>
- Have students investigate the names of solar system objects and their features. Interesting research reveals cultures, mythology, history, literature, and more..
- Have students investigate the robotic spacecraft that have explored our solar system. Not all missions have been successful while others have accomplished much more than originally planned. Use a solar system model to plot each spacecraft's destinations and discoveries.

## Exhibit Connections

### Space Chase – Test Bed

- Start at the **Rocket Launch** to see how rockets escape Earth's gravity. Use **Trajectory Trails** to see how rockets move in space because of gravity. Explore the **Drop Tower & Spin Browser** to see how everyday objects behave in microgravity. These three exhibits provide hands-on experience with Newton's Laws of Motion.
- Practice moving outside a spacecraft on the **EVA wall**, or sit and try to use a tool on the **MicroG simulator chairs**.

### Space Chase – Solar System Survey

- The movement of the earth around the sun can be seen in the Earth-sun orrery in the Solar System Survey.
- Explore the **Solar System Touchscreens** to learn about the Sun, planets, moons, and human exploration of Earth's planetary neighborhood.

## Resources

### Websites

Monthly star charts and related articles

[SudekumPlanetarium.com](http://SudekumPlanetarium.com)

Paper Plate Astronomy

[analyzer.depaul.edu/paperplate/](http://analyzer.depaul.edu/paperplate/)

Build a Solar System -

[http://www.exploratorium.edu/ronh/solar\\_system/](http://www.exploratorium.edu/ronh/solar_system/)

How Big is the Solar System? -

[noaa.edu/education/peppercorn/pcmain.html](http://noaa.edu/education/peppercorn/pcmain.html)

National Space Science Data Center:

(up-to-date data about the Solar System)

[nssdc.gsfc.nasa.gov/planetary/planetfact.html](http://nssdc.gsfc.nasa.gov/planetary/planetfact.html)

Scale models of the solar system

[vendian.org/mncharity/dir3/solarsystem/](http://vendian.org/mncharity/dir3/solarsystem/)

List of current Solar System probes with links:

[http://en.wikipedia.org/wiki/List\\_of\\_active\\_Solar\\_System\\_probes](http://en.wikipedia.org/wiki/List_of_active_Solar_System_probes)

Chronology of Lunar and Planetary Exploration, 1957-present

[nssdc.gsfc.nasa.gov/planetary/chronology.html](http://nssdc.gsfc.nasa.gov/planetary/chronology.html)

ISS and Satellite Flyovers:

<http://www.spaceweather.com/flybys/>

Current ISS news and pictures:

[http://www.nasa.gov/mission\\_pages/station/](http://www.nasa.gov/mission_pages/station/)

Rocket Science 101

[nasa.gov/externalflash/RocketScience101/RocketScience101.html](http://nasa.gov/externalflash/RocketScience101/RocketScience101.html)

NasaQuest rockets information

<http://quest.nasa.gov/space/teachers/rockets/>

The history of rockets since 100BC

[history.msfc.nasa.gov/rocketry/](http://history.msfc.nasa.gov/rocketry/)

## Books

[Rocket Science \(Apogee Books Space Series\)](#) by Alfred Zaehring and Steve Whitfield

[Space Exploration \(DK Eyewitness Books\)](#) by Carole Stott

[Amazing International Space Station, The](#) by Editors of YES Mag

[Space Shuttle: The First 20 Years -- The Astronauts' Experiences in Their Own Words](#) by DK Publishing

800 Fort Negley Blvd.  
Nashville, TN 37203  
[www.adventuresci.com](http://www.adventuresci.com)



Phone: 615-862-5160  
Fax: 615-862-5178  
School reservations: 615-862-5177