STANDARDS

The nationwide movement for high standards has not only determined what students should learn, but also has mandated that students *demonstrate* what they know. Teachers who choose SPACE RACE will find it is a standards-based program addressing English Language Arts Standards, Science Standards, and National Standards for the Arts. SPACE RACE provides many opportunities for performance assessments as students conduct research, respond to the interactive Solar Stop activities, and write Space Log entries. The cooperation and teamwork necessary to "explore the solar system" and write and act in an original skit address many Applied Learning standards.

NCTE Standards for the English Language Arts

Standard 3: Students apply a wide range of strategies to comprehend, interpret, evaluate, and appreciate texts. They draw on their prior experiences, their interactions with other readers and writers, their knowledge of word meaning and of other texts, their word identification strategies, and their understanding of textual features.

Standard 4: Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate with different audiences for a variety of purposes.

Standard 5: Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.

Standard 6: Students apply knowledge of language structure, language conventions (e.g., spelling and punctuation), media techniques, figurative language, and genre to create, critique, and discuss print and nonprint text.

Standard 12: Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information).

National Science Education Standards K–4

Standard D: Earth and Space Science

As a result of activities in grades K–4, all students should develop an understanding of:

- Objects in the sky
- Changes in earth and sky

Standard G: History and Nature of Science

As a result of activities in grades K–4, all students should develop an understanding of:

- Science as a human endeavor

STANDARDS

National Standards for the Arts

Theatre Standard 2: Uses acting skills

- Knows characters in dramatizations, their relationships, and their environments
- Uses basic acting skills to develop characterizations that suggest artistic choices

California Applied Learning Standards

Standard 2: Students will understand how to solve problems through planning and organization.

Standard 6: Students will understand how to apply communication skills and techniques. Students will demonstrate ability to communicate orally and in writing.

Standard 8: Students will understand the importance of teamwork. Students will work in teams to achieve objectives.

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OVERVIEW

OVERVIEW

Your primary students will embark on an exciting simulated journey through the solar system by first joining other students as members of Space Exploration Teams. Each team member is given a specific task to fulfill during the course of the trip. These tasks are rotated throughout the unit. Each of the team members experiences four roles during the course of the SPACE RACE simulation. The roles include: Captain, Navigator, Communications Officer, and Explorer. The Space Exploration Teams will use the **Solar System** (a large map of the solar system) to record their movements as they race through space. Each Space Exploration Team creates a different colored spacecraft to propel it from place to place. These spacecraft are represented on the large map with color-coordinated pushpins.

When a team is ready to move to a new stop, the Navigator chooses a Destination Icon with a specific destination on it—Venus, Mars, Saturn, Sun, etc. At each Solar Stop, the students learn about their location, respond in writing to questions, complete creative and/or critical-thinking projects, read stories about the solar system, and write in their Space Explorer's Log. Students are encouraged to use varied resources such as the Internet, fiction and non-fiction classroom books, encyclopedia, science texts, as well as the background information provided in the unit. These space travelers make a brief stop to "visit" comets, meteors, and asteroids. When all teams have traveled to every stop and all members have completed the appropriate activities, the race is over.

Extensions provide students with additional opportunities to learn about the solar system and people who have explored space.

Sharing Sessions are scheduled following each Space Race activity period. This offers students an opportunity to share their creative thinking efforts, discuss new vocabulary, and present completed projects.

Each Space Exploration Team's completed individual and group written work is placed in a color-coded Team Folder and assessed by the teacher. All student projects are evaluated according to Rubrics and given a point value. The team that scores the most points is the winner. When all the teams have successfully returned from their journeys into outer space, a *Debriefing Session* is held. Information and projects are shared and discussed. Just like real astronauts, the space travelers participate in a *Press Conference* where they ask and answer questions about what they have learned during SPACE RACE. Then each Space Exploration Team writes an original skit based on one of its space travel experiences. The unit culminates as teams perform their skits in front of classmates and invited guests and participate in an Award Ceremony at *Space Race Day*.

Differentiation

Like all Interact units, SPACE RACE provides differentiated instruction through its various learning opportunities. Students learn and experience the knowledge, skills, and attitudes through all domains of language (reading, writing, speaking, and listening). Adjust the level of difficulty as best fits your students. Assist special needs students in selecting activities that utilize their strengths and allow them to succeed. Work together with the Resource Specialist teacher, Gifted and Talented teacher, or other specialist to coordinate instruction.

1. **Before You Begin**
   Study the Teacher Guide thoroughly to become familiar with the activities available to your students. Throughout the Teacher Guide, Interact employs certain editorial conventions to identify materials.
   a. In preparing materials, *class set* means *one per student*.
   b. All masters and student handouts are listed by name using ALL CAPITAL LETTERS.
   c. Teacher reference pages are named in **Bold**.
   d. Special events are named using *Italics* (e.g., *Space Race Day*).

2. **Incorporating SPACE RACE into Your Curriculum**
   Study the Teacher Guide thoroughly to become familiar with its contents. Prior to beginning the unit, review the **Background Information** (pages43–57) to gather background information about the solar system to use in the unit.
   a. Decide on the amount of time you will devote to SPACE RACE (see **Setup Directions #3, Timing Options** for more information).
   b. Select books from the **Resources** or other sources to use for read-alouds.
   c. Determine the confidence level of your students' reading. For younger students and/or less confident readers use parent volunteers to assist throughout the unit. Consider the following options for reading:
      - Students follow along during
        — Read-alouds
        — Shared or Paired reading
      - Use small reading groups led by the teacher and/or other adult(s)

3. **Timing Options**
   SPACE RACE can be used in a variety of time settings:
   - One afternoon or morning each week
   - A daily lesson for a pre-determined length of time
   - Twice a week for one or two hour periods
   - In place of science or language arts periods

   Set the length after reflecting upon your students' age/abilities and after considering other time constraints in the curriculum.

   - **A note on Pluto.** In 2006, the International Astonomical Union downgraded the status of Pluto to a "dwarf planet." In planning, it could be left out or made a Short Stop.

SETUP DIRECTIONS

The Solar Stops are divided into 11 *long* stops and one *short* stop.

- **Long Stops**
  The long stops include: Sun, Mercury, Venus, Earth, Earth's Moon, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto. At the long stops, teams complete the Information form and students complete two activities. Long stops take approximately 60 minutes.
- **Short Stop**
  During the short stop students learn about Asteroids, Comets, and Meteors. Teams work together to complete the Information form and three activities. The short stop takes approximately 30 minutes.

The number of activities and extensions that the students must complete can be limited, if necessary. Consider the following timing options:

- All teams visit all 12 stops.
  You will need 16 days for students to complete all 12 stops and understand the material (the days do not need to be consecutive). The 16 days includes the Introduction, Debriefing, *Press Conference*, and *Playhouse Presentations*.
- Teams visit different stops and report to the whole class on the information learned. Plan for eight days for this option. In five school days, four teams of students visit three long stops each and then share the information (so that all stops are visited). All teams visit the short stop. The final three days are devoted to the Debriefing, *Press Conference*, and *Playhouse Presentations*.
- The class visits fewer than 12 stops.
  — All teams visit the same teacher-determined stops.
  — Teams visit different stops and report to the whole class.

TEACHING TIP

Carefully consider your unique situation regarding size of class, age of students, maturity levels, interest levels, time constraints, etc., when deciding on the timing appropriate for you.

Carefully examine the Reproducible Masters. Use all of those designated for each stop or select pages most appropriate to your teaching goals.

The educational standards listed in this Teacher Guide are based on visiting all 12 stops.

4. **Typical Teaching Cycle**
   Below is a typical teaching "day" if you choose to have teams visit the same Solar Stops and you spend one day per Solar Stop.
   - Read aloud a short story or picture book to illustrate a certain part of the solar system. Have a book discussion following the reading. (10–15 minutes)
   - Navigators choose a Destination Icon and move their teams' pushpin to the appropriate location on the **Solar System**.
   - Explorers gather the appropriate materials for their team.

- Review the procedure for the day. As appropriate, discuss any problems that certain teams or individuals are having.
- Allow time for teams to work on their Solar Stop (group and individual) activities. (30–60 minutes)
- Captains turn in completed work to teacher.
- Hold a *Sharing Session* at the end of each day. Each team's Communications Officer begins the teams' sharing by providing an oral summary of what the team learned. Other team members contribute to the sharing. (10+ minutes)

5. **Establish a Classroom Environment**
   a. **Classroom Map**
   Dedicate a classroom bulletin board to SPACE RACE. Post the **Solar System** on this bulletin board where it is clearly visible. Each team uses a different colored pushpin to represent their spaceship on the map to mark each visit to the various Solar Stops.
   b. **Word Wall**
      - Designate space on the classroom bulletin board or wall area as the Word Wall. Examine the GLOSSARY to find words that you will use during the course of the unit. Write the words on colored index cards or on oak tag strips. Include these words on your Word Wall prior to beginning the unit. Place blank cards in a basket or other container for student choices throughout the unit. Discuss these words during each *Sharing Session* as students build their vocabulary.
      - As students complete their research and locate new vocabulary words they check the Glossary for the definition. If the newly discovered word is not in the Glossary, the Communications Officer adds the word to the wall and the Explorer locates the word's definition.
   c. **Space related materials**
   Display posters relating to the solar system. Mobiles and scale models can also be placed around the classroom, as well as scientific tools such as a telescope.

The Solar Stop activities require 30–60 minutes. The additional components of a typical day can add 30+ minutes, for a total of 60–90 minutes.

If you cannot find enough different colored pushpins, make a small colored flag on the pushpin to differentiate teams.

For added eye appeal, use planet or spaceship shaped cards. Place some glossary words on the wall as a start.

TEACHING TIP

Students learn the abilities necessary to complete scientific inquiry as they complete outside research. Students need access to additional resources to complete and fully benefit from the various activities.

d. **Classroom Library**
Create a Classroom Library using fiction and non-fiction books on each of the Solar Stops, the solar system, etc. Students read these independently throughout the course of the unit. Review the books in the **Resources** (page 20). For each Solar Stop, locate several books that are appropriate for your classroom. The library can be in several locations or in one designated area.
Decide the following:
- which books you will have available for students to read
- which books you will use for read-alouds

e. **Art Supply Box**
Create an art supply box for student use throughout the unit. Many of the activities call for student creativity. Include such items as paint, paper, fabric, feathers, clay, buttons, cardboard scraps, cotton balls, etc.

6. **Grouping Students**
Divide your class into heterogeneous groups of four students, called Space Exploration Teams. Consider achievement, ability, and maturity. If your class does not evenly divide into groups of four consider the following options for grouping:
- Divide the class so that you have one or two groups of three students—two roles become one role for those groups (e.g., combine the Captain and the Navigator into one role).
- Divide the class so that you have one or two groups of five students—two students rotate through the roles together.

TEACHING TIP

The Social Skills Chart and Space Exploration Team Rubric are also found in the Student Guide.

Teach, monitor, and reinforce social skills throughout SPACE RACE using the provided SOCIAL SKILLS CHART (page 58) and SPACE EXPLORATION TEAM RUBRIC (page 69).

7. **Assigning and Rotating Space Exploration Team Roles**
Within each Space Exploration Team, students assume a particular role. Assign each student one of the roles to begin the simulation. Rotate roles at each Solar Stop so that all students have a chance to rotate through each role. The roles should have equal importance and value to each student. Every team member is responsible for the unit activities.
- **Captain**—The Captain is the team leader responsible for seeing that all members are working cooperatively and completing each activity. The Captain maintains the team's folder and turns in all completed work to the teacher. The Captain becomes the Navigator when roles rotate.

- **Navigator**—The Navigator chooses the Destination Icon and glues it to the appropriate location on the Team Itinerary. The Navigator then moves the team's pushpin on the classroom **Solar System** to show their location. The Navigator becomes the Communications Officer when roles rotate.
- **Communications Officer**—The Communications Officer is responsible for writing the work of the group. The Communications Officer provides the initial oral summary of the group work during *Sharing Sessions*. Additionally, he/she adds new vocabulary words to the Word Wall. The Communications Officer becomes the Explorer when roles rotate.
- **Explorer**—The Explorer collects and returns all materials and folders to the designated areas. This person ensures that his/her Space Exploration Team has what they need to complete the day's work. This person is responsible for leaving a clean work area. When a teammate discovers a new word not found on the Glossary, the Explorer locates the definition. The Explorer becomes the Captain when roles rotate.

8. **Materials**
   Prior to beginning SPACE RACE, assemble the following materials in the quantities indicated in *Italics*.
   General Materials
   - Art supplies (for creating spacecraft) — *one set per Space Exploration Team*
   - Basket or other container (for Word Wall words) — *one*
   - Computer with Internet access — *at least one*
   - Crayons (or other means of identifying Team colors; different color per Space Exploration Team) — *one per Space Exploration Team*
   - Envelopes (letter size; for Destination Icons) — *one per Space Exploration Team*
   - Folders (manila; different color per Space Exploration Team) — *one per Space Exploration Team*
   - Glue — *at least one bottle per Space Exploration Team*
   - Index cards or oak tag strips (for Word Wall) — *one per Glossary word + several extra (left blank)*
   - Marker (black) — *one per Space Exploration Team*
   - Model of solar system (3-D) — *one (optional)*
   - Paper (white; 8.5" x 11") — *one per Space Exploration Team*
   - Paper (blank or lined; for Space Explorer's Logs) — *several class sets*
   - Pushpins (different color per Space Exploration Team) — *one per Space Exploration Team*

During the Introduction to the unit, Space Exploration Team Captains come up to the front of the class, one at a time, and select a team color from a bag or container of teacher-selected colors. (Crayons can be used).

Each Space Exploration Team is identified by its color. Team folders, pushpins, etc. need to be in the appropriate team color.

Each Space Explorer's Log requires one page per Solar Stop for log entries.

SETUP DIRECTIONS

- Resources (variety of fiction and non-fiction books; see **Resources**) — *many*
- Scissors — *one per Space Exploration Team*
- String or tape (to attach the spacecraft near the Space Exploration Teams) — *several yards per Space Exploration Team*

Solar Stop Materials

Sun—Prism

- Crayons (variety of colors) — *several per Space Exploration Team visiting this Solar Stop*
- Flashlight (to use with prism) — *several*
- Paper (blank) — *several*
- Prism — *several*
- Scissors — *several*

TEACHING TIP

The Prism activity requires sunlight as students experiment with a prism.

Sun—Be an Artist

- Paper plate (large, dinner size) — *one per student visiting this Solar Stop*
- Art supplies (including paint, paper, fabric, feathers, clay, buttons, cardboard scraps, cotton balls, etc.) — *many*

Mercury—Problem Solving on Mercury

- Calculator — *several*

TEACHING TIP

The Greenhouse activity requires direct sunlight. Direct students to an appropriate location for this experiment.

Venus—The Greenhouse

- Baggie (clear, plastic; with tie or zipper) — *one per Space Exploration Team visiting this Solar Stop*
- Thermometer (to measure external ambient temperature) — *two per Space Exploration Team visiting this Solar Stop*

If you do not have access to a scale and/or objects to weigh, write down the weights (either on Earth or on Jupiter) of objects on pieces of paper. Students select these and use them to complete their Jupiter Weight and Earth Weight calculations.

Jupiter—Jupiter Weight and Earth Weight

- Food (packaged, with their weight printed on the package) — *several per Space Exploration Team visiting this Solar Stop*
- Food or other common objects (to be weighed) — *several per Space Exploration Team visiting this Solar Stop*
- Scale (balance or spring) — *one per Space Exploration Team visiting this Solar Stop*

Neptune—Neptune Getaways

- Art supplies (paint, markers, crayons, etc.) — *several*
- Poster board — *one per Space Exploration Team visiting this Solar Stop*

Asteroids—Warning Signs

- Art supplies (markers, crayons, paint, etc.) — *many*
- Construction paper or poster board — *one per student visiting this Solar Stop*

Extensions Materials

Building a Space Station

- Resources (newspapers, magazines, Internet; articles on International Space Station) — *many*

Star Search
- Stars (sticker or drawn by teacher) — *up to 10 per student completing this Extension*

A Sundial
- Crayons (variety of colors) — *many*
- Glue — *many*
- Paper plate or piece of cardboard (to create the sundial) — *one per student completing this Extension*
- Scissors — *many*

Press Conference **Materials**
- Chairs (for Exploration Team being interviewed) — *four*
- Chairs (for reporters and audience) — *many*
- Hole punch — *several*
- Scissors — *one per Space Exploration Team*
- Table (or several desks for Space Exploration Team being interviewed) — *one*
- Yarn (24" per student; to attach to the Press Pass and hang from students' necks) — *class set*

Space Race Day **Materials**
- Materials to create simple sets, props, and costumes — *as needed*

9. **Preparing Materials**
   a. **Background Information**
   Make one copy of BACKGROUND INFORMATION for each Space Exploration Team. Choose from the following options when distributing this information.
      - Place Background Information within the Team Folder.
        — Read as a class
        — Teams read when they "visit" each Solar Stop
      - Cut each section of Background Information apart and place with the materials for each Solar Stop (teams read the information for each stop when appropriate).
      - Cut each section of Background Information apart and place around the classroom.

   b. **Social Skills Chart**
   Make a large wall chart of SOCIAL SKILLS CHART (on page 58). Use this as a focal point for the cooperative group work. Place it on your SPACE RACE bulletin board, along with the **Solar System** map.

A Sundial gives students an idea of how a sundial works. This helps students grasp the concept of the sun's apparent movement in the sky.

Another version of a sundial is to place a mound of modeling clay in the center of a paper plate. Stick a pencil into the mound of modeling clay. Students record the time that shadows are cast, by tracing the shadow and writing in the time.

SETUP DIRECTIONS

c. **Destination Icons**
Duplicate DESTINATION ICONS for each team. Cut the icons apart and place one set in each envelope (identified by the team's color). These guide each team's journey through the solar system. The Navigator for each team chooses a stop from the choices in the envelope. The Navigator then glues the icon to the appropriate location on the Team Itinerary and moves the team's pushpin ship to the location on the **Solar System** map.

d. **Solar Stop Boxes**
Create a box for each Solar Stop (labeled on the outside). Place the appropriate number of copies of each reproducible master and the appropriate materials in each box. During daily activities each Explorer locates the Solar Stop box and gathers the appropriate materials.

e. **Team Folders**
To assist your Space Exploration Teams organize their work for this unit, use manila folders to keep their SPACE RACE handouts and completed work. Prepare one folder per team and include the following in each:
- TEAM ITINERARY (stapled to the inside left cover of the folder) — *three*
- DESTINATION ICONS — *one set*
- SPACE EXPLORER'S LOG — *one per Space Exploration Team member*
- SPACECRAFT — *one*
- GLOSSARY — *one*
- EXTENSIONS — *one*

TEACHING TIP

Consider placing the Solar Stop Boxes throughout the classroom, creating your own solar system within your room. Hang or place the names of the Solar Stops in the appropriate locations so that students know where to find each box.

Consider reproducing the Background Information and placing each section within the appropriate Solar Stop Box (e.g., background information on the Sun is placed within the Sun Solar Stop Box).

10. **Reproducible Masters**
Duplicate the following number of items in the quantity indicated in *Italics:*

Teacher Reference
- **Cooperative Exploration Record** — *class set*
- **Solar Stop Answers** — *one per destination reached today*
- BACKGROUND INFORMATION — *one set per Space Exploration Team*
- SOCIAL SKILLS CHART (enlarged and placed on SPACE RACE bulletin board) — *one*
- TEAM ITINERARY — *three per Space Exploration Team*
- DESTINATION ICONS (cut apart) — *one set per Space Exploration Team*
- SPACE EXPLORER'S LOG — *class set*
- SPACECRAFT — *one per Space Exploration Team*
- GLOSSARY — *one per Space Exploration Team*

TEACHING TIP

Include Background Information within each Team Folder or cut each section out and place copies with the materials for each Solar Stop.

Create a large Social Skills Chart using the master. Place on a wall in your classroom.

UNIT TIME CHART

INTRODUCTION

45–60 minutes

- Complete Solar System KWL/Solar System Background
- Introduce unit
- Read a short story or picture book related to the solar system
- Introduce Story Sequence Map and Book Report assignments
- Group students and assign roles
- Review cooperative group work expectations
- Space Exploration Teams choose colors
- Create Space Explorer's Log and spacecraft
- Navigators choose destination icons and place pushpin on classroom map

EACH SOLAR STOP

60–90 minutes each

- Conduct research
- Complete individual and group activities

DEBRIEFING

45–60 minutes

- Students individually complete Debriefing
- Whole class debriefing discussion

PRESS CONFERENCE

60 minutes

- Each Space Exploration Team participates in the Press Conference

CULMINATION

60–120+ minutes each

- Space Race Playhouse Presentations
- Award Ceremony