National Center
for Earth and Space Science Education

Universities Space Research Association

Introduction to the *Journey through the Universe* Program, the *Voyage* Program, and the *Voyage* Grade 3-4 Lessons

1. The Programs

Journey through the Universe (http://journeythroughtheuniverse.org) is a national science education initiative that engages *entire* communities—students, teachers, families, and the public—using education programs in space exploration and the space sciences to inspire and captivate. The initiative embraces the notion that—*it takes a community to educate a child.*

Journey through the Universe programming is tailored to a community's strategic needs in science, technology, engineering, and mathematics (STEM) education, and is a framework for partnership between school districts, museums and science centers, colleges and universities, civic and business organizations, and the public. The cornerstone philosophy for all programming is—*inspire… then educate.*

Voyage: a Journey Through Our Solar System (http://voyagesolarsystem.org) is a one to ten billion scale model of the Solar System exhibition that was permanently installed on the National Mall in Washington, DC, in October 2001. The greater *Voyage* Program includes the exhibition on the National Mall; replicas of the exhibition available for permanent installation in communities worldwide—designated *Voyage Communities*; and programming in Solar System science and exploration for thousands of students, educators, and families available to each of the *Voyage Communities*. The programming is provided through *Journey through the Universe*, and supported by a grade K-12 compendium of lessons—the ***Voyage* Education Module**.

2. The Grade K-12 *Voyage* Education Module

The *Voyage* Education Module includes an **Education Unit** at four grade levels: lower elementary (K-2); upper elementary (3-4); middle (5-8); and high school (9-12). Each Unit contains lessons comprised of content overviews, inquiry-based hands-on activities, assessment rubrics, resource listings, student worksheet masters, and answer keys.

The lessons were developed from the ground up from national science education standards and benchmarks, and are comprehensive enough to be adopted by school districts as the space science curriculum. Lessons target core standards and benchmarks through inquiry-based, hands-on activities whose objective is deep conceptual understanding of both content and process. The lessons are also meant to work in concert with a trip to a *Voyage* exhibition, serving as pre- and post-visit activities.

3. The *Voyage* Grade 3-4 Lessons

This document provides a description of each lesson and the embedded inquiry-based activities for the *Voyage* **upper elementary school (grade 3-4)** Education Unit. Also provided are connections to National Science Education Standards for grades K-4, and AAAS Benchmarks for Science Literacy for grades 3-5.

VOYAGE for Education: The 3-4 Unit Progression		
Lesson Title	The 3-4 Story	Activities
Lesson 1: Modeling Patterns & Cycles in Our Lives	Many observable phenomena are associated with predictable cycles and patterns in nature. Sometimes these phenomena are difficult to see, so we build and use models to understand cycles and patterns such as the seasons, the water cycle, or sunrise and sunset. By using the Earth as a prototype, students come to realize that similar patterns and cycles may also exist on other planets.	*Activity: Patterns and Cycles;* Students conduct an activity with three parts; first, they discuss cycles and patterns in nature, then they define and identify models, and finally they build a popsicle model of a cycle.
Lesson 2: Designing a Scale Model of the Solar System	Students conduct research on the planets, with emphasis on patterns and cycles, and gain an appreciation for the variation in length of year, length of day, and seasonal variation across the Solar System. To explore whether the patterns and cycles on the planets are related to planetary position in the Solar System, students create posters that can be used to mark the locations of the planets within a *Voyage* model of the Solar System.	*Activity: Build a Scale Model of the Planets;* Students create a poster for each planet that contains planetary characteristics relevant to patterns and cycles, together with a graphic representing the planet at the *Voyage* scale, and the number of paces to the next planet. At the end of this activity students are ready to lay out the *Voyage* scale model Solar System.
Lesson 3: *Voyage* through the Solar System	Students build the *Voyage* scale model of the Solar System on a playground and "travel" to each planet. This exercise allows students to recognize that the Sun and planets are tiny worlds in a vast space. Students also explore the similarities and differences in the patterns and cycles observable on the planets. The students come to realize that while seasonal variation (except for the length of seasons) seems independent of planet location, both the length of the day and length of the year do reflect planetary position. Students then explore why this occurs, with length of year dependent on the distance from the Sun, and length of day dependent on whether the planet is an inner Earth-like planet, an outer Jupiter-like planet, or a Pluto-like object further out in the Solar System. This experience gives students a new perspective on the Solar System, and allows them to gain a new sense of home.	*Activity: Voyage Through the Solar System;* Students construct the *Voyage* scale model Solar System and travel to each planet to explore the similarities and differences between the planets.

Connection to Standards

This Education Unit has been mapped to the National Science Education Standards (National Research Council, National Academy Press, Washington, DC, 1996) and to the Benchmarks for Science Literacy, (American Association for the Advancement of Science, Project 2061, Oxford University Press, New York, 1993). A complete explanation of the Standards can be found at: http://www.nap.edu/html/nses/html/. A complete explanation of the Benchmarks can be found at: http://www.project2061.org/tools/benchol/bolintro.htm. Core standards for each lesson are indicated by a "√"; related standards are indicated by an "x."

	Education Standards In Voyage: A Journey Through Our Solar System: 3-4 Education Unit						
	National Science Education Standards, K-4	AAAS Benchmarks for Science Literacy, 3-5					
	Standard D: Earth and Space Science	Benchmark 2: The Nature of Mathematics	Benchmark 4: The Physical Setting	Benchmark 9: The Mathematical World	Benchmark 11: Common Themes		
	D2: Objects in the sky	2A: Patterns and Relationships	4A: The Universe	9C: Shapes	11B: Models	11C: Constancy and Change	11D: Scale
Modeling Patterns & Cycles in Our Lives	x	√			√	x	
Designing a Scale Model of the Solar System	√		√	√	√		x
Voyage through the Solar System	√		√	x	√		