

# MISSION: KSC

**2008 ADDENDUM**

to

**Space Week Teacher's Guide  
for Launch Specialists**



# **Brevard Space Week Committee**

## **Summer 2008**

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### **Advisor:**

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### **Addendum Committee Members:**

Michelle Ferro	West Melbourne Elementary School For Science
Paul Hancock	Palm Bay Elementary
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Janice Jones	Curriculum & Instruction

### **Purpose**

New curriculum standards for science in grades K-12 have been adopted by the state of Florida and are being implemented at the start of the 2008/2009 school year. The "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" and student activity books have not been changed. The intent of this addendum is to correlate Space Week activities with the Next Generation Sunshine State Standards for Science, and thereby supporting success on the revised district required assessments. Not all activities align with the new standards, but should be used to prepare for, as well as enrich the Space Week event. Space Week is designed to teach quality science and motivate students to consider career choices that require advanced education in the areas of science and mathematics.

This document is aligned with the Next Generation Sunshine State Standards for Science and is to be used in conjunction with MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008. Teacher suggestions are included with each lesson and offer support for program implementation and student success.



## **Mission: KSC**

### **Letter to Launch Directors**

Dear Teachers,

Welcome to the Kennedy Space Center. Big changes are taking place at NASA. The Space Shuttle is about to be replaced with new launch vehicles that will take us back to the Moon, this time to stay, and to Mars and beyond. It is a wonderful time to be looking upward and your students will benefit from the renewal of direct human exploration of the solar system. The first person to set foot on Mars may be sitting in your classroom today.

At the Visitor Complex we like to think of ourselves as part of the support system for the most important work of the age - educating the citizens and explorers of tomorrow. We are here to help you excite and motivate your students to pursue their dreams.

The Kennedy Space Center and the nearby Cape Canaveral Air Force Station are our portals to the universe. It is here that the first American satellites and the first American astronauts began their journeys into space. The first person to step on the Moon left Earth from our launch pad.

The Kennedy Space Center is the home of the Space Shuttle and the marshalling point for most of the components of the International Space Station. It is the home of the rockets of the future - Ares 1 and Ares 5.

We are thrilled to partner with Brevard Public Schools, the National Space Club Florida Chapters, and other community resources to assist you in inspiring your students.

Sincerely,

Dan LeBlanc  
President & Chief Operating Officer

## **Points of Emphasis**

Feedback from teachers and volunteers has been instrumental to the improvement of the Space Week experience and has been incorporated in this addendum to "Mission: KSC Space Week Teacher's Guide for Launch Specialists."

- **Pre/Post Test:** The on-line Pre/Post test is a critical component of the Space Week program. The results of this assessment provide the district-wide data that justifies the continuation of funding and is essential to program evaluation. A copy of this test is in "Mission: KSC Space Week Teacher's Guide for Launch Specialists" on pgs. 102-112.
- **Activities:** Activities in the "Mission: KSC Space Week Teacher's Guide for Launch Specialists" reflect the science behind man's exploration of space, NASA's focus on the colonization of the moon, the eventual manned launch to Mars and prepare students for their visit to for KSC including the new **Shuttle Launch Experience (SLE)**.
- **Benchmarks:** Benchmarks from the Physical Science Body of Knowledge (BOK), taught at the beginning of the year in grade 6, align very well with the Space Week activities. Six (6) Physical Science benchmarks are taught through these activities, four (4) of them multiple times. Therefore, these lessons/activities support student preparation for the district required assessments. Additionally, Space Week provides support in teaching the benchmarks from the Nature of Science BOK. Seven (7) Nature of Science benchmarks are taught through these activities, four (4) of them multiple times. NOTE that only one (1) Earth and Space benchmark and one (1) Life Science benchmark are taught through Space Week activities.
- **Teacher Notes:** The agenda for the Space Week study trip provides for a full day of activities. In order to get the most out of this experience, it is critical for each school's Space Week Contact to take the lead in the following:
  1. Have an assigned area for the KSC busses to park at your school that won't conflict with the BPS school busses. Get the packet of schedules, information, and wristbands from the KSC driver when he/she arrives.
  2. Make sure that all chaperones are adequately prepared to supervise the students. Review "Chaperone Guidelines" with them in advance found in "Mission: KSC Space Week Teacher's Guide for Launch Specialists" pg. 2.
  3. Check that all students and adults with special dietary needs, including vegetarians, have brought their own lunch.
  4. Make sure that all students, teachers and chaperones wear their wristbands at all times. Wristbands can be found in the packet received from the KSC driver. Extra wristbands must be turned in upon arrival at KSC.
  5. Please remind everyone in your group to be courteous at all times.
  6. Students may bring cameras at your discretion.
  7. Bring pencils for the Scavenger Hunt. Students will work in groups of 4-5, (2 groups per chaperone) with each group needing one pencil. The

Scavenger Hunt clues will be given to the chaperones upon arrival at the Apollo/Saturn V Center, to be reviewed when you return to school.

8. The Space Week Contact/Lead Teacher will pick-up a storage bag at registration. This bag will be used to hold student/chaperone personal belongings while riding the Shuttle Launch Experience. The empty bag will be returned to Space Week personnel at the departure gate.

- **Chaperones:** Note that for the KSCVC trip we are limited to one chaperone per ten (10) students and that **teachers are considered chaperones**. E.g. a school with 100 sixth graders attending can have 10 chaperones. If 4 teachers are attending, then only 6 parents can chaperone.
- **Use the Guide:** Make sure you utilize "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" to prepare you and your students for Launch Day (the study trip).
- **Pre-Launch Curricular Support:** This section contains a number of activities for classroom use.
  - **Minimum Curricular Requirements (MCR):** Teachers are expected to prepare their students for Brevard Space Week by performing these activities prior to the study trip. *These in-class activities, combined with the Space Week experience, contain information the students will need in order to successfully answer the questions on the Post Test.*
- **Extensions to the Curricular Requirements (ECR):** These activities are provided to further enrich the pre-study trip learning experience and extend the post-study trip experience. They are to be used at the teacher's discretion.
- **Post Launch Debriefing:** Teachers may also choose from the many activities provided in "Mission: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008." As a follow-up curriculum, these activities serve to: 1) replicate study trip activities in the classroom, 2) solidify addressed concepts, and 3) extend learning opportunities.

These activities are designed to enhance the launch day experience, reinforce motivation for careers in science and facilitate participation in the free response questions contained on the Space Week Post Test. Please keep in mind that the Pre/Post Test is the primary instrument for determining the efficacy of the Space Week experience and is crucial to the continuation of funding.

- **Mission Support:** This section contains information that might be useful to you as you enter the world of KSC. After the study trip, you will receive a "Mission: KSC Family Activity Guide" for each student in your class. Reviewing this guide with your students will help them become expert "Mission Specialists" when they return with their family to tour KSC. Their FREE Family Admission Certificate is found in the family guide. **ENCOURAGE YOUR STUDENTS TO USE IT!**

Good luck as you embark on this fantastic mission - Mission: KSC!

## **II. Pre-Launch Curricular Support**

### **KSC Background Information: History of Space Travel Activities**

#### ❖ **Space Travel:**

*Activity from Mission: KSC Space Week Guide pg. 6*

**SC.6.N.1.5:** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*

#### **Teacher Suggestions:**

1. Use a variety of reference materials. The media specialist at your school is a great resource.
2. Use different mediums for constructing the timelines.
3. See "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" pg. 7 for Deep Space Extensions.
4. Have students discuss the pros and cons of human space flight.
5. Students can debate what they feel is the most important historical space event.

#### ❖ **Space Exploration Basics:**

*Activity from Mission: KSC Space Week Guide pg. 8*

This activity does not directly align with the Next Generation Sunshine State Standards for Science. However, it provides vital background information that adds to the context for the Space Week learning experience. It also provides opportunities for cooperative learning in the classroom.

#### ❖ **Mission Patches:**

*Activity from Mission: KSC Space Week Guide pg. 12*

This activity does not directly align with the Next Generation Sunshine State Standards for Science. However, it provides vital background information that adds to the context for the Space Week learning experience. It also provides opportunities for cooperative learning in the classroom.

#### ❖ **SLE and the Puffy-Face, Bird-Legs Syndrome:**

*Activity from Mission: KSC Space Week Guide pg. 14*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data,*

*interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.1.5:** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*

**SC.6.P.13.2:** *Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.*

**SC.6.L.14.5:** *Identify and investigate the general functions of the major systems of the human body (digestive, respiratory, circulatory, reproductive, excretory, immune, nervous, and musculoskeletal) and describe ways these systems interact with each other to maintain homeostasis.*

### **Teacher Suggestions:**

1. Use this activity to review observation and data analysis skills.
2. You may want to tell the students to dress appropriately the day before doing this activity.
3. Have students get up slowly after this activity; light-headedness may occur.
4. See "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" pg. 16 for questions to probe further understanding of the Law of Gravity.

### **Moon and Mars: What We Know Activities**

#### **❖ Strange New Planet:**

*Activity from Mission: KSC Space Week Guide pg. 18*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.2.2:** *Explain that scientific knowledge is durable because it is open to change as new evidence or interpretations are encountered.*

**SC.6.N.3.4:** *Identify the roles of models in the context of the sixth grade science benchmarks.*

**Teacher Suggestions:**

1. Ask students to bring in some of the materials.
2. Ask the art teacher for assistance in finding colored cellophane.
3. Be sure that none of your students are allergic or overly sensitive to perfumes or fragrances.
4. Asking students from other classes to design the planets is a great time saver.
5. Be sure to give groups of students time to discuss and complete the Visual Observation Sheet and student Data Sheets from pages 21-26 "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008."
6. This activity could easily be extended over 5 days, with just one phase done per day. This would allow students time to research the different missions.

**❖ Impact Craters:**

*Activity from Mission: KSC Space Week Guide pg. 27*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.3.4:** *Identify the roles of models in the context of the sixth grade science benchmarks.*

**SC.6.E.6.1:** *Describe and give examples of ways in which Earth's surface is built up and torn down by physical and chemical weathering, erosion, and deposition.*

**SC.6.P.11.1:** *Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.*

**Teacher Suggestions:**

1. Try other materials to simulate the moon's surface and compare results.
2. All students should wear goggles or safety glasses.
3. You might want to consider doing this outside on a calm day.
4. Make sure the students are keeping accurate data and measurements.

5. You can do this by having all groups drop their marbles at your signal.
6. Use playground jungle gyms to increase the height of the drop.

❖ **Moon ABC's Fact Sheet:**

*Activity from Mission: KSC Space Week Guide pg. 30*

This activity does not directly align with the Next Generation Sunshine State Standards for Science. However, it provides vital background information that adds to the context for the Space Week learning experience. It also provides opportunities for cooperative learning in the classroom.

### **Moon and Mars: How Will We Get Their Activities**

❖ **Paper Rockets**

*Activity from Mission: KSC Space Week Guide pg. 32*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.3.4:** *Identify the roles of models in the context of the sixth grade science benchmarks.*

**SC.6.P.11.1:** *Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.*

**SC.6.P.13.1:** *Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.*

**SC.6.P.13.2:** *Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.*

**SC.6.P.13.3:** *Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.*

### **Teacher Suggestions:**

1. Allow a wide variety of rocket lengths.
2. Experiment with different sizes and number of fins.
3. Keeping accurate records is an important skill. Students should record each time they change a variable until they have the best design.
4. See "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" pg. 35 for Discussion, Extensions, and Assessment ideas.

### ❖ **3-2-1 POP:**

*Activity from Mission: KSC Space Week Guide pg. 37*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.3.4:** *Identify the roles of models in the context of the sixth grade science benchmarks.*

**SC.6.P.11.1:** *Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.*

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**SC.6.P.13.2:** *Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.*

**SC.6.P.13.3:** *Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.*

### **Teacher Suggestions:**

1. Use Fuji brand film canisters.
2. Ask your local film developer to save canisters for you; they are getting harder to come by now that most people use digital cameras.
3. Make sure effervescent antacid tablets are fresh.
4. Be sure to read Management on pg. 37 in the "MISSION: KSC Space Week Teacher's Guide for Launch Specialists 2007-2008" for common mistakes.
5. Plan to have enough antacid tablets and time for several trials.
6. Using denture cleaning tablets have produced mixed results.

### **Landing, Building, Moving, and Discovering Activities**

#### **❖ How to Land Softly on a Hard Planet:**

*Activity from Mission: KSC Space Week Guide pg. 40*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.2:** *Explain why scientific investigations should be replicable.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.1.5:** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*

**SC.6.P.11.1:** *Explore the Law of Conservation of Energy by differentiating between potential and kinetic energy. Identify situations where kinetic energy is transformed into potential energy and vice versa.*

**SC.6.P.12.1:** *Measure and graph distance versus time for an object moving at a constant speed. Interpret this relationship.*

**SC.6.P.13.1:** *Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.*

**SC.6.P.13.2:** *Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.*

**SC.6.P.13.3:** *Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.*

**Teacher Suggestions:**

1. Your local fire department may bring a truck and drop your models for you.
2. A member of staff may be willing to drop models from the roof of your school.
3. Make the construction of the "Lander" a homework assignment. Option 2 on pg. 44 of the "MISSION: KSC Space Week Teacher's for Launch Specialists Guide 2007-2008" could be given to the students to complete at home. Completion of the parachute and air bags could be completed in the classroom. Or let the students come up with their own designs. Have extra eggs on hand for those who can't get their egg to school without breaking it.
4. Remember that raw eggs cause illness, so take the proper safety precautions.

❖ **Building Trusses:**

*Activity from Mission: KSC Space Week Guide pg 49*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

**SC.6.N.1.5:** *Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.*

**SC.6.N.2.3:** *Recognize that scientists who make contributions to scientific knowledge come from all kinds of backgrounds and possess varied talents, interests, and goals.*

**SC.6.N.3.4:** *Identify the roles of models in the context of the sixth grade science benchmarks.*

**SC.6.P.13.1:** *Investigate and describe types of forces including contact forces and forces acting at a distance, such as electrical, magnetic, and gravitational.*

**SC.6.P.13.3:** *Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.*

**Teacher Suggestions:**

1. This is a Science Technology Engineering and Math (STEM) activity and can be used as a center.
2. Students can experiment with different length trusses and compare the maximum amount of weight that can be supported.
3. Challenge pairs of students by allowing them only 5 large sheets of paper and 2 meters of masking tape for each of their constructions. (They will probably ask for more paper and tape for “do-overs” as they get ideas from others or see their design doesn’t work.)
4. Have the students design a sign showing the name and logo for their engineering company. Have them present their truss in front of the class, placing their truss on the stand and decide where the cup will hang; before adding the weights to the cup. Award the NASA contract to the strongest truss design.

❖ **Welcome to the International Space Station:**

*Activity from Mission: KSC Space Week Guide pg 51*

This is a Science Technology Engineering and Math (STEM) activity and can be used as an anchor activity or homework assignment.

**Teacher Suggestions:**

Enlarge the pages on legal or larger paper. Be sure to cover the SOLUTIONS section on pg. 52 of the “MISSION: KSC Space Week Teacher’s Guide for Launch Specialists 2007-2008” before copying!

❖ **Rocket Racer:**

*Activity from Mission: KSC Space Week Guide pg 53*

**SC.6.N.1.1:** *Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.*

**SC.6.N.1.4:** *Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.*

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**SC.6.P.13.2:** *Explore the Law of Gravity by recognizing that every object exerts gravitational force on every other object and that the force depends on how much mass the objects have and how far apart they are.*

**SC.6.P.13.3:** *Investigate and describe that an unbalanced force acting on an object changes its speed, or direction of motion, or both.*

**Teacher Suggestions:**

1. Your local grocery store may donate Styrofoam™ trays.
2. Instead of using pins with the wheels, run bamboo skewers through straws for axles.
3. Students should record a detailed drawing of their racer.

# **Teacher's Notes**

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## SCHOOL BOARD MEMBERS

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Richard A. DiPatri, Ed.D.



### NONDISCRIMINATION NOTICE

It is the policy of the School Board of Brevard County to offer the opportunity to all **students** to participate in appropriate programs and activities without regard to race, color, gender, religion, national origin, disability, marital status, or age, except as otherwise provided by Federal law or by Florida state law.

A **student** having a grievance concerning discrimination may contact:

Dr. Richard A. DiPatri  
Superintendent  
Brevard Public Schools

Ms. Brenda Blackburn  
Associate Superintendent,  
Division of Curriculum  
and Instruction  
Equity Coordinator

Dr. Walter Christy, Director  
Office of Secondary Programs

Ms. Eva Lewis, Director  
ESE Program Support  
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Coordinator

School Board of Brevard County  
2700 Judge Fran Jamieson Way  
Viera, Florida 32940-6601  
(321) 633-1000

It is the policy of the School Board of Brevard County not to discriminate against **employees** or **applicants** for employment on the basis of race, color, religion, sex, national origin, participation and membership in professional or political organizations, marital status, age, or disability. Sexual harassment is a form of employee misconduct which undermines the integrity of the employment relationship, and is prohibited. This policy shall apply to recruitment, employment, transfers, compensation, and other terms and conditions of employment.

An **employee** or **applicant** having a grievance concerning employment may contact:

Ms. Susan Standley, Director  
Office of Compensation & Benefits

Ms. Joy Salamone, Director  
Human Resources Services  
and Labor Relations

School Board of Brevard County  
2700 Judge Fran Jamieson Way  
Viera, Florida 32940-6601  
(321) 633-1000

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