Theme B: Introduction: Teacher Resource Plan Overview

Purdue University College of Education

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### Theme B: Introduction: Teacher Resource Plan Overview

**Title:** Becoming a Spacewalker: My Journey to the Stars, by Astronaut Jerry L Ross  
by Andra L. Zoller

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<tr>
<td><strong>Language Arts:</strong> Interactive Read Aloud</td>
<td><strong>Language Arts:</strong> Interactive Read Aloud</td>
<td><strong>Language Arts:</strong> Shared Reading KID STUFF</td>
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<td><strong>Language Arts:</strong> Interactive Read Aloud</td>
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| **Science Investigation:** Gravity and a Bouncing Basketball | **Science Investigation:** Gravity and an Inflated Beach Ball | **Science Investigation:** Weight Comparison: On Earth vs. Felt Like in Space | **STEM Investigation:** Float or Sink? | **Science Investigation:** Sputnik 1 have in common.  
**Vocabulary:** Change, sound, sight, force, gravity, weight |
| **Materials:** beach ball, scale, science notebook/journal/iPad, chart paper, marker, pencil | **Materials:** beach ball, scale, science notebook/journal/iPad, chart paper, marker, pencil | **Materials:** Science notebook, transparent tub, water, floating/sinking objects, prediction/results chart | **Materials:** Love My Science: Floating and Sinking—Float or Sink | **Materials:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts |
| **Resources:** Sputnik and the Dawn of the Space Age (NASA) | **Resources:** Sputnik and the Dawn of the Space Age (NASA) | **Resources:** Sputnik and the Dawn of the Space Age (NASA) | **Website Resources:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts | **Website Resources:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts |
| [https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8) | [https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8) | [https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8) | [https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8) | [https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8) |
| What is gravity really? | What is gravity really? | What is gravity really? | What is gravity really? | What is gravity really? |

**STEM Objective:** To investigate force and a bouncing basketball.  
**Vocabulary:** change, sound, sight, force, bounce, gravity, weight  
**Materials:** basketball, scale, science notebook/journal/iPad, chart paper, marker, pencil  
**Resources:** Tell Me a Story Jerry Ross—What Was I Thinking? (1:58)  
[https://www.youtube.com/watch?v=NTWWofyObo8](https://www.youtube.com/watch?v=NTWWofyObo8)  
What is gravity really?  

**STEM Objective:** To discover how a force can act upon a beach ball; To explore what a beach ball and Sputnik 1 have in common.  
**Vocabulary:** change, sound, sight, force, gravity, weight  
**Materials:** beach ball, scale, science notebook/journal/iPad, chart paper, marker, pencil  
**Resources:** Sputnik and the Dawn of the Space Age (NASA)  

**STEM Objective:** To investigate weight on earth and what it feels like in space. What is it like to experience G-forces on earth?  
**Vocabulary:** weight (on earth versus “felt like in space”)  
**Materials:** scale, science notebook/journal/iPad, chart paper, marker, pencil, prediction/results chart  
**Resources:** Connection: “felt like I was riding a roller coaster in the sky” p. 21  
Roller Coaster Design by Aditya and Tyler  
[http://pbskids.org/dragonflytv/show/rollercoasterdesign.html](http://pbskids.org/dragonflytv/show/rollercoasterdesign.html)  
Space Shuttle Discovery Launch (April 27, 2011)  
[https://www.youtube.com/watch?v=OnoNITECLc](https://www.youtube.com/watch?v=OnoNITECLc)  
Basketball by Jai and Jonathan (Arc)  
[http://pbskids.org/dragonflytv/show/basketball.html](http://pbskids.org/dragonflytv/show/basketball.html)  

**STEM Objective:** To explore floating and sinking using simple available materials.  
**Vocabulary:** gravity, transport, investigate, countryside, marsh  
**Materials:** Science notebook, transparent tub, water, floating/sinking objects, prediction/results lab, large towel  
**Resources:** Love My Science: Floating and Sinking—Float or Sink  
Mark 111 Suit Test Evaluation in WETF with Jerry Ross  
[https://www.youtube.com/watch?v=DY8t8Aui2ug](https://www.youtube.com/watch?v=DY8t8Aui2ug)  
Metric Conversion Chart  
[http://www.metric-conversions.org/weight/pounds-to-kilograms.htm](http://www.metric-conversions.org/weight/pounds-to-kilograms.htm)  

**STEM Objective:** To investigate “Space Age” weight/size and utilize data to solve mathematical comparisons.  
**Vocabulary:** orbit, venture, man-made, launched, satellite, bulletin, rocket  
**Materials:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts  
**Website Resources:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts  

**Website Resources:** Sputnik 1 Information, Wikipedia: Mercury 7 website, science notebook/journal/iPad, computer, calculator, pencil, chart paper, charts  

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<tr>
<th>DAY 6</th>
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<tbody>
<tr>
<td><strong>Language Arts:</strong> Shared Reading <strong>SCIENTIFIC CURIOUSITY</strong></td>
<td><strong>Language Arts:</strong> Shared Reading <strong>TRY, TRY AGAIN</strong></td>
<td><strong>Language Arts:</strong> Shared Reading <strong>SPACE TRAVELER</strong></td>
<td><strong>Language Arts:</strong> Shared Reading <strong>LIFE IN ZERO GRAVITY</strong></td>
<td><strong>Language arts/STEM culminating activity:</strong> Extending the learning</td>
</tr>
<tr>
<td>Science Investigation: <strong>BLAST OFF!</strong> The Balloon Rocket Experiment</td>
<td>Science Investigation: Impact of Gravity on Structural Design</td>
<td>Science Investigation: Space Travel: From Your Point of View</td>
<td>Science Investigation: Space Menu: “Need vs. Want”</td>
<td><strong>Student Activity:</strong> Children create a means to express what Jerry Ross’s story means to them using any medium of choice.</td>
</tr>
</tbody>
</table>
| *Video STS-74 Flight Day 1 Atlantis Liftoff! November 12, 1995 (Total Time: 17:46/Begin viewing at 12:00) | **STEM Objective:** To integrate language arts concepts with STEM to explore propulsion and the impact of various conditions using rocket balloons. | **Science Objective:** To provide an opportunity for children to sketch to stretch child’s own understanding of space travel using various mediums to express what they are learning. | **STEM Objective:** To provide the students with an opportunity to “think like a chef on a budget” and develop one menu (breakfast, lunch, and dinner menu for one day with cost to be determined) to feed one person up in space. | Menu of possible topics:  
| | **Vocabulary:** spacewalk, astronaut, engineer, space station, habitable, structure, force, resistance, colossal, extreme, shuttle | **Vocabulary:** ignition, thunderous, trajectory, parallel, acceleration, G-force, construction, robotic, hatch, crew members, hostile, liftoff, atmosphere | **Vocabulary:** portable, magnetized, galley, cramped, resistance, zero gravity, treadmill | • Space facts/research  
| | **Materials:** 8 ½” x 11” cardstock or construction paper (7–10 pieces) 5-ounce paper or plastic cup Pile of pennies 2 same-size, empty boxes from cereal, shoes or crackers. Scissors Tape or glue Tabletop or flat surface Computer/Internet capabilities | **Materials:** paper (8 ½” x 14”), pencil, markers, clay, paint, paint brush, computer, iPad, Notebook, etc. | **Resources:** Kroger  
| | **Science Investigation:** The Lawrence Hall of Science  
http://static.lawrencehallofscience.org/kidsite/activities/bridges/ | **Science Investigation:** Space Shuttle STS-110 Atlantis Space Station Assembly ISS-8A S0 Truss 2002 NASA  
https://www.youtube.com/watch?v=Uq8Nnt5VzGE | **Resources:**  
| | **Resources:** Bridge Builders  
http://static.lawrencehallofscience.org/kidsite/activities/bridges/ |  
| | (November 26, 1985)  
https://www.youtube.com/watch?v=8Jwvlpvzy8Y | |  
| | **Resources:**  
| | | **Mission Patch**  
http://www.spacecenter.org/docs/Activities-MissionPatch.pdf | | **Resources:**  
| | **Language Arts/STEM Learning Objective:** To provide an opportunity for children to express and extend what they have learned about space, history of space exploration, positive character traits, plan careers, scientific process and procedures. | | **Materials:** To be determined by student |

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INTRODUCTION-SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS STANDARDS

Becoming a Spacewalker: My Journey to the Stars by Astronaut Jerry L. Ross
STEM Standards Andra L. Zoller

Next Generation Science Standards Science and Engineering Practices:
Asking Questions and Defining Problems; Analyzing and Interpreting Data; Using Mathematics and Computational Thinking

NGSS Connections:
Interdependence of Science, Engineering and Technology
• Science and technology support each other.
• Tools and instruments are used to answer scientific questions, while scientific discoveries lead to the development of new technologies.
• People’s needs and wants change over time, as do their demands for new and improved technologies.
• Engineers improve existing technologies or develop new ones to increase their benefits, decrease known risks, and meet societal demands.
• When new technologies become available, they can bring about changes in the way people live and interact with one another.

Influence of Engineering, Technology and Science on Society and the Natural World
Home/Community/School Connections:
• Increasing parent involvement in their children’s science classroom and encouraging parents’ roles as partners in science learning
• Engaging students in defining problems and designing solutions of community projects in their neighborhoods (typically engineering)
• Focusing on science learning in informal environments

The International Society for Technology in Education (ISTE) National Educational Technology Standards (NETS) and Performance Indicators for Students: (Include)
Standard 1.0 Creativity and Innovation; Standard 2.0 Communication and Collaboration; Standard 3.0 Research and Information Fluency; Standard 4.0 Critical Thinking, Problem Solving, and Decision Making; Standard 5.0 Digital Citizenship Standard 6.0 Technology Operations and Concepts

1. Creativity and innovation
Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.
   a. Apply existing knowledge to generate new ideas, products, or processes
   b. Create original works as a means of personal or group expression
   c. Use models and simulations to explore complex systems and issues
   d. Identify trends and forecast possibilities

2. Communication and collaboration
Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
   a. Interact, collaborate, and publish with peers, experts, or others employing a variety of digital environments and media
b. Communicate information and ideas effectively to multiple audiences using a variety of media and formats

c. Develop cultural understanding and global awareness by engaging with learners of other cultures

d. Contribute to project teams to produce original works or solve problems

3. Research and information fluency
Students apply digital tools to gather, evaluate, and use information.

a. Plan strategies to guide inquiry

b. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media

c. Evaluate and select information sources and digital tools based on the appropriateness to specific tasks

d. Process data and report results

4. Critical thinking, problem solving, and decision making
Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

a. Identify and define authentic problems and significant questions for investigation

b. Plan and manage activities to develop a solution or complete a project

c. Collect and analyze data to identify solutions and/or make informed decisions

d. Use multiple processes and diverse perspectives to explore alternative solutions

5. Digital citizenship
Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.

a. Advocate and practice safe, legal, and responsible use of information and technology

b. Exhibit a positive attitude toward using technology that supports collaboration, learning, and productivity

c. Demonstrate personal responsibility for lifelong learning

d. Exhibit leadership for digital citizenship

6. Technology operations and concepts
Students demonstrate a sound understanding of technology concepts, systems, and operations.

a. Understand and use technology systems

b. Select and use applications effectively and productively

c. Troubleshoot systems and applications

d. Transfer current knowledge to learning of new technologies
Fourth Grade Compatible STEM Standards Addressed in STEM Investigations

Becoming a Spacewalker: My Journey to the Stars by Astronaut Jerry L. Ross with Susan G. Gunderson
Compatible STEM Standards Andra L. Zoller

Day One: A DREAM BEGINS

http://www.nextgenscience.org/next-generation-science-standards

Common Core (CC) Math: 4.MD.A.1
http://www.corestandards.org/

Indiana Academic Standards (IAS):
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, 4.NS.1, 4.NS.6, 4.M.2, 4.DA.1
IAS Science: 4.4.1
IAS Physical Education: 4.RI.7, 4.RI.8, 4.1.2, 4.2.1, 4.3.3
IAS Health and Wellness: 4.1.1, 4.2.3, 4.2.4, 4.2.5
http://www.doc.in.gov/standards

High Ability Resource Guide for the IAS for ELA and Mathematics:

Indiana Academic Standards Technology (IAST):
Standard 1.0 Creativity and Innovation; Standard 2.0 Communication and Collaboration; Standard 3.0 Research and Information Fluency; Standard 4.0 Critical Thinking, Problem Solving, and Decision Making; Standard 5.0 Digital Citizenship; Standard 6.0 Technology Operations and Concepts
http://www.doc.in.gov/sites/default/files/standards/iste.pdf

The International Society for Technology in Education (ISTE), National Educational Technology Standards (NETS) and Performance Indicators for Students:
Standard 1.0 Creativity and Innovation; Standard 2.0 Communication and Collaboration; Standard 3.0 Research and Information Fluency; Standard 4.0 Critical Thinking, Problem Solving, and Decision Making; Standard 5.0 Digital Citizenship Standard 6.0 Technology Operations and Concepts
http://www.iste.org/docs/pdfs/20-14_ISTE_Standards-s_PDF.pdf

Day Two: GRIT AND DETERMINATION

CC: 4.MD.A.1
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, 4.NS.1, 4.NS.6, 4.DA.1
IAS Science: 4.4.1
IAS Physical Education: 4.RI.7, 4.RI.8, 4.W.8, 4.1.2, 4.2.1, 4.3.3, 4.RI.7, 4.RI.8, 4.W.8, 4.1.2, 4.2.1, 4.3.3
IAST, ISTE/NETS: Standards 1-6

Day Three: SPACE - AT LAST

NGSS: 4-ESS2 Earth’s Systems, 4.MD.A.1, PS2.A, PS2.B
CC: 4.NBT.A.1, 4.NBT.A.2, 4.NBT.B.4, 4.MD.A.1, 4.MD.A.2,
IAS Math: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, 4.NS.1, 4.NS.6, 4.NS.7, 4.NS.9, 4.M.2, 4.DA.1, 4.DA.3 (utilizing T-chart and bar graph)
IAS Science: 4.4.1
IAST, ISTE/NETS: Standards 1-6
Day Four: KID STUFF  
NGSS: Standard 4: Science, Engineering and Technology, 4.4.1, 4.MD.A.1, 4.MD.A.2.  
NGSS Connections to CCSSM Standards for Mathematical Practice: MP.2, MP.4, MP.5  
NGSS Science and Engineering Practices: Eight practices for science and engineering  
CC: 4.OA.C.5, 4.NBT.A.1, 4.MD.A.1, 4.MD.A.2, 4.MD.B.4  
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, 4.NS.1, 4.NS.6, 4.NS.7, 4.DA.1, 4.DA.3, 4.M.2  
IAS Science: All Science and Design Process Standards, 4.4.1  
IAST, ISTE/NETS: Standards 1-6

Day Five: THE SPACE AGE  
NGSS: 4.MD.A.1, 4.MD.A.2  
Connections to CCSSM Standards for Mathematical Practice: MP.2, MP.4, MP.5  
NGSS Science and Engineering Practices: Eight practices for science and engineering  
IAS Science: 4.4.1  
IAST, ISTE/NETS: Standards 1-6

Day Six: SCIENTIFIC CURIOSITY  
NGSS: Standard 4: Science, Engineering and Technology  
Core Standard: Design a moving system and measure its motion 4.4.1, 4.MD.A.1, 4.MD.A.2  
CC: 4.NBT.A.1, 4.NBT.A.3, 4.MD.A.1, 4.MD.A.2  
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, 4.NS.1, 4.NS.2, 4.NS.3, 4.NS.6, 4.NS.9, 4.C.1, 4.AT.1, 4.M.1, 4.M.2, 4.M.3, 4.DA.1, 4.DA.2, 4.DA.3  
IAS Science: 4.4.1, 4.4.2, 4.4.3, 4.4.4 (Student choice)  
IAST, ISTE/NETS: Standards 1-6

Day Seven: TRY, TRY AGAIN  
CC: 4.OA.A.3, 4.OA.C.5, 4.NBT.A.1, 4.NBT.A.2, 4.NBT.A.4, 4.MD.A.1  
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.7, PS.8  
IAS Science: 4.2.5, 4.4.1, 4.4.2, 4.4.3, 4.4.4  
IAST, ISTE/NETS: Standards 1-6
Day Eight: SPACE TRAVELER
NGSS: To apply comprehension strategies and illustrate the “Interdependence of Science, Engineering and Technology”
NGSS Connections: Interdependence of Science, Engineering and Technology; Influence of Engineering, Technology and Science on Society and the Natural World; Home/Community/School
Connections: “Home and Community Connections to School Science for Student Diversity”
NGSS Connections: In the Next Generation Science Standards—“Interdependence of Science, Engineering, and Technology” and “Influence of Engineering, Technology, and Science on Society and the Natural World (3-5 Connections Statements)
http://www.nextgenscience.org/sites/ngss/files/APPENDIX%20J_0.pdf
IAS Science: Cumulative Science Standards Application
IAS Social Studies: 4.1.13, 4.1.14, 4.1.15, 4.1.18, 4.2.6, 4.3.2, 4.3.3, 4.3.12, 4.3.13, 4.4.2, 4.4.6, 4.4.7, 4.4.8, 4.4.10
IAS Science: Cumulative Science Standards Application
IAS Social Studies: 4.4.4, 4.4.6, 4.4.10
Health and Wellness: 4.1.1, 4.2.2, 4.2.5, 4.3.2
IAST, ISTE/NETS: Standards 1-6

Day Nine: LIFE IN ZERO GRAVITY
NGSS: To apply comprehension strategies and illustrate the “Interdependence of Science, Engineering and Technology”
NGSS Connections: Interdependence of Science, Engineering and Technology
CC: Math/Measurement & Data 4.MD.A.1, 4.MD.A.2, 4.OA.C.5, 4.OA.A.1, 4.OA.A.3, 4.NBT.B
IAS Mathematics: PS.1, PS.2, PS.3, PS.4, PS.5, PS.6, PS.8, 4.NS.1, 4.NS.9, 4.C.1, 4.AT.1, 4.M.3, 4.DA.1
IAS Science: Cumulative Science Standards Application
IAS Social Studies: 4.4.4, 4.4.6, 4.4.10
Health and Wellness: 4.1.1, 4.2.2, 4.2.5, 4.3.2
IAST, ISTE/NETS: Standards 1-6

Day Ten: EXTENDING THE LEARNING “The Final Countdown”
NGSS, NGSS Connections, Common Core, IAS, IAS Technology, ISTE/NETS- All appropriate standards will be applied in the completion of the final product.

Note:

In addition to the above standards, the Fourth Grade Literacy Standards Addressed in Interactive Read Alouds, Shared Reading, and Graphic Organizers can be found in the “Theme A: Introduction: Teacher Resource Plan Overview.”
MISSION SCHEDULE
by Andra L. Zoller

DAY 1:
Science Investigation: Bouncing Basketball
Gravity and a Bouncing Basketball

DAY 2:
Science Investigation: Inflated Beach Ball
Gravity, Inflated Beach Ball, and Sputnik 1

DAY 3:
Science Investigation: Weight on Earth and in Space
Weight Comparison: On Earth vs. Felt Like in Space

DAY 4: KID STUFF
Science Investigation: Float or Sink?
Objects that Float or Sink

DAY 5: THE SPACE AGE
Science Investigation: Space Age Mathematics Adventures
Mathematics Problem(s) Computation

DAY 6: SCIENTIFIC CURIOSITY
Science Investigation: Balloon Rocket
BLAST OFF! The Balloon Rocket Experiment

DAY 7: TRY, TRY AGAIN
Science Investigation: Bridge Builders
Impact of Gravity on Structural Design

DAY 8: SPACE TRAVELER
Science Investigation: Space Travel Interpretation
Space Travel: From Your Point of View

DAY 9: LIFE IN ZERO GRAVITY
Science Investigation: Space Food and a Budget
Space Menu: Need vs. Want

DAY 10: EXTENDING THE LEARNING
Language Arts/STEM Culminating Activity:
The Final Countdown