Third Grade: Earth Science Unit (3.E.1)

Decision 1: What will students learn in this unit?

Standards Addressed:
1. **Science:**
   - 3.E.1 Recognize the major components and patterns observed in the earth/moon/sun system

2. **Reading Informational Text:**
   - RI.3.1 Ask and answer questions to demonstrate understanding of a text.
   - RI.3.5 Use text features to locate information relevant to a given topic efficiently.
   - RI.3.7 Use information gained from illustrations and the words in a text to demonstrate understanding of the text.

3. **Math:**
   - MD.3 Draw a scaled pictograph or bar graph.

4. **Writing:**
   - W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

5. **Technology:**
   - 3.TT.1 Use technology tools and skills to reinforce classroom concepts and activities.

6. **Other:**
   - Visual Arts: 3.V.1.5 Understand characteristics of the Principles of Design, including repetition, movement, emphasis, contrast, balance, proportion, harmony, and unity.

What do I want my students to **KNOW**, **UNDERSTAND** and be able to **DO** at the end of this unit?

<table>
<thead>
<tr>
<th>Know</th>
<th>Understand</th>
<th>Do</th>
</tr>
</thead>
<tbody>
<tr>
<td>• That the solar system includes star, planets, and other objects.</td>
<td>• The sun, planets, and many moons are part of our solar system.</td>
<td>• Diagram and label the parts in the solar system.</td>
</tr>
<tr>
<td>• Planets and other objects revolve around the star.</td>
<td>• When light sources change position, shadows change as well.</td>
<td>• Describe how the planets revolve around the sun.</td>
</tr>
<tr>
<td>• That Earth is the third planet from the sun.</td>
<td>• Evidence of light and shadows can be used to make conclusions about our solar system.</td>
<td>• Explain how day and night are caused by Earth’s rotation.</td>
</tr>
<tr>
<td>• The sun and stars in the sky move in consistent patterns.</td>
<td></td>
<td>• Compare the length of shadows as the sun moves across the sky during the day.</td>
</tr>
<tr>
<td>• That shadows are created by objects blocking the light.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• The Earth rotates on its axis and revolves around the sun.</td>
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</table>

**Decision 1 - What will students learn in this unit?**
Decision 2: Assessment

Plan for how students will indicate learning and understanding of the concepts in the unit.
How will you assess learning?

**Pre-assessment**
Students will draw an illustration of the solar system for 5 minutes. Afterwards, students will do a quick write for 3 minutes to describe their illustration.

**Journal**
Students will complete Quick Writes throughout the unit.

**Post-assessment**
Repeat the pre-assessment.

Describe the performance, product, or project that will be the culminating activity for the unit.

The student’s assignment for the Culminating Activity includes:

- **Unit** essential question or “I Can” statement for the culminating activity.
  - I can create a mobile of the solar system. I can describe how the planets revolve around the sun.

- A thorough **description** of the activity including steps or task **analysis** in completing the culminating activity.
  - At the end of the unit, students will create a mobile of the solar system. Students will include the sun and the planets in the mobile. Students will write about what they have learned in the unit. Students should include facts about the major parts of our solar system including that planets revolve around the sun and how day and night are caused by Earth’s rotation.

- A copy(ies) of the rubric(s) you will use to assess the culminating activity or any other aspects of the unit.
  - See the rubric below.
### Decision 2: Assessments – Rubric Reminders:

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Knowledge about the solar system.</td>
<td></td>
</tr>
<tr>
<td>Student accurately included 2 or fewer facts about the solar system.</td>
<td></td>
</tr>
<tr>
<td>Balance and use of space.</td>
<td></td>
</tr>
<tr>
<td>The mobile seems unfinished or the student has not placed more than four planets in the correct order, including the sun.</td>
<td></td>
</tr>
<tr>
<td>Time and effort.</td>
<td></td>
</tr>
<tr>
<td>Class time was not used wisely and no additional effort was put in at other times or places.</td>
<td></td>
</tr>
<tr>
<td>Knowledge about the mobile.</td>
<td></td>
</tr>
<tr>
<td>The colors of the mobile can be interpreted to correlate with less than 4 of the planets.</td>
<td></td>
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</tbody>
</table>
**Decision 3: Student Learning Map**

**Key Learning Targets:**

<table>
<thead>
<tr>
<th>Concept:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.E.1.1. We live on a planet that is part of a solar system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concept:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.E.1.2. The sun and stars in the sky move in consistent patterns.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concept:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lesson EQ(s):</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>1. I can diagram and label the parts in the solar system.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lesson EQ(s):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I can describe how the planets revolve around the sun.</td>
</tr>
<tr>
<td>2. I can explain how day and night are caused by Earth’s rotation.</td>
</tr>
<tr>
<td>3. I can compare the length of shadows as the sun moves across the sky during the day.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar system</td>
</tr>
<tr>
<td>Planet</td>
</tr>
<tr>
<td>Sun</td>
</tr>
<tr>
<td>Star</td>
</tr>
<tr>
<td>Moon</td>
</tr>
<tr>
<td>Earth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constellations</td>
</tr>
<tr>
<td>Shadows</td>
</tr>
<tr>
<td>Rotation</td>
</tr>
<tr>
<td>Revolution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vocabulary:</th>
</tr>
</thead>
</table>
**Decision 4: Launch Activities**

**Hooks and Links**

Develops student interest and links prior knowledge. Provides the Student Learning Map and the key vocabulary to students.

**Guiding Questions:**
1. How are you going to get students engaged?
2. How are you going to develop student interest and link their prior knowledge?
3. How are you going to start the Student Learning Map of the unit with students?
4. How are you going to preview key vocabulary with students?

**Teacher will ask students:**
- Has anyone heard of the solar system?
- What does solar mean?
- What planet do we live on?
- Does anyone know if there are any other planets other than Earth?
- Why is this important to know?

*Watch the video about the solar system on [www.Brainpop.com](http://www.Brainpop.com).*

**Ask students after watching the video:**
- How are the planets formed?
- What is at the center of our solar system?
- Is it a planet?
- How does the orbit affect the planet’s atmosphere?

**Show students the Student Learning Map for the unit. Preview key vocabulary using a PowerPoint.**
Decision 5: Acquisition Lesson One

Language Objective(s), where appropriate:
I will name the eight planets in order.
I will draw a diagram of the planets and label them.
I will place the sun at the center of the solar system and draw one moon for Earth.

Lesson Essential Question(s) or “I Can” Statement(s):
I can diagram and label the parts in the solar system.

Activating Strategies: (Learners Mentally Active)
Sing “Planets” song to the tune of “Twinkle Twinkle Little Star” (from Can Teach).

Acceleration/Previewing: (key vocabulary)
- Solar system
- Planet
- Sun
- Mercury
- Venus
- Earth
- Mars
- Jupiter
- Uranus
- Saturn
- Neptune

Teaching Strategies: (Explain and Model Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)
Divide the class into teams of four. Each team member will have a card which s/he will read to the group. Continue following directions for “lining up the planets.” (See attached activity.) From the clue cards and scale drawings, students will choose one planet to research. They will use the Big 6 Process to research their planet then write an imaginative narrative about what it would be like to live on that planet.

Distributed Guided Practice/Summarizing Prompts: (prompts designed to Initiate Periodic Practice or Summarizing)

Summarizing Strategies: Learners Summarize and Answer Essential Questions
Complete “Label the Planets” (attached).
Complete the “Connected Learning” questions that accompany “Lining Up the Planets.”

Lesson Resources
- Student clue cards
- Scale drawings of planets
- Construction paper (12 x 8)
- Glue sticks
- Scissors
Decision 5 - Acquisition Lesson Planning

LABEL THE PLANETS
Topic
Planet order in the solar system

Key Question
As a team, how can we construct a model of planet order?

Learning Goals
Students will:
• use a collaborative approach to construct a two-dimensional model that represents planet order in the solar system,
• make a scale model that represents planet order, and
• use a reading passage to collect information.

Guiding Documents
Project 2061 Benchmarks
• Nine planets of very different size, composition, and surface features move around the sun in nearly circular orbits. Some planets have a great variety of moons and even flat rings of rock and ice particles orbiting around them. Some of these planets and moons show evidence of geological activity. The earth is orbited by one moon, many artificial satellites, and debris.
• The earth is one of several planets that orbit the sun, and the moon orbits around the earth.
• We live on a relatively small planet, the third from the sun in the only system of planets definitely known to exist (although other, similar systems may be discovered in the universe).

NRC Standards
• Develop descriptions, explanations, predictions, and models using evidence.
• The earth is the third planet from the sun in a system that includes the moon, the sun, eight other planets and their moons, and smaller objects, such as asteroids and comets. The sun, an average star, is the central and largest body in the solar system.

Integrated Processes
Observing
Sorting and classifying
Collecting and recording data
Interpreting data
Inferring

Materials
For each four-member student group:
• individual student clue cards
• scale drawings of the planets
• construction paper, 12 x 18 inch
• glue sticks
• scissors

Background Information
The order of the planets in our solar system is frequently addressed in Earth Science. The first four planets (Mercury, Venus, Earth, and Mars) are called the inner planets. Jupiter, Saturn, Uranus, and Neptune make up the outer planets. An asteroid belt creates a dividing line between the inner and outer planets.

Management
1. Make one set of clue cards for each group. Copy them on various colors, or mark the back of the cards to keep track of the different sets.

Procedure
1. Ask the Key Question and state the Learning Goals.
2. Divide the class into teams of four.
3. Explain that each team member will have a card that he or she reads to the group. Other team members are not to read each other’s cards, but they are to practice listening and then apply what they hear.
4. Have the students use the scaled planet drawings and large construction paper to make a model of planetary order based on the collaborative clue cards.
5. After the students have constructed the model, have them label the inner and outer planets.
6. Discuss with the students the information obtained from their model.

Connecting Learning
1. What are the eight planets that make up our solar system?
2. What is the order of the eight planets?
3. What are the planets that make up the inner planets? ...the outer planets?
4. How do scientists know this information?
5. How successful was your team in solving the problem? Were some clues more important than others? Explain.
6. Why do you think scientists divide the planets into these two groups?
7. What are you wondering now?

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Key Question
As a team, how can we construct a model of planet order?

Learning Goals

**Students will:**

- use a collaborative approach to construct a two-dimensional model that represents planet order in the solar system,
- make a scale model that represents planet order, and
- use a reading passage to collect information.
LINING UP THE PLANETS

- JUPITER
- VENUS
- URANUS
- MARS
- SATURN
- NEPTUNE
- EARTH
- MERCURY
• There are eight planets in our solar system.
• Neptune is the farthest planet from the sun.
• Mars is next to Jupiter.
• There are six planets between Mercury and Neptune.

• Mercury, Earth, Mars, and Venus are called the inner planets.
• Jupiter is the largest planet in the solar system.
• Jupiter, Saturn, Uranus, and Neptune are larger than Earth.
• There is one planet between Uranus and Jupiter.

• The outer planets are Saturn, Jupiter, Uranus, and Neptune.
• Mercury and Venus have no moons.
• Earth is the third planet from the sun.
• There is one planet between Venus and Mars.

• Mercury is the planet closest to the sun.
• Saturn is the second largest planet in the solar system.
• Uranus is between Saturn and Neptune.
• Saturn is closer to Neptune than Earth.
Connecting Learning

1. What are the eight planets that make up our solar system?

2. What is the order of the eight planets?

3. What are the planets that make up the inner planets? ...the outer planets?

4. How do scientists know this information?

5. How successful was your team in solving the problem? Were some clues more important than others? Explain.

6. Why do you think scientists divide the planets into these two groups?

7. What are you wondering now?
# Big 6 Worksheet

<table>
<thead>
<tr>
<th>Step 1:</th>
<th>What is my task and what information do I need?</th>
</tr>
</thead>
</table>
|        | ____ Did I understand my task?  
|        | ____ Did my questions focus on the topic?  
|        | ____ Did I need to narrow my focus? |

<table>
<thead>
<tr>
<th>Step 2:</th>
<th>What source can I use?</th>
</tr>
</thead>
</table>
|        | ____ Did I use more than one source?  
|        | ____ List type of sources used: |

<table>
<thead>
<tr>
<th>Step 3:</th>
<th>Where is the source and information?</th>
</tr>
</thead>
</table>
|        | Were my sources:  
|        | ____ Useful?  
|        | ____ Current?  
|        | ____ Reliable?  
|        | ____ Appropriate? |

<table>
<thead>
<tr>
<th>Step 4:</th>
<th>Use the information.</th>
</tr>
</thead>
</table>
|        | ____ Did I organize my notes?  
|        | ____ Did I put everything in my own words?  
|        | ____ Did I cite my sources? |

<table>
<thead>
<tr>
<th>Step 5:</th>
<th>Synthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>____ Did I share what I learned so that others can understand?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 6:</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Product: How will I know I did well?</td>
</tr>
<tr>
<td></td>
<td>Process: What would I do differently?</td>
</tr>
</tbody>
</table>
|        | ____ Did I do my best work?  
|        | ____ Is my project complete?  
|        | How could I do things better next time? |

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Decision 5 - Acquisition Lesson Planning
Big 6 Worksheet

Project: ____________________________________________

<table>
<thead>
<tr>
<th>Step 1: Task Definition</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do I need to do?</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2: Information-Seeking Strategies</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>What can I use to find what I need?</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 3: Location and Access</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where can I find what I need?</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4: Use of Information</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>What information do I need for my notes?</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 5: Synthesis</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>What can I make to present my information?</td>
<td>__________</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 6: Evaluation/Reflection</th>
<th>__________</th>
</tr>
</thead>
<tbody>
<tr>
<td>How will I know I did well?</td>
<td>__________</td>
</tr>
</tbody>
</table>
Decision 5: Acquisition Lesson Two

Language Objective(s), where appropriate:
I will act out with other students the movements of the planets as they move around the sun and explain what I am doing.

Lesson Essential Question(s) or “I Can” Statement(s):
I can describe how the planets revolve around the sun.

Activating Strategies: (Learners Mentally Active)
Students are given names of the planets. They then are put into order to make their rotations around the sun. The students are moving as the planets and sun.

Acceleration/Previewing: (key vocabulary)
- Solar system
- Planet
- Sun
- Mercury
- Venus
- Earth
- Planet
- Neptune
- Mars
- Jupiter
- Rotation
- Revolution
- Saturn

Teaching Strategies: (Explain and Model Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)
- www.discoveryeducation.com
  4 minute video showing the rotation of the planets around the sun (*Heavenly Bodies*)
  1 minute video (*Welcome to the Solar System!* ) shows the rotation of the planets.

Distributed Guided Practice/Summarizing Prompts: (prompts designed to Initiate Periodic Practice or Summarizing)

Summarizing Strategies: Learners Summarize and Answer Essential Questions
In their science journals, explain how the planets revolve and rotate around the sun.

Lesson Resources
- Name tags or balloons
- Computer to show videos
- Science journals
Decision 5: Acquisition Lesson Three

Language Objective(s), where appropriate:
I will act out with other students how the Earth rotates on its axis to cause day and night. I will use sentence starters to record answers.

Lesson Essential Question(s) or “I Can” Statement(s):
I can explain how day and night are caused by Earth’s rotation.

Activating Strategies: (Learners Mentally Active)
Ask students “What makes day and night?” Give each student a sticky note to record their answer on. Once they have answered, they bring their sticky note to the board and place it under the question. Discuss/share some or all answers given.

Sentence Starters:
Day is ______________.
Night is ______________.

Acceleration/Previewing: (key vocabulary)
Sun
Moon
Rotation
Earth

Teaching Strategies: (Explain and Model Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)
Read aloud whole group or in collaborative pairs What Makes Day and Night by Franklyn M. Branley. When pairs/whole group reach p. 20, stop and perform the experiment on pages 20-23 that shows how we move from daylight to darkness. Use the flashlights from the FOSS kits as the “lamp.” Perform the experiment twice so that each student gets to be the earth and sun. Finish reading the book, and discussing.

Distributed Guided Practice/Summarizing Prompts: (prompts designed to Initiate Periodic Practice or Summarizing)

Summarizing Strategies: Learners Summarize and Answer Essential Questions
In their journals, explain how the experiment they did in class shows how day and night are caused by earth’s rotation.

Lesson Resources
What Makes Day and Night? By Franklyn M. Branley
Flashlights
Sticky notes
Science journals
Decision 5: Acquisition Lesson Four

Language Objective(s), where appropriate:
I will measure and record the shadow’s length.

Lesson Essential Question(s) or “I Can” Statement(s):
I can compare the length of shadows as the sun moves across the sky during the day.

Activating Strategies: (Learners Mentally Active)
Students answer “What’s In a Shadow” questions as an Anticipation Guide. Use a flashlight to show how a shadow of your hand is different depending on the position of the flashlight. Tell students we will measure shadows at different times of day. Watch “What’s In a Shadow” video on Discovery Education (www.discoveryeducation.com). Revisit the Anticipation Guide together. Discuss why false statements are false!

Acceleration/Previewing: (key vocabulary)
Sun
Inches
Centimeters
Shadow
Feet
Bar graph

Teaching Strategies: (Explain and Model Collaborative Pairs; Distributed Guided Practice; Distributed Summarizing; Graphic Organizers)
Take class outside. Model how to measure the shadow of a yardstick. Divide class into 4 groups. Each group will measure and record the measurement of the stick in the group. Repeat activity 3 different times. Have students create a bar graph using their data.

Distributed Guided Practice/Summarizing Prompts: (prompts designed to Initiate Periodic Practice or Summarizing)

Summarizing Strategies: Learners Summarize and Answer Essential Questions
Create a class bar graph showing the four group’s data at the 3 different times of day.

Lesson Resources
Stick
Computer to show videos
Ruler or yardstick
Paper
What’s in a Shadow?
(Discovery Education)

Name__________________________________ # __________

Mark the following statements as either True (T) or False (F). Remember to use the information you saw in the video to help you answer the questions!

True or False?

_________ 1. Shadows can help you when you are finding direction.

_________ 2. Your shadow will be the same no matter where you are in the world.

_________ 3. My shadow will look the same on December 25, as it does on July 4.

_________ 4. My shadow will be the longest, at 8:00 a.m.

_________ 5. My shadow is the shortest of all, at noon.

_________ 6. The sun rises in the east, and sets in the west.

_________ 7. The revolution of the Earth around the sun determines when the areas of our planet are having daylight.

_________ 8. At noon, my shadow is pointing in a westerly direction.

_________ 9. People who live at or near the equator have no problem seeing their shadow.

_________ 10. You can leave your shadow behind.
**Decision 6: Extending Thinking Activities**

Include extending activities for several lessons in the essential units.

<table>
<thead>
<tr>
<th>Cause/Effect</th>
<th>Compare/Contrast</th>
<th>Deduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Justification</td>
<td>Induction</td>
<td>Analyzing Perspective</td>
</tr>
<tr>
<td>Error Analysis</td>
<td>Abstracting</td>
<td>Evaluation</td>
</tr>
<tr>
<td>Classifying</td>
<td>Constructing Support</td>
<td>Writing Prompt</td>
</tr>
</tbody>
</table>
**Decision 7: Differentiating the Unit**

What accommodations will you make in order to meet the varied interests, learning styles, and ability levels of all students?

<table>
<thead>
<tr>
<th>choice menus</th>
<th>compacting</th>
<th>grouping</th>
</tr>
</thead>
<tbody>
<tr>
<td>seating</td>
<td>visual, auditory, kinesthetic activities</td>
<td>scaffolding</td>
</tr>
<tr>
<td>real world meaning</td>
<td>interests</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Visual learners</th>
<th>videos, illustrations, diagrams, books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditory learners</td>
<td>songs, audio from books/videos</td>
</tr>
<tr>
<td>Kinesthetic</td>
<td>“Lining Up the Planets” activity and “Shadows” activity</td>
</tr>
</tbody>
</table>
Decision 8: Unit Calendar

Determine the most viable sequence for the experiences, activities, and lesson and create a timeline.

- This unit will take 4-6 weeks to complete (depending on how often you are able to teach science).
- Begin the unit with the Launch activity, allow for one class period to watch the BrainPop video and preview the key vocabulary of the unit.
- Complete the lessons/activities following the sequence on the Student Learning Map.
- After all of the lessons/activities are complete, allow students time to complete the culminating activity: Creating a mobile of the solar system and writing research about the solar system.
Decision 9: Resources and Research

Provide graphic organizers, links, book titles, websites, etc. that provide support for teaching this unit.

Books
*What Makes Day and Night?* by Franklin Branley

Activity
AIM – Lining Up the Planets activity

Websites
BrainPop: Solar System video

Can Teach: Space songs
Retrieved from [http://www.canteach.ca/elementary/songspoems34.html](http://www.canteach.ca/elementary/songspoems34.html)

Discovery Education: [www.discoveryeducation.com](http://www.discoveryeducation.com)

Other
“Label the Planets” diagram

*What’s In a Shadow?* Discovery Education video

Provide ideas about how to integrate Big 6 or Super 3 research framework.
Unit Designers:

Date: January 22, 2013

<table>
<thead>
<tr>
<th>Name</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanna Chandler</td>
<td>Fletcher</td>
</tr>
<tr>
<td>Tonya Jackson</td>
<td>Atkinson</td>
</tr>
<tr>
<td>Mary Montross</td>
<td>Mills River</td>
</tr>
<tr>
<td>Peggy Dawson</td>
<td>Upward</td>
</tr>
<tr>
<td>Sarah Swanzy</td>
<td>Hillandale</td>
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