**Unit Preparation**

**Essential Question**
How can we use Alice Programming to reinforce basic science concepts?

**Unit Goals**
- Create initial Alice Worlds.
- Insert basic characters.
- Program characters to perform basic functions.
- Create quizzes in Alice World based on basic science concepts as a review for NJASK GRADE 8.
- Use Alice Worlds to allow the students to reinforce science concepts.

**Materials/Integrated Technology**
- ALICE software
- MAC or laptop

**Vocabulary**
- Evaporation
- Precipitation
- Condensation
- Newton's First Law of Motion
- Newton's Second Law of Motion

**Alice Vocabulary**
- Objects
- Methods
- Properties
- Functions

**Standards**
- **NJ_Core_Curriculum_Content_Standards - Science (2009) - 5,6**
  Standard 5.4.6 Earth operates as a set of complex, dynamic, and interconnected systems, and is a part of the all-encompassing system of the universe.
  Strand 5.4.6.F Earth's weather and climate systems are the result of complex interactions between land, ocean, ice, and atmosphere.

- **NJ_Core_Curriculum_Content_Standards - Science (2009) - 7,8**
Standard 5.2.8 Physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.

Strand 5.2.8.E It takes energy to change the motion of objects. The energy change is understood in terms of forces.

Content Statement 5.2.8.E.a An object is in motion when its position is changing. The speed of an object is defined by how far it travels divided by the amount of time it took to travel that far.

Content Statement 5.2.8.E.b Forces have magnitude and direction. Forces can be added. The net force on an object is the sum of all the forces acting on the object. An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion at constant velocity will continue at the same velocity unless acted on by an unbalanced force.

Cumulative Progress Indicator 5.2.8.E.2 Compare the motion of an object acted on by balanced forces with the motion of an object acted on by unbalanced forces in a given specific scenario.

**NJ_Core_Curriculum_Content_Standards - Technology (2009) - 5,6,7,8**

Standard 8.1.8 All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand 8.1.8.B Creativity and Innovation

Content Statement The use of digital tools and media-rich resources enhances creativity and the construction of knowledge.

Standard 8.2.8 All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world, as they relate to the individual, global society, and the environment.

Strand 8.2.8.B Design: Critical Thinking, Problem Solving, and Decision-Making

Cumulative Progress Indicator 8.2.8.B.3 Solve a science-based design challenge and build a prototype using science and math principles throughout the design process.

**NJ_Core_Curriculum_Content_Standards - Technology (2009) - 9,10,11,12**

Standard 8.1.12 All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaboratively and to create and communicate knowledge.

Strand 8.1.12.B Creativity and Innovation

Cumulative Progress Indicator 8.1.12.B.1 Design and pilot a digital learning game to demonstrate knowledge and skills related to one or more content areas or a real world situation.

**Integrated Technology**
### Lesson/Activity Plan

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<tr>
<th>Lesson Objectives</th>
<th>Guided Instruction (Hook, Activity, Wrap Up, Extension)</th>
<th>Materials/Integrated Technology</th>
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<tr>
<td>Learners will be able to explain Newton's Three Laws of Motion using Alice World.</td>
<td>Background:</td>
<td>1. Hands on experiments for each law of motion.</td>
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<td>Alice World will be a culmination of several hands-on lessons which will demonstrate the laws of motion.</td>
<td>First Law of Motion: An object at rest stays at rest and an object in motion stays in motion with the same speed and in the same direction unless acted upon by an unbalanced force.</td>
<td>2. Alice World software</td>
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<tr>
<td>Students will be shown an example Alice World with three scenes; each scene will depict one of the three laws of motion.</td>
<td>Second Law of Motion: Newton's second law of motion pertains to the behavior of objects for which all existing forces are not balanced. The second law states that the acceleration of an object is dependent upon two variables - the net force acting upon the object and the mass of the object.</td>
<td>3. Story Boards</td>
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<td>Students will then create story boards using object of their choice to create the three laws of motion.</td>
<td>Third Law of Motion: Forces always come in pairs - equal and opposite action-reaction force pairs.</td>
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think about how they will represent each law in Alice World. This presupposes a familiarity with Alice. This section will take several class periods and students will present and critique their work before any coding is begun.

3. Students will illustrate the concepts using Alice.

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| Learners will be able to explain The WATER CYCLE using Alice World. Alice World will be a culmination of several hands-on lessons which will demonstrate the water cycle. This lesson can be prepared for lower school students who will answer the questions about the water cycle. Upper school students will CREATE their own water cycle OR use this template and practice creating different types of questions. | **Background:**  
Evaporation:  
Evaporation is when the sun heats up water in rivers or lakes or the ocean and turns it into vapor or steam. The water vapor or steam leaves the river, lake or ocean and goes into the air.  
Condensation:  
Water vapor in the air gets cold and changes back into liquid, forming clouds. This is called condensation.  
You can see the same sort of thing at home... pour a glass of cold water on a hot day and watch what happens. Water forms on the outside of the glass. That water didn't somehow leak through the glass! It actually came from the air. Water vapor in the warm air, turns back into liquid when it touches the cold glass. | 1. Hands on experiments for the water cycle.  
2. Alice World software  
3. Story Boards |
Precipitation:

Precipitation occurs when so much water has condensed that the air cannot hold it anymore. The clouds get heavy and water falls back to the earth in the form of rain, hail, sleet or snow.

This lesson will be broken down into individual parts:

1. Review concepts: The students have spent several class periods performing hands on experiments to demonstrate the Water Cycle.

2. Create story boards: Have students begin to think about how they will represent the Water Cycle in Alice World. This presupposes a familiarity with Alice. This section will take several class periods and students will present and critique their work before any coding is begun.

3. Students will illustrate the concepts using Alice. Lower school students will answer the questions designed by the upper school

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