Curriculum Scope and Sequence			
Content Area	Invention and innovation	**Course Title/Grade Level:**	Gate 3

Written By: Alice Willard

	Topic/Unit Name	Suggested Pacing (Days/Weeks)
Topic/Unit #1	Self- Awareness	September/ October
Topic/Unit #2	The Mystery of the Moli Stone	November / December
Topic/Unit #3	Exploring Leonardo Da Vinchi	January / February
Topic/Unit #4	Exploring Unknown Mysteries	March / April
Topic/Unit #5	Balance, Forces, and Civil Engineering	May / June

Topic/Unit 1 Title	Self- Awareness	Approximate Pacing	September / October

STANDARDS
NJSLS (Content)

NAGC Standards :
Gifted Education Programing Standards:
Standard 1: Learning and Development
1.1 <u>Self Understanding</u>- Students with Gifts and Talents demonstrate self- knowledge with respect to their interests, strengths, identities, and needs in socio-emotional development and intellectual, academic, creative leadership, and artistic domains.
1.2 <u>Self - Understanding-</u> Students with gifts and talents possess a developmentally appropriate understanding of how they learn and grow;they recognize the influences of their beliefs, traditions, and values on their learning and behavior.
1.3. <u>Self-Understanding.</u> Students with gifts and talents demonstrate understanding of and respect for similarities and differences between themselves and their peer group and others in the general population.
1.4. <u>Awareness of Needs.</u> Students with gifts and talents access resources from the community to support cognitive and affective needs, including social interactions with others having similar interests and abilities or experiences, including same-age peers and mentors or experts.
1.5. Awareness of Needs. Students' families and
communities understand similarities and
differences with respect to the development and
characteristics of advanced and typical learners
and support students with gifts and talents' needs.
1.6. Cognitive and Affective Growth. Students with gifts and talents benefit from meaningful and challenging learning activities addressing their unique characteristics and needs.
1.7. Cognitive and Affective Growth. Students with gifts and talents recognize their preferred approaches to learning and expand their repertoire.
 1.8. Cognitive and Affective Growth. Students with gifts and talents identify future career goals that match their talents and abilities and resources needed to meet those goals (e.g., higher education opportunities, mentors, financial support)

9.4 Life Literacies and Key Skills :
Creativity and Innovation: 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives
                    9.4.2.CI.2: Demonstrate originality and inventiveness in work .

Interdisciplinary Connections:	21st Century Skills:
Self-Awareness Activities **Mindfulness Curriculum** **Ready Set Respect Curriculum** **Character Education Curriculum**	**Standard: 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning:** **-Critical Thinking and Problem Solving** **- Creativity and Innovation** **- Cross Cultural Understanding and Interpersonal Information** **-Communication and Media Fluency** **-Accountability, Productivity, and Ethics.**
Technology Standards:	**Career Ready Practices:**
8.2.2.C.1 Brainstorm ideas on how to solve a problem or build a product. **8.2.2.E.1 List and demonstrate the steps to an everyday task.**	
UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS	
What does it mean to be smart? What characteristics do you have that make you smart? What kinds of things do you think about? What kinds of things make you a unique person? What kind of smart are you? (Multiple Intelligences) What makes you unique? How are you creative? What makes you a good thinker?	CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

What qualities do you have that make you have task commitment. What do you dream about?	

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**

Students will know:
Understanding of self by completing activities that are unique to the individual student.
What is a simile?
Compare and Contrast
Bloom's Taxonomy of Thinking
Writing a Personal Simile
	Students will be able to complete a series of self-awareness activities that will help them acknowledge their persona self, likes and dislikes, and be more aware of who they are as a person.
	Students will be able to:
	 design a nameplate that reflects the students personality.
	 Define and give an example of a simile.
	Students will brainstorm how their personality relates to certain objects (things in nature, animals, vehicles etc)
	 Think of some examples of similes.
	Think of ways that their personality compares to certain objects.
	Students will think of ways in which they are like :
	    - an object in nature
	    - an animal
	    - two contrasting colors
	    - a food
	    - an electrical appliance
	    - a type of rock
	    - a model of a car
	    - an object or idea of your choice.
	Students will brainstorm ways in which their personality is like the object and tell why they think so.
	Complete a personal alphabet
	Complete a personal name plate
	Design a Wordle about themselves

ASSESSMENT OF LEARNING	
Summative Assessment (Assessment at the end of the learning period)	**Portfolio** **Rubrics** **Personal Simile**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Anecdotal Records** **Teacher Observation**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	

RESOURCES
Core instructional materials: **Primary Thinking Skills**   **Primary Creativity**
Supplemental materials:

	Modifications for Learners

Gifted and Talented

**Gifted and Talented
 Extension Activities**

- **Thematic topics for discussion and research**
- **Provide advanced/supplementary reading materials**
- **Use authentic resources to promote a deeper understanding of concepts**
- **Provide opportunities for open-ended, self-directed activities**
- **Facilitate communication with experts outside the classroom for real world and deeper contextual understanding**
- **Encourage creativity/Provide opportunities to develop depth and breadth of knowledge in the subject area (examples: create drawings/illustrations, use of music, create poems/songs, write opinion letters, create videos/stories/comic strips, etc.)**
- **Conduct research and provide a presentation of related topics**
- **Design surveys to generate and analyze data to be used in discussion**
- **Debate topics of interest/cultural importance**
- **Provide complex, authentic reading sources that provide data and support for concepts covered in the course**
- **Use higher level questioning techniques**
- **Choice Board**
- **Presentation of ideas and public speaking**
- **Tiered activities**
- **Creative activities related to self**
- **Accountable Talk in classroom discussions**

Topic/Unit 2 Title	The Mystery of the Moli Stone	Approximate Pacing	November / December
STANDARDS			

NJSLS (Content)

NCTM, 2000 Numbers and Operations
CCCS:3.NBT.A.1
Standard 6.2 Global Studies
 	
Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
 	
Creativity and Innovation: 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives
                              9.4.2.CI.2: Demonstrate originality and inventiveness in work .
                              9.4.2.CT.3 Uses a variety of types of thinking to solve problems (e.g.,inductive, deductive)

Interdisciplinary Connections:	21st Century Skills:
Ancient Number Systems **Archaeology** **Ancient Civilizations** **Number Systems** **Symbols** **Sign Language** **Codes**	**Standard: 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning:** **-Critical Thinking and Problem Solving** **- Creativity and Innovation** **- Cross Cultural Understanding and Interpersonal Information** **-Communication and Media Fluency** **-Accountability, Productivity, and Ethics.**

Technology Standards:	Career Ready Practices:
9.4 Life Literacy and KeySkills	**CRP1. Act as a responsible and contributing citizen and employee.**

Information and Media Literacy - Digital tools and media resources provide access to vast stores of information that can be searched. **9.4.22IML.1 Identify a simple search term to find information in a search engine or digital resource.**	**CRP2. Apply appropriate academic and technical skills.** **CRP4. Communicate clearly and effectively and with reason.** **CRP5. Consider the environmental, social and economic impacts of decisions.** **CRP6. Demonstrate creativity and innovation.** **CRP7. Employ valid and reliable research strategies.** **CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.** **CRP11. Use technology to enhance productivity.** **CRP12. Work productively in teams while using cultural global competence.**

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

What is the meaning of symbols?

How have symbols been used throughout the world?

How are symbols used today?

How do symbols affect communication?

How do we use symbols to represent numbers?

What is the value of ancient Egyptian numbers?

What is the structure of the base-ten number system?

What is the ancient Chinese number system?

What is place value and how is it different from face value?

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know: *Symbols* *Place value*	*Students will be able to:* *Understand how symbols are used to represent different numbers .*

Face Value *Sign Language* *Morse Code* *Braille* *Ancient Egyptian numbers* *Chinese numbers* *Mayan Numbers* *Greek Numbers* *Native American Code Talkers* *Native American symbols* *Hieroglyphics* *Hieroglyphs* *Roman Numbers* *Babylonian Numbers* *Primitive Numbers* *Create an original artifact with an original number system and unique alphabet .*	*Recognize the importance of zero in the base- ten place value system* *Build new knowledge through problem solving* *Apply and adapt a variety of strategies to solve problems* *Make and investigate mathematical conjectures* *Develop and evaluate mathematical arguments* *Organize and consolidate their mathematical thinking through communication* *Communicate their mathematical thinking with teachers and peers* *Analyze and evaluate mathematical thinking and strategies to others* *Recognize and use connections among mathematical ideas.* *Create and use representations to organize , record, and communicate mathematical ideas.* *Decode symbols Understand, decode and write numbers using the following systems (sign language, Morse Code, Braille, Ancient Egyptian, Chinese, Mayan, Greek, Native American, Roman, Babylonian and primitive numbers)* *Students will decode and write all of these number systems.* *Students will recognize these numbers systems .* *Students will think of and create* *an original artifact.* *an original number system* *a unique alphabet* *Students will design an artifact from a period of history and write a secret message to the world on it using the unique alphabet and number system that they create.* *Original thinking* *Creativity* *Problem solving* *Bloom's Taxonomy of thinking*
ASSESSMENT OF LEARNING	

Summative Assessment (Assessment at the end of the learning period)	**Student Portfolios** **Final Moli Stone Artifact Project**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Teacher Observation** **Notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	

RESOURCES

Core instructional materials:

The Mystery of the Moli Stone : Numbers and Operations By: M. Katherine Gavin, Suzanne H. Chapin, Judith Dailey, and Linda Jensen Sheffield

Supplemental materials:

Can You Count in Greek : Exploiting Ancient Number Systems By: Judith Leimbach and Kathy Leimbach

Modifications for Learners

Gifted Modifications :
Choice Board

Tiered Leveled activities
 Accountable Talk
Meaningful content
Digging Deeper into a topic to expand student interest
Effective project design (Moli Stone Project)
Personal responsibility
Higher level assignments and activities which keep students thinking and engaged.
Provide visual puzzles
Decode and Encode Hieroglyphics , Braille, Sign Language, Chinese, Greek and other number symbols
Facilitate communication with experts outside the classroom for real world and deeper contextual understanding
Archaeology research Opportunities (Pompeii, Egypt, Rome, Greece, Babylonia , Mayan Civilization)
Bloom's Taxonomy of Thinking
Opportunity to use a variety of creative thinking and self-expression. Ability to design their own idea.

Topic/Unit 3 Title	Exploring Leonardo Da Vinci	Approximate Pacing	8 weeks
STANDARDS			
NJSLS (Content)			

Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.

Creativity and Innovation: 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives
                            9.4.2.CI.2: Demonstrate originality and inventiveness in work .
                            9.4.2.CT.3 Uses a variety of types of thinking to solve problems (e.g.,inductive, deductive)

CCCS: 6.2 World History
CCCS: RI 3.1
CCCS: Grade 3 CCSS.ELA-Literacy.RI.3.7
Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). (This standard will apply when we read the book, "Who was Leonardo da Vinci?" by Roberta Edwards

Interdisciplinary Connections:	21st Century Skills:
Art History Inventions Engineering Medicine Machines Flight	Standard: 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning: -Critical Thinking and Problem Solving - Creativity and Innovation - Cross Cultural Understanding and Interpersonal Information -Communication and Media Fluency -Accountability, Productivity, and Ethics.
Technology Standards:	**Career Ready Practices:**
9.4 Life Literacy and KeySkills Information and Media Literacy - Digital tools and media resources provide access to vast stores of information that can be searched.	CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills.

9.4.22IML.1 Identify a simple search term to find information in a search engine or digital resource.	CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Why was Leonardo da Vinci considered a genius?
What situations did Leonardo overcome?
What does learning about Leonardo da Vinci teach you about humans? About Yourself?

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
Students will know:Where and when did Leonardo da Vinci grow up ? *What hardship did he overcome as a child?* *What was it like to live in Florence, Italy in the 1400's ?* *What was the Renaissance?* *How did artists make paintings in the 1400's?* *Identify the things that Leonardo was known to do other than paint?* *Name Leonardo's successes and failures.* *What were Leonardo's most famous paintings?* *Why do you think the Mona Lisa is the most famous painting in the world.* *Name all the contributions that Leonardo did in his lifetime.*	*Students will be able to:* - *Understand the life of Leonardo da Vinci and be able to name all of the things that he was known for?* - *Understand how he influenced the Renaissance.* - *Understand other Renaissance artists.* - *Write using Mirror Writing* - *Experiment with making their own paint* - *Complete a picture using perspective drawing.* - *Design a working parachute* - *Design a new background for the Mona Lisa* - *Build a working catapult* - *Explore different ways to make the Mona Lisa using modern materials .* - *Make a Icosahedron using marshmallows and toothpicks*

Understand that Leonardo Da Vinci was an inventor , a painter, a mechanical engineer, a medical artist, naturalist, and dreamer, a futurist	- *Make invisible ink* - *Design a paper robotic arm with a string that really works.*

ASSESSMENT OF LEARNING

Summative Assessment (Assessment at the end of the learning period)	**Portfolio** **Rubrics** **Notes**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Teacher observation of task commitment.** **Evaluation of class projects.** **Anecdotal Records**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	

RESOURCES

Core instructional materials:

Who was Leonardo da Vinci?   By Roberta Edwards

Amazing Leonardo da Vinci Inventions that you can make yourself by Maxine Anderson

Supplemental materials: **Leonardo da Vinci for Kids by: Janis Herbert**
Modifications for Learners
Gifted Modifications : **Choice Board** **Tiered Leveled activities** **Accountable Talk** **Meaningful content** **Digging Deeper into a topic to expand student interest** **Effective project design** **Personal responsibility** **Higher level assignments and activities which keep students thinking and engaged.** **Provide visual puzzles** **Facilitate communication with experts outside the classroom for real world and deeper contextual understanding** **Archaeology research Opportunities** **Bloom's Taxonomy of Thinking** **Opportunity to use a variety of creative thinking and self-expression** **Ability to design their own idea and make it come to fruition.**

Topic/Unit 4 Title	Unknown Mysteries	Approximate Pacing	8 weeks

STANDARDS

NJSLS (Content)

Standard 9.1 21st-Century Life and Career Skills: All students will demonstrate the creative, critical thinking, collaboration, and problem-solving skills needed to function successfully as both global citizens and workers in diverse ethnic and organizational cultures.
Creativity and Innovation: 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives
                     9.4.2.CI.2: Demonstrate originality and inventiveness in work .
                     9.4.2.CT.3 Uses a variety of types of thinking to solve problems (e.g.,inductive, deductive)

CCCS: ELA- Literacy. RI. 5.6 Analyze multiple accounts of the same event or topic, noting important similarities and differences in the point of view they represent.

Interdisciplinary Connections:	21st Century Skills:
Myths and Legends **Urban Legends** **Cryptozoology**	**Standard: 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning:** **-Critical Thinking and Problem Solving** **- Creativity and Innovation** **- Cross Cultural Understanding and Interpersonal Information** **-Communication and Media Fluency** **-Accountability, Productivity, and Ethics.**
Technology Standards:	Career Ready Practices:

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9.4 Life Literacy and KeySkills Information and Media Literacy - Digital tools and media resources provide access to vast stores of information that can be searched. 9.4.22IML.1 Identify a simple search term to find information in a search engine or digital resource.	CRP1. Act as a responsible and contributing citizen and employee. CRP2. Apply appropriate academic and technical skills. CRP4. Communicate clearly and effectively and with reason. CRP5. Consider the environmental, social and economic impacts of decisions. CRP6. Demonstrate creativity and innovation. CRP7. Employ valid and reliable research strategies. CRP8. Utilize critical thinking to make sense of problems and persevere in solving them. CRP11. Use technology to enhance productivity. CRP12. Work productively in teams while using cultural global competence.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

This unit's content is based on Unsolved Mysteries in the world.

This unit focuses on open-ended activities that are designed to extend students' imagination and creativity. It includes activities based on William's Model of Cognitive and Affective Behaviors.

Cognitive –Intellective- Fluent, flexible, original, and elaborative thinking.

Affective- Feeling- Risk-taking, Complexity, Curiosity, and Imagination.

The students will extend their thinking skills while discussing unknown mysteries like the Loch Ness Monster, Bigfoot and UFOs. They will ask questions, critique evidence, wonder why anyone cares about these myths, and complete activities that will explore different points of view.

Where do myths and legends come from?

How are Urban Myths developed ?

What is Cryptozoology?

How do famous myths affect our culture?

Where do myths exist in our culture?

Why do people keep searching for something that there is no scientific evidence for?

How did the Loch Ness Monster legend begin?

How did the Bigfoot/ Yeti legend begin?
Does life exist beyond our Solar System?
Why do cultures believe in certain myths?

STUDENT LEARNING OBJECTIVES	
Key Knowledge	**Process/Skills/Procedures/Application of Key Knowledge**
Cryptozoology *The Legend of Bigfoot* *The Legend of the Loch Ness Monster* *Explore UFO sightings* *Explore Exoplanets* *Explore different solar systems* *Explore common hoaxes* *Create their own planet* *Create their own alien*	*Students will be able to:* Define and give an example of a hoax. The Study of Bigfoot Read about the YETI and Bigfoot and describe how they would feel if they encountered an unidentified cryptoid in the woods. Think of ways to design a trap to capture Bigfoot Design and evaluate the trap for Bigfoot. Discuss the legend of Bigfoot and why people are still talking about this creature. -write down 3 reasons why people believe in this creature and why they do not. Discuss if it is possible to have a prehistoric man living in the woods. Discuss what Bigfoot could be. Decide if it is possible for this creature to exist. Write a diary entry to describe what it would feel like to encounter one of these creatures Study of the Loch Ness Monster - **Analyze and interpret existing evidence of the Loch Ness Monster.**

	- Understand why a topic can be interpreted from different points of view. - Write about a topic from 3 different points of view. - Create an advertisement that entices visitors to come to Loch Ness. - Create a Loch Ness themed menu. - Define Cryptozoology - Examine picture evidence of the creature. - read facts about the creature. - Tie the topic in with a current event. (Fox News) - write down 3 reasons why people believe in this creature and why they do not. - write about the Loch Ness Monster from three different points of view: - A Loch Ness souvenir shop owner. - A tourist who thinks it is all a hoax - An 8 year old visiting Scotland for the 1st time Make a colorful advertisement for the newspaper to entice visitors to visit the Urquhart Castle in Scotland where most of the sightings occurred. Students will have the option of creating the advertisement so that it entices and attracts a certain population. (Adults, families, children, senior citizens , and scientists) *UFO'S and Planets* 　　*-define UFO* 　　*-Examine our solar system* 　　*-think of possibilities of what people are seeing in the sky* 　　*- visit the NASA website*

- Explore current research on space exploration
- Examine the Kepler Planets
- Examine the Trappist Planets
- Discuss the possibility of life forms on other
  planets
 -Think about the characteristics of the planets in
 our solar system
-Discuss Earth and the things that make it unique
and special.
-Complete a solar system chart and label all of the
planets.
-Tell how Earth is different from the other planets.
 Imagine that you were chosen to create a new
planet of your own.

Create a Planet
- Imagine that you were chosen to create a new
planet of your own.
-Students will write about why they were chosen to
receive a new planet that was discovered in a new
solar system and what qualities and qualifications
they have to own it.
Students will think of what their new planet looks
like from space.
 Students will create the president of the planet and
what an average citizen looks like.
 The students will create :
  New life forms
 New Government
New Planet Map
Patriotic Symbols
Rules and Regulations

	Geographical Characteristics Next they will create the license plate that goes on each of the spaceships to identify the planet that it is from. (Use of color and symbolism is encouraged) Students will also design money for their planet Then students will create special awards or certificates that are used on the planet. They can be birth certificates, awards, or wanted posters. Remember that creativity counts. <u>Galaxy Idol</u> Students will create an Alien for an in class Galaxy Idol contest. Students will be given a series of templates to design their alien. Students can use some of the parts of the template, but must design another original part of the alien. At least one of the parts of the alien must be an original design. Students must design the Alien according to the category that they want to win in. Alien categories include(Most beautiful, most alien-ish, most likely to end up in a move, funniest, smarties etc) Students will hold a class contest and vote on what category each Alien should win.
ASSESSMENT OF LEARNING	

Summative Assessment (Assessment at the end of the learning period)	**Student Portfolio** **Planet Creation** **Alien Creation** **Rubrics**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Teacher Observation** **Notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	
Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	

RESOURCES

Core instructional materials:

Creative Ventures- Mysteries and UFO's by Rebecca Stark

Just Think- *Activities For the Gifted Classroom* by Good Apple Publishers.

Monsters- Mysteries and UFO's by Linda Spellman

Supplemental materials:

www.nasa.gov
Modifications for Learners
Gifted Modifications : **Choice Board** **Tiered Leveled activities** **Accountable Talk** **Meaningful content** **Digging Deeper into a topic to expand student interest** **Effective project design** **Personal responsibility** **Higher level assignments and activities which keep students thinking and engaged.** **Provide visual puzzles** **Facilitate communication with experts outside the classroom for real world and deeper contextual understanding** **NASA research Opportunities** **Bloom's Taxonomy of Thinking** **Opportunity to use a variety of creative thinking and self-expression** **Ability to design their own idea and make it come to fruition.**

Topic/Unit 5 Title	Civil Engineering- Designing Bridges	Approximate Pacing	8 weeks

STANDARDS

NJSLS (Content)

3-PS2 Motion and Stability: Forces and Interactions
3-PS2-1. Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.
3-5-ETS1 Engineering Design
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

Interdisciplinary Connections:	21st Century Skills:
Bridge designs around the world **Famous Bridge disasters** **Unique bridges around the world** **Future Bridge designs**	**Standard: 9.1 describes skills that prepare students to fully engage in civic and work life. The standard includes six strands, which reflect the Framework for 21st Century Learning:** **-Critical Thinking and Problem Solving** **- Creativity and Innovation** **- Cross Cultural Understanding and Interpersonal Information** **-Communication and Media Fluency** **-Accountability, Productivity, and Ethics.**
Technology Standards:	**Career Ready Practices:**

9.4 Life Literacy and KeySkills	CRP1. Act as a responsible and contributing citizen and employee.
Information and Media Literacy - Digital tools and media resources provide access to vast stores of information that can be searched.	CRP2. Apply appropriate academic and technical skills.
	CRP4. Communicate clearly and effectively and with reason.
	CRP5. Consider the environmental, social and economic impacts of decisions.
9.4.22IML.1 Identify a simple search term to find information in a search engine or digital resource.	CRP6. Demonstrate creativity and innovation.
	CRP7. Employ valid and reliable research strategies.
	CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
	CRP11. Use technology to enhance productivity.
	CRP12. Work productively in teams while using cultural global competence.

UNIT/TOPIC ESSENTIAL QUESTIONS AND ENDURING OBJECTIVES/UNDERSTANDINGS

Engineering is Elementary is a curriculum program that integrates engineering with elementary science topics.
Goal1: Increase children's technological literacy . Students will acquire essential understanding and skills that include:

Knowledge: (Know about)
- *What engineering and technology are and what engineers do.*
- *Various fields of engineering*
- *Nearly everything in the human world has been touched by engineering*
- *How technology affects the world both negatively and positively.*
- *Engineers are from all races, ethnicities, and genders.*
- *Engineering problems have multiple solutions.*

Skills/ Experience (Be able to)
- *Apply the Engineering Design Process*
- *Apply science and math engineering*
- *Employ creativity and careful thinking to solve problems*
- *Envision one's own abilities as an engineer*
- *Troubleshoot and learn from failure*
- *Understand the central role of materials and their properties in engineering solutions*

What are Technologies and who designs them?

What kinds of bridges are in the world?
Why are some of the forces that act on structures and how do civil engineers design the structures that can withstand these forces ?
How does the structure of the bridge affect its strength and how can we use different materials in our bridge designs?
How can we use our knowledge of materials and their properties, different bridge types , and the Engineering Design Process to design a strong and stable bridge?

STUDENT LEARNING OBJECTIVES

Key Knowledge	Process/Skills/Procedures/Application of Key Knowledge
What are technologies and who designs them? *Almost all objects that we use everyday are examples of Technology .* *Technology can be made of many different kinds of materials* *Engineers design Technology to solve problems .* *Depending on the criteria and constraints of a given problem, one or more bridge types may be the best choice.* *Engineers must consider criteria and constraints when solving a problem.* *Bridges are a type of technology.* *Anyone can use the Engineering Design Process to solve a problem .* *What are some of the forces that act on structures and how do civil engineers design structures that can withstand force?* *Forces act on structures in many different directions.* *Two equivalent forces acting on a structure in opposite directions will balance one another .* *Civil engineers need to understand the forces acting on a structure in order to make it safe and stable .* *How does a structure of a bridge affect its strength and how can we use different materials in our bridge designs?* *Different bridge types, with unique shapes can support different amounts of weight.*	*Students will be able to:* *-examine everyday examples of technology* *-discuss how these objects were designed to solve problems* *-discuss the materials that the objects are made of* *- listen to the story of Javier Builds a Bridge* *- learn about different types of bridges (suspension , arch , beam)* *-discuss what civil engineers do for their jobs* *- become familiar with the Engineering Design Process* *- examine several different structures and observe how each is affected by a force.* *- brainstorm and implement some engineering solutions to prevent forces from causing a structure to fail.* *- discuss how civil engineers work to counteract the forces (pushes and pulls) on a structure in order to make it stronger and more stable.* *-Create three different types of bridges (beam , arch, and deep beam bridge) out of index cards.* *Test each type of bridge to see how much weight it can support and how adding weights affects the structure of the bridge.* *Examine the materials available to them for designing their bridges and brainstorm how they might use each material in their bridges.*

Controlled experiments can help determine the strengths and weaknesses of different bridge designs. *materials can be used in different ways to accomplish different design tasks.* *How can we use our knowledge of materials and their properties , different bridge types, and the Engineering Design Process to design a strong and stable bridge?* *Engineers use a series of steps called, The Engineering Design Process , to design solutions to problems.* *Sheets of paper can be modified and reinforced to make a strong and stable bridge.* *Testing and re-designing can improve the performance of any technology.*	- *Use the Engineering Design Process to design a bridge made from paper and other materials.* - *Test and improve their bridges using the evaluation criteria of strength and stability.*

ASSESSMENT OF LEARNING

Summative Assessment (Assessment at the end of the learning period)	**Student Portfolios** **Bridge Designs** **Rubrics**
Formative Assessments (Ongoing assessments during the learning period to inform instruction)	**Teacher Observation** **Notes**
Alternative Assessments (Any learning activity or assessment that asks students to *perform* to demonstrate their knowledge, understanding and proficiency)	

Benchmark Assessments (used to establish baseline achievement data and measure progress towards grade level standards; given 2-3 X per year)	

RESOURCES

Core instructional materials:

To Get To the Other Side: Designing Bridges : Balance, Forces, and Civil Engineering for Elementary Students

Engineering is Elementary- National Center for Technological Literacy.

Supplemental materials:

Modifications for Learners

Gifted Modifications :
Choice Board
Tiered Leveled activities
 Accountable Talk
Meaningful content
Digging Deeper into a topic to expand student interest
Effective project design
Personal responsibility
Higher level assignments and activities which keep students thinking and engaged.
Provide visual puzzles
Facilitate communication with experts outside the classroom for real world and deeper contextual understanding
Bridge research
Bloom's Taxonomy of Thinking
Opportunity to use a variety of creative thinking and self-expression

Ability to design their own bridge.
Provide various Stem activities like build a bridge out of paper or straws.