Kingsway Regional School District

Committed to Excellence

Course Name: Architectural Design	**Grade Level(s):** 7
Department: Math	**Credits:** NA
BOE Adoption Date: October 2016	**Revision Date(s): October 2017; October 2018**

ABSTRACT

This semester course introduces students to early hands-on engineering lessons. Students will study ancient architecture from the Egyptians and Romans as well as modern architecture. Students will study engineering disasters and their causes while applying their new found knowledge to plan and design buildings, bridges, urban areas, and space stations.

The course will incorporate concepts related to physics, math, and engineering. Students will need to conceptually understand mathematical concepts in order to be able to apply them to features related to buildings, bridges, transportation, and energy needs. Architectural Design is a course that transcends traditional subject-matter. In education today, we are often program-heavy and systems-light. The Architectural Design curriculum is a catalyst for real change.

The course will be broken up into four major units which include:

- History of Architecture
- Structural Engineering
- Urban Design
- Aerospace Engineering

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Mission Statement

The Kingsway Regional School District believes that this school district is responsible for developing and maintaining a comprehensive educational program that will foster the academic, social, and personal growth of all students. The Kingsway Regional School District provides a secure, supportive environment. It also provides high quality resources to challenge and empower each individual to pursue his/her potential, to develop a passion for learning in a diverse and challenging world, to encourage active citizenship, and to reach a high standard of achievement at all grade levels as defined by the New Jersey Student Learning Standards (NJ SLS).

Curriculum & Instruction Goals

Goal(s):

1. To ensure students are college and career ready upon graduation
2. To vertically and horizontally align curriculum K-12 to ensure successful transition of students at each grade level
3. To identify individual student strengths and weaknesses utilizing various assessment measures (formative, summative, alternative, etc.) so as to differentiate instruction while meeting the rigor of the applicable content standards
4. To improve student achievement as assessed through multiple measures including, but not limited to, state testing, local assessments, and intermediate benchmarking

Philosophy of the Shared Curriculum Service with South Harrison Township Elementary

The ultimate goal of the newly established shared curriculum service with South Harrison Township Elementary is to provide clearly coherent curriculum for grades K-12 to enhance student growth and achievement and provide learning experiences that assist in providing an inherent love of learning. With true vertical and horizontal curricular alignment all students will be effectively prepared for their arrival onto the campus of Kingsway Regional Middle School. Through this shared vision, both school districts are able to work earlier and more productively with students to ensure they are properly equipped with the knowledge and skills necessary to be successful in college and career upon graduation from high school. The alignment of curriculum K-12 safeguards countless benefits for our children; it is the very foundation for the improved teaching and learning that is our goal as educators, parents, and community members. Most notably, an aligned curriculum K-12 creates a common ownership and understanding of what must be taught and learned at each grade level for each subject area. No matter where a student attends, the curriculum requirements are the same across buildings, grade levels and teachers. Additionally, an aligned curriculum serves to provide valuable information to parents who will know what each child is expected to learn while in the classroom.

How to Read this Document

This curricular document contains both *pacing guides* and *curriculum units*. The pacing guides serve to communicate an estimated timeframe as to *when* skills and topics will be taught throughout the year. The pacing, however, may differ slightly depending upon the unique needs of each learner. The *curriculum units* contain more detailed information as to the content, goals, and objectives of the course well as how students will be assessed. The terms and definitions below will assist the reader to better understand the sections and components of this curriculum document.

Terms to Know

1. **Accommodation(s):** The term "accommodation" may be used to describe an *alteration* of environment, curriculum format, or equipment that allows an individual with a disability to gain access to content and/or complete assigned tasks. They allow students with disabilities to pursue a regular course of study. The term accommodation is often used interchangeable with the term modification. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with added assistance in that achievement. Since accommodations do not alter what is being taught, instructors should be able to implement the same grading scale for students with disabilities as they do for students without disabilities.

2. **Differentiated Instruction:** Differentiation of instruction relies on the idea that instructional approaches should be tailored to each individual student's learning needs. It provides students an array of options during the learning process that allows them make sense of ideas as it relates to them. The integration of differentiated instructional techniques is a curriculum design approach to increase flexibility in teaching and decrease the barriers that frequently limit student access to materials and learning in classrooms.

3. **Enduring Understanding:** Enduring understandings (aka big ideas) are statements of understanding that articulate deep conceptual understandings at the heart of each content area. Enduring understandings are noted in the alongside essential questions within each unit in this document.

4. **Essential Question:** These are questions whose purpose is to stimulate thought, to provoke inquiry, and to spark more questions. They extend beyond a single lesson or unit. Essential questions are noted in the beginning of each unit in this document.

5. **Formative Assessments:** Formative assessments monitor student learning to provide ongoing feedback that can be used by (1) instructors to improve teaching and (2) by students to improve their learning. Formative assessments help identify students' strengths and weaknesses and address problems immediately.

6. **Learning Activity(s):** Learning activities are those activities that take place in the classroom for which the teacher facilitates and the students participate in to ensure active engagement in the learning process. (Robert J. Marzano, *The Art and Science of Teaching*)

7. **Learning Assignment(s):** Learning assignments are those activities that take place independently by the student inside the classroom or outside the classroom (i.e. homework) to extend concepts and skills within a lesson.

8. **Learning Goal(s):** Learning goals are broad statements that note what students "should know" and/or "be able to do" as they progress through a unit. Learning goals correlate specifically to the NJ SLS are noted within each unit.

9. **Learning Objective(s):** Learning objectives are more specific skills and concepts that students must achieve as they progress towards the broader learning goal. These are included within each unit and are assessed frequently by the teacher to ensure students are progressing appropriately.

10. **Model Assessment:** Within the model curriculum, model assessments are provided that included assessments that allow for measuring student proficiency of those target skills as the year of instruction progresses.

11. **Model Curriculum:** The model curriculum has been provided by the state of New Jersey to provide a "model" for which districts can properly implement the New Jersey Student Learning Standards by providing an example from which to work and/or a product for implementation.

12. **Modification(s):** The term "modification" may be used to describe a *change* in the curriculum. Modifications are typically made for students with disabilities who are unable to comprehend all of the content an instructor is teaching. The term modification is often used interchangeable with the term accommodations. However, it is important to remember that modifications change or modify the intended learning goal while accommodations result in the same learning goal being expected but with assistance in that achievement.

13. **Performance Assessments:** (aka alternative or authentic assessments) Performance assessments are a form of assessment that requires students to perform tasks that generate a more authentic evaluation of a student's knowledge, skills, and abilities. Performance assessments stress the application of knowledge and extend beyond traditional assessments (i.e. multiple-choice question, matching, true & false, etc.).

14. **Standards:** Academic standards, from which the curriculum is built, are statements that of what students "should know" or "be able to do" upon completion of a grade-level or course of study. Educational standards help teachers ensure their students have the skills and knowledge they need to be successful by providing clear goals for student learning.

- **State:** The New Jersey Student Learning Standards (NJ SLS) include Preschool Teaching and Learning Standards as well as K-12 standards for: *Visual and Performing Arts; Comprehensive Health and Physical Education; Science; Social Studies; World Languages; Technology; 21st-Century Life and Careers; Language Arts Literacy; and, Mathematics*

15. **Summative Assessments:** Summative assessments evaluate student learning at the end of an instructional time period by comparing it against some standard or benchmark. Information from summative assessments can be used formatively when students or faculty use it to guide their efforts and activities in subsequent courses.

16. **21st Century Skills:** These skills emphasis the growing need to focus on those skills that prepare students successfully by focusing on core subjects and 21st century themes; learning and innovation skills; information, media and technology skills; and life and career skills. These concepts are embedded in each unit of the curriculum.

Proficiencies and Pacing Guide:
Course Title: Architectural Design
Prerequisite(s): none

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 1: History of Architecture	3 weeks Sept	**Mathematics:** NJ SLS.7.RP A.1, NJ SLS.7.RP.A.2.a, NJ SLS.7.NS A.3, NJ SLS.7.NS.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.8.G.B.6, NJ SLS.8.G.B.7, NJ SLS.8.G.B.8 **Science and engineering:** NJ SLS.MS-PS2-2, NJ SLS.MS-ETS1-3, NJ SLS.MS-ETS1-4, NJ SLS.HS-PS2-1 **Interdisciplinary:** NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 **Technology**: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS.8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS.8.2.8.D.3 **21st Century Life & Career Standards** NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3,	• Students will be able to analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in different units as they read and create scale drawings (NJ SLS.7.RP A.1, 7.RP.A.2.a, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2)(2 weeks) • Students will be able to explain a proof of the Pythagorean Theorem and its converse as it pertains to the Egyptian pyramids and also apply the Pythagorean Theorem to find unknown side lengths in a right triangle and the distance between two points. (NJ SLS.7.NS.A.3, NJ SLS.7.NS.B.3, NJ SLS.8.G.B.6, NJ SLS.8.G.B.7, NJ SLS.8.G.B.8) (1 week)	• Understand how and why early architecture starting with the pyramids of Egypt were designed and built • Understand where the Pythagorean Theorem came from and how it was used in early architecture • Apply the Pythagorean Theorem to identify right triangles • Apply the Pythagorean Theorem to find the unknown side of a right triangle • Apply the Pythagorean Theorem to find the distance between two points • Understand the basics of architecture • Design a single family home within a budget • Determine the dimensions and area of their home design

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 **Career Ready Practices:** CRP1, NSLS.CRP2, CRP4, CRP6, JSLS.CRP7, CRP8		
Unit 2: Structural Engineering	6 weeks Sept-Nov	**Mathematics:** NJ SLS.7.RP A.1, NJ SLS.7.NS A.3, NJ SLS.7.NS.B.3, NJ SLS.7.EE.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4 **Science and engineering** NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2, NJ SLS.MS-ETS1-3 **Interdisciplinary:** NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 **Technology**: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS.8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS.8.2.8.D.3	• Students will be able to analyze data from past engineering disasters to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to understand what contributed to the disaster and how to improve the design. (NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2, NJ SLS.MS-ETS1-3) (2 weeks) • Students will be able to design a skyscraper taking into account material cost and tensile strength along with the strength of geometric shapes. They will also evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem. (NJ SLS.7.RP.A.1, NJ SLS.7.EE.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4, NJ SLS.MS-ETS1-1) (2 weeks) • Students will be able to draw and construct bridges understanding the	• Understand the importance to detail • Understand why engineering disasters happen • Understand the effects of wind shear on a bridge • Understand why the Twin Towers fell on 9/11 • Develop an understanding of tensile strength of different material • Develop an understanding that different geometric shapes have different strengths • Design a city skyline • Plan and design a skyscraper • Compare skyscraper designs • Understand how skyscrapers differ depending on where it is built and why • Design different types of bridges based on the location, height, and distance of the bridge • Design and build a toothpick bridge

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		21st Century Life & Career Standards NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 **Career Ready Practices:** CRP1, CRP2, CRP4, CRP6, CRP7, CRP8	constraints of the design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on the natural environment that may limit possible solutions. (NJ SLS.7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4, NJ SLS.MS-ETS1-1) (2 weeks)	• Compare their bridges for strength
Unit 3: Urban Design	6 weeks Nov-Jan	**Mathematics:** NJ SLS.7.RP A.1, NJ SLS.7.NS A.3, NJ SLS. 7.NS.B.3, NJ SLS.7.G A.1, NJ SLS.7.G.A.2 **Science and engineering** NJ SLS.MS-ESS3-3, NJ SLS.MS-ESS3-4, NJ SLS. MS-ESS3-5, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2 **Interdisciplinary:** NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 **Technology**: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3,	• Students will be able to analyze different urban development plans comparing the similarities and differences taking into account relevant scientific principles and potential impacts on people and the natural environment that may have limited the urban designs. (NJ SLS.7.RP.A.1, NJ SLS.MS-ETS1-2) (1 week) • Students will be able to construct an argument supported by evidence of how human population and their consumption of natural resources impact Earth. Students will also be able to analyze factors which contribute to the cause of rise in global temperatures and apply scientific principles to design a way to minimize human impact on the environment. (7.NS.A.3, NJ SLS.7.NS.B.3,	• Compare different urban design layouts • Understand the impact of land formations and the design of the urban area • Understand the importance of a transportation system • Understand the important role energy plays in daily life • Investigate alternative energy sources • Understand the importance for public space and landscaping in urban living • Design their own urban layout • Design/Construct their own urban design through SimCity challenge • Design/construct a tiny house

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS.8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS.8.2.8.D.3 **21st Century Life & Career Standards** NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 **Career Ready Practices:** CRP1, CRP2, CRP4, CRP6, CRP7, CRP8	NJ SLS.MS-ESS3-3, NJ SLS.MS-ESS3-4, NJ SLS.MS-ESS3-5) (1 week) • Students will be able to define the criteria and constraints of an urban design, taking into account impacts on people and the natural environment that may limit possible designs. They will also create a scale drawing an urban design which would meet their defined criteria and constraints. (NJ SLS.7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2) (2 weeks) • Students will be able to create and evaluate competing design solutions using SimCity results to determine how well they met the criteria and constraints of urban design. (NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-2) (2 weeks)	
Unit 4: Aerospace Engineering	3 weeks Jan-Feb	**Mathematics:** NJ SLS.7.RP A.1, NJ SLS.7.NS.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2 **Science and engineering** NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2 **Interdisciplinary:** NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7	• Students will be able to analyze different planets comparing the similarities and differences to Earth taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit life on other planets. (NJ SLS.7.RP.A.1, NJ SLS.7.NS.B.3, NJ SLS.MS-ETS1-2)(1 week) • Students will be able to define the criteria and constraints of a space station design, taking into account impacts on people, and the natural environment that	• Understand the NASA technology used every day • Understand NASA's future plans for space travel • Compare urban design to a possible space station on the moon or Mars • Describe constraints on a possible space station • Understand the importance of a transportation hub for life in space • Compare an airport to a

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		Technology: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS. 8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS. 8.2.8.D.3 **21st Century Life & Career Standards** NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 **Career Ready Practices:** CRP1, CRP2, CRP4, NJLS.CRP6, CRP7, CRP8	may limit possible designs. They will also create a scale drawing a space station which would meet their defined criteria and constraints. (7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2) (2 weeks)	possible space station port • Plan and design a space station for the moon or Mars

Unit: 1 History of Architecture	Recommended Duration: 3 Weeks– Sept
Unit Description: This unit takes a global look at the history of architecture, from the Egyptian civilization to the current day. It treats buildings and environments, including cities, in the context of the cultural and civilizational history. It offers an introduction to design principles and analysis.	

Essential Questions:	Enduring Understandings:
• How does ancient architecture influence modern architectural design? • What are the implications of not using a scale model or drawing when designing architecture?	• Understand architecture is the art of building something. • Understand architects design a building using scale drawings such as ¼ scale and mathematical concepts used.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJ SLS.7.RP A.1** Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour. **NJ SLS.7.RP.A.2.a** Analyze proportional relationships and use them to solve real-world and mathematical problems. Recognize and represent proportional relationships between quantities. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line	• Students will be able to analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in different units as they read and create scale drawings (NJ SLS.7.RP A.1, NJ SLS.7.RP.A.2.a, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2) (2 weeks) • Students will be able to explain a proof of the Pythagorean Theorem and its converse as it pertains to the Egyptian pyramids and also apply the Pythagorean Theorem to find unknown side lengths in a right triangle and the distance between two points. (7.NS.A.3, NJ SLS.7.NS.B.3, NJ SLS.8.G.B.6, NJ SLS.8.G.B.7, NJ SLS.8.G.B.8) (1 week)	• Understand how and why early architecture starting with the pyramids of Egypt were designed and built • Understand where the Pythagorean Theorem came from and how it was used in early architecture • Apply the Pythagorean Theorem to identify right triangles • Apply the Pythagorean Theorem to find the unknown side of a right triangle • Apply the Pythagorean Theorem to find the distance between two points • Understand the basics of architecture • Design a single family home within a budget • Determine the dimensions and area of their home design

Relevant Standards:	Learning Goals:	Learning Objectives:
through the origin. **NJ SLS.7.NS A.3** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Solve real-world and mathematical problems involving the four operations with rational numbers. **NJ SLS.7.NS.B.3** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **NJ SLS.7.G A.1** Draw, construct, and describe geometrical figures and describe the relationships between them. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and		

Relevant Standards:	Learning Goals:	Learning Objectives:
reproducing a scale drawing at a different scale. **NJ SLS.7.G.A.2** Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle **NJ SLS.8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse. **NJ SLS.8.G.B.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **NJ SLS.8.G.B.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Pre-Assessment , Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit test, Extended constructed response questions, Quizzes, Student logbook	¼ scale drawing of a home	**Major Assignments (required):** ¼ scale drawing of a home, Unit test, Extended constructed response questions, Quizzes, Student logbook **Major Activities (required):** ¼ scale drawing of a home

Possible Assessment Adjustments (Modifications/Accommodations/ Differentiation): Word Banks, Calculators, Bold Key Words within Questions, Reduce Answer Choices --<how can we expand on these supportive pieces and move these down to the four categories listed here			
Special Education Students	**English Language Learners**	**At Risk Learners**	**Advanced Learners**

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing We need to clarify the listed strategies: ☐ "Instructional strategies are listed and **explain** how they are being used in the unit. For example: Graphic Organizers are being used within the writing process: Venn diagram for comparing and contrasting, Narrative Writing Diamond (for set-up of narrative), and a Mind Map (for brainstorming ideas)

Possible Instructional Modifications /Accommodations:
Instructional Scaffolds, "Interleave"-style Homework Assignments (solutions are made available to students at home to utilize as references for homework assignments), Calculators, Small Group Review of Pre-Requisite Skills (such as measurement, units of measure, and properly reading a stopwatch and tape measure), Review and Re-teaching of Difficult Concepts

Unit Vocabulary:
Essential: Aqueduct, Amphitheatre, Theatre, arch, column, bathhouse, monument, pyramid, Pythagorean Theorem, right triangle, hypotenuse, addition, subtraction, square, square root **Non-Essential:** Colosseum, Doric, Ionic, Corinthian, Great Pyramid at Giza, Valley of the Kings, capital

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
E/LA: NJ SLS.RST.6-8.1 NJ SLS.RST.6-8.3	Technology:	_x__ Financial, Economic, Business,	__x_ Creativity & Innovation

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
NJ SLS.RST.6-8.7 NJ SLS.RST. 6-12.4 NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1 NJ SLS.WHST.6-8.7 **Mathematics**: NJ SLS.7.RP A.1, 7.RP.A.2.a NJ SLS.7.NS A.3 NJ SLS.7.NS.B.3 NJ SLS.7.G.A.1 NJ SLS.7.G.A.2 NJ SLS.8.G.B.6 NJ SLS.8.G.B.7 NJ SLS.8.G.B.8 **Science**: NJ SLS.MS-PS2-2 NJ SLS.MS-ETS1-3 NJ SLS.MS-ETS1-4 NJ SLS.HS-PS2-1 **Technology**: NJ SLS.8.1.8.A.4 NJ SLS.8.1.8.F.1 NJ SLS.8.2.8.A.2 NJ SLS.8.2.8.A.3 NJ SLS.8.2.8.A.4 NJ SLS.8.2.8.A.5 NJ SLS.8.2.8.C.1 NJ SLS.8.2.8.C.2 NJ SLS.8.2.8.C.4 NJ SLS.8.2.8.C.5.a NJ SLS.8.2.8.C.7	☐ List the specific technology used by the students ☐ List how the specific technology aids in instruction (SAMR)	& Entrepreneurial Literacy	_x__ Critical Thinking and Problem Solving _x__ Life and Career Skills Technologies Literacy _x__ Communication & Collaboration

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
NJ SLS.8.2.8.C.8 NJ SLS.8.2.8.D.2 NJ SLS.8.2.8.D.3 **21st Century Life and Careers**: NJ SLS.9.3.ST.1 NJ SLS.9.3.ST.2 NJ SLS.9.3.ST.3 NJ SLS.9.3.ST-ET.1 NJ SLS.9.3.ST-ET.2 NJ SLS.9.3.ST-ET.3 NJ SLS.9.3.ST-ET.4 NJ SLS.9.3.ST-ET.5 NJ SLS.9.3.ST-ET.6 NJ SLS.9.3.ST-SM.1 NJ SLS.9.3.ST-SM.2 NJ SLS.9.3.ST-SM.4			

Resources:
Texts/Materials: websites, YouTube clips, any specific articles students read in this unit? Any use of informational text?

Unit: 2 Architectural Engineering	Recommended Duration: 6 Weeks– Sept- Nov
Unit Description: In unit two, students will study some of the engineering disasters that have plagued architects and engineers alike, from the leaning Tower of Pisa to the Tacoma Narrows Bridge "Galloping Gertie" and many more. Students will also develop an understanding of tensile strength of materials and geometric shapes. With this knowledge, students will design bridges and a skyscraper.	

Essential Questions:	Enduring Understandings:
• What are the primary causes of an engineering disaster? • How did the collapse of the Tacoma Narrows Bridge change how suspension bridges are made today? • What is tensile strength? • What geometric shapes are the strongest? • How did the collapse of the Twin Towers change skyscrapers today? • What forces do bridges and skyscrapers have to overcome?	• Understand there are a number of reasons including human error, design error, material failure, and extreme conditions on environment. • Understand that aerodynamics must be accounted for in more than automobiles. • Understand different materials can withstand different amounts of tension. • Understand geometric shapes have different strengths. • Understand that structures must overcome a number of forces.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJ SLS.7.RP.A.1** Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different	• Students will be able to analyze data from past engineering disasters to determine similarities and differences among several design solutions to identify the best characteristics of each	• Understand the importance to detail • Understand why engineering disasters happen • Understand the effects of wind shear on a bridge • Understand why the Twin Towers fell

Relevant Standards:	Learning Goals:	Learning Objectives:
units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour. **NJ SLS.7.EE.B.3** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. 3. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **NJ SLS.7.G A.1** Draw, construct, and describe geometrical figures and describe the relationships between them. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **NJ SLS.7.G.A.2** Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle **NJ SLS.7.G.B.4** Solve real-life and mathematical problems	that can be combined into a new solution to understand what contributed to the disaster and how to improve the design. (NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2, NJ SLS.MS-ETS1-3) (2 weeks) • Students will be able to design a skyscraper taking into account material cost and tensile strength along with the strength of geometric shapes. They will also evaluate competing design solutions to determine how well they meet the criteria and constraints of the problem. (NJ SLS.7.RP.A.1, NJ SLS.7.EE.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4, NJ SLS.MS-ETS1-1) (2 Weeks) • Students will be able to draw and construct bridges understanding the constraints of the design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on the natural environment that may limit possible solutions. (NJ SLS.7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4, NJ SLS.MS-ETS1-1) (2 weeks)	on 9/11 • Develop an understanding of tensile strength of different material • Develop an understanding that different geometric shapes have different strengths • Design a city skyline • Plan and design a skyscraper • Compare skyscraper designs • Understand how skyscrapers differ depending on where it is built and why • Design different types of bridges based on the location, height, and distance of the bridge • Design and build a toothpick bridge • Compare their bridges for strength

Relevant Standards:	Learning Goals:	Learning Objectives:
involving angle measure, area, surface area, and volume. 4. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle. **Science:** **NJ SLS.MS-ETS1-1** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **NJ SLS.MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **NJ SLS.MS-ETS1-3** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Pre-Assessment , Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit test, Extended constructed response questions, Quizzes, Student logbook, Team projects	Geometric shapes strength test, city skyline, skyscraper design, bridge designs, toothpick bridge	**Major Assignments (required):** Unit Test **Major Activities (required):** geometric shapes strength test, skyscraper design, toothpick bridge

Possible Assessment Modifications /Accommodations:
Word Banks, Calculators, Bold Key Words within Questions, Reduce Answer Choices

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Modifications /Accommodations:
Instructional Scaffolds, "Interleave"-style Homework Assignments (solutions are made available to students at home to utilize as references for homework assignments), Calculators, Small Group Review of Pre-Requisite Skills (such as measurement, units of measure, and properly reading a stopwatch and tape measure), Review and Re-teaching of Difficult Concepts

Unit Vocabulary:
Essential: Metric, Imperial, Cable-Stayed Bridge, Suspension Bridge, Cantilever Bridge, Arch Bridge, Beam Bridge, Truss Bridge**,** tensile strength **Non-Essential:**

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
E/LA: NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 Mathematics: NJ SLS.7.RP A.1, NJ SLS.7.NS A.3, NJ SLS.7.NS.B.3, NJ SLS.7.EE.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.7.G.B.4	Technology:	____ Global Awareness ____ Civic Literacy _x__ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	_x__ Creativity & Innovation ____ Media Literacy _x__ Critical Thinking and Problem Solving _x__ Life and Career Skills ____ Information & Communication Technologies Literacy

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
Science: NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2, NJ SLS.MS-ETS1-3 Visual and Performing Arts: Health/PE: World Languages: Social Studies: Technology: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS.8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS.8.2.8.D.3 21st Century Life and Careers: NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 Library:			_x__ Communication & Collaboration ____ Information Literacy

Resources:
Texts/Materials:

Unit: 3 Urban Living	Recommended Duration: 6 Weeks– November- January
Unit Description: In unit three, students will study urban living and city design. Students will understand the importance in the location of streets, transportation hubs, buildings, public space, and landscape. They will also understand the importance of energy and how to supply it to the city.	

Essential Questions:	Enduring Understandings:
• What does urban design consist of? • How important is transportation? • Why is it important to have public space and landscaping in urban design? • What are the pros and cons of each energy source? • Are there any alternatives for future energy consumption? • What are the basic energy sources?	• Understand designing an urban area consists of many aspects including buildings, streets, transportation hubs, energy sources, public space, and landscaping. • Understand there are many energy sources for urban development. • Understand the importance of implementing alternative energy sources.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJ SLS.7.RP A.1** Analyze proportional relationships and use them to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.	• Students will be able to analyze different urban development plans comparing the similarities and differences taking into account relevant scientific principles and potential impacts on people and the natural environment that may have limited the urban designs. (NJ SLS.7.RP.A.1, NJ SLS.MS-ETS1-2) (1 week)	• Compare different urban design layouts • Understand the impact of land formations and the design of the urban area • Understand the importance of a transportation system • Understand the important role energy plays in daily life • Investigate alternative energy sources • Understand the importance for public

Relevant Standards:	Learning Goals:	Learning Objectives:
NJ SLS.7.NS A.3 Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers. Solve real-world and mathematical problems involving the four operations with rational numbers. **NJ SLS.7.NS.B.3** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **NJ SLS.7.G A.1** Draw, construct, and describe geometrical figures and describe the relationships between them. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **NJ SLS.7.G.A.2** Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.	• Students will be able to construct an argument supported by evidence of how human population and their consumption of natural resources impact Earth. Students will also be able to analyze factors which contribute to the cause of rise in global temperatures and apply scientific principles to design a way to minimize human impact on the environment. (NJ SLS.7.NS.A.3, NJ SLS.7.NS.B.3, NJ SLS.MS-ESS3-3, NJ SLS.MS-ESS3-4, NJ SLS.MS-ESS3-5) (1 week) • Students will be able to define the criteria and constraints of an urban design, taking into account impacts on people and the natural environment that may limit possible designs. They will also create a scale drawing an urban design which would meet their defined criteria and constraints. (NJ SLS.7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2)(2 weeks) • Students will be able to create and evaluate competing design solutions using SimCity results to determine how well they met the criteria and constraints of urban design. (NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-2) (2 weeks)	space and landscaping in urban living • Design their own urban layout • Design/Construct their own urban design through SimCity challenge

Relevant Standards:	Learning Goals:	Learning Objectives:
Science: **NJ SLS.MS-ESS3-3** Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. **NJ SLS.MS-ESS3-4** Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems. **NJ SLS.MS-ESS3-5** Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century. **NJ SLS.MS-ETS1-1** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **NJ SLS.MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Pre-Assessment , Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit test, Extended constructed response questions, Quizzes, Student logbook, Team projects	Design a neighborhood, energy of the future project, SimCity project	**Major Assignments (required):** Unit Test **Major Activities (required):** Design a neighborhood, SimCity project

Possible Assessment Modifications /Accommodations:
Word Banks, Calculators, Bold Key Words within Questions, Reduce Answer Choices

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Modifications /Accommodations:
Instructional Scaffolds, "Interleave"-style Homework Assignments (solutions are made available to students at home to utilize as references for homework assignments), Calculators, Small Group Review of Pre-Requisite Skills (such as measurement, units of measure, and properly reading a stopwatch and tape measure), Review and Re-teaching of Difficult Concepts

Unit Vocabulary:
Essential: Energy, Kinetic Energy, Potential Energy, Conservation of Energy, Energy Transfer, Gravitational Potential Energy, Chemical Energy, Mechanical Energy, Electrical Energy, renewable energy, solar energy, wind energy, hydroelectric energy **Non-Essential:** ?

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
E/LA: NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 Mathematics: NJ SLS.7.RP A.1, NJ SLS.7.NS A.3, NJ SLS.7.NS.B.3, NJ SLS.7.G A.1, NJ SLS.7.G.A.2	Technology:	____ Global Awareness ____ Civic Literacy _x__ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	_x__ Creativity & Innovation ____ Media Literacy __x_ Critical Thinking and Problem Solving _x__ Life and Career Skills ____ Information & Communication

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
Science: NJ SLS.MS-ESS3-3, NJ SLS.MS-ESS3-4, NJ SLS.MS-ESS3-5, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2 Visual and Performing Arts: Health/PE: World Languages: Social Studies: Technology: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS.8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS.8.2.8.D.3 21st Century Life and Careers: NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4			Technologies Literacy _x__ Communication & Collaboration ____ Information Literacy

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Library:			

Resources:
Texts/Materials: internet, virtual reality glasses, SimCity

Unit: 4 Space Design	Recommended Duration: 3 Weeks– January-February
Unit Description: This unit takes a turn towards space as the students study the possibility of life in space. It offers an introduction NASA and its plans to build a space station on the moon and Mars. Students will investigate the dangers and problems that humans will have to overcome in order to make space life possible. Weighing the possible solutions and the drawbacks, students will plan and design their own space station.	

Essential Questions:	Enduring Understandings:
• What are NASA's plans for the future? • What problems does NASA face with building a space station? • How does the design of the space shuttle compare with the design of a skyscraper? • How would the design of a space station on another planet compare to an urban development design?	• Understand NASA's technology is used on Earth every single day. • Understand NASA is planning on sending humans to space. • Understand the obstacles facing life in space. • Understand the basic design of a spacecraft and its similarities to skyscrapers. • Understand the importance of a transportation hub, even with life in space.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJ SLS.7.RP A.1** Analyze proportional relationships and use them	Students will be able to analyze different planets comparing the similarities and	• Understand the NASA technology used every day • Understand NASA's future plans for

Relevant Standards:	Learning Goals:	Learning Objectives:
to solve real-world and mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks ½ mile in each ¼ hour, compute the unit rate as the complex fraction ½/1/4 miles per hour, equivalently 2 miles per hour. **NJ SLS.7.NS.B.3** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 ¾ inches long in the center of a door that is 27 ½ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation. **NJ SLS.7.G A.1** Draw, construct, and describe geometrical figures and describe the relationships between them. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale. **NJ SLS.7.G.A.2** Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more	differences to Earth taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit life on other planets. (NJ SLS.7.RP.A.1, NJ SLS.7.NS.B.3, NJ SLS.MS-ETS1-2) Students will be able to define the criteria and constraints of a space station design, taking into account impacts on people, and the natural environment that may limit possible designs. They will also create a scale drawing a space station which would meet their defined criteria and constraints. (NJ SLS.7.RP.A.1, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2, NJ SLS.MS-ETS1-1, NJ SLS.MS-ETS1-2)	space travel • Compare urban design to a possible space station on the moon or Mars • Describe constraints on a possible space station • Understand the importance of a transportation hub for life in space • Compare an airport to a possible space station port • Plan and design a space station for the moon or Mars

Relevant Standards:	Learning Goals:	Learning Objectives:
than one triangle, or no triangle **Science:** **NJ SLS.MS-ETS1-1** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **NJ SLS.MS-ETS1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.		

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Pre-Assessment , Teacher Observation, Class Participation, Warm Ups, Homework, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, Stomp on Three, Student Progress Charts & Reflections	Unit test, Extended constructed response questions, Quizzes, Student logbook, Team projects	Space station design	**Major Assignments (required):** Space station design **Major Activities (required):** Space station design

Possible Assessment Modifications /Accommodations:
Word Banks, Calculators, Bold Key Words within Questions, Reduce Answer Choices

Instructional Strategies:
Chunking Content into Digestible Bites, Recording and Representing Knowledge, Reviewing Content, Using Homework, Examining Similarities and Differences, Examining Errors in Reasoning, Practicing Skills, Strategies and Processes, Engaging Students in Cognitively Complex Tasks Involving Hypothesis Generation and Testing

Possible Instructional Modifications /Accommodations:
Instructional Scaffolds, "Interleave"-style Homework Assignments (solutions are made available to students at home to utilize as references for homework assignments), Calculators, Small Group Review of Pre-Requisite Skills (such as measurement, units of measure, and properly reading a stopwatch and tape measure), Review and Re-teaching of Difficult Concepts
Unit Vocabulary:
Essential: **Non-Essential:**

Interdisciplinary Connections (Applicable Standards):	**Integration of Technology:**	**21st Century Themes:**	**21st Century Skills:**
E/LA: NJ SLS.RST.6-8.1, NJ SLS.RST.6-8.3, NJ SLS.RST.6-8.7, NJ SLS.RST. 6-12.4, NJ SLS.RST.6-12.7 NJ SLS.WHST.6-8.1, NJ SLS.WHST.6-8.7 Mathematics: NJ SLS.7.RP A.1, NJ SLS.7.NS.B.3, NJ SLS.7.G.A.1, NJ SLS.7.G.A.2 Science: MS-ETS1-1, MS-ETS1-2 Visual and Performing Arts: Health/PE: World Languages: Social Studies:	Technology:	____ Global Awareness ____ Civic Literacy ____ Financial, Economic, Business, & Entrepreneurial Literacy ____ Health Literacy	____ Creativity & Innovation ____ Media Literacy __x_ Critical Thinking and Problem Solving __x_ Life and Career Skills _x__ Information & Communication Technologies Literacy __x_ Communication & Collaboration ____ Information Literacy

Interdisciplinary Connections (Applicable Standards):	Integration of Technology:	21st Century Themes:	21st Century Skills:
Technology: NJ SLS.8.1.8.A.4, NJ SLS.8.1.8.F.1, NJ SLS.8.2.8.A.2, NJ SLS.8.2.8.A.3, NJ SLS.8.2.8.A.4, NJ SLS.8.2.8.A.5, NJ SLS.8.2.8.C.1, NJ SLS.8.2.8.C.2, NJ SLS.8.2.8.C.4, NJ SLS.8.2.8.C.5.a, NJ SLS.8.2.8.C.7, NJ SLS. 8.2.8.C.8, NJ SLS.8.2.8.D.2, NJ SLS. 8.2.8.D.3 21st Century Life and Careers: NJ SLS.9.3.ST.1, NJ SLS.9.3.ST.2, NJ SLS.9.3.ST.3, NJ SLS.9.3.ST-ET.1, NJ SLS.9.3.ST-ET.2, NJ SLS.9.3.ST-ET.3, NJ SLS.9.3.ST-ET.4, NJ SLS.9.3.ST-ET.5, NJ SLS.9.3.ST-ET.6, NJ SLS.9.3.ST-SM.1, NJ SLS.9.3.ST-SM.2, NJ SLS.9.3.ST-SM.4 Library:			

Resources:
Texts/Materials: NASA website, internet, YouTube clips, virtual reality glasses