Kingsway Regional School District

Committed to Excellence

Course Name: Discovering STEM 8	**Grade Level(s): 8**
Department: Math/Science/Technology	**Credits: NA**
BOE Adoption Date: October 2018	**Revision Date(s): October 2019; October 2021**

ABSTRACT

This semester course will introduce students to basic engineering principles while strengthening mathematical application, with a focus on physics, and concepts in relation to science, technology, math, and engineering. The major objective of this course will be to prepare students for STEM initiatives relevant to 21st century learning. Students will engage in hands-on projects, discovery-based learning, and collaborative group efforts in order to become better critical thinkers. The topics are aligned with the STEM standards within the New Jersey Core Curriculum Standards as well as the Common Core State Standards for mathematics. This class will also integrate real-world application of technology by utilizing various programs to develop projects.

This course will be broken up into three major topical areas that include:

- Problem solving, reasoning, and critical thinking
- Physics Design and Engineering
- Career Exploration

Proficiencies and Pacing Guide:

Course Title: Discovering STEM 8
Prerequisite(s): NA

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
Unit 1: Problem Solving	3 weeks	Mathematics: NJSLS.7.RP.A.1 NJSLS.7.NS.A.3 NJSLS.7.EE.A NJSLS.7.EE.B Science: NJSLS.MS.ETS-1-1 NJSLS.MS.ETS-1-2 Technology: NJSLS.8.1.8.AP.7 Career Ready Practices: CLKS.1 CRP2 CRP4 CLKS.3 CLKS.4 CLKS.5 CLKS.6 CLKS.12	• Students will be able to follow and give appropriate instructions to complete a multistep task, both individually and with a group. (CRP4, CLKS.12) (1 week) • Students will be able to define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and constraints that may limit possible solutions. (NJSLS.MS.ETS-1-1, NJSLS.MS.ETS-1-2) (1.5 weeks) • Students will be able to solve real-world and mathematical problems involving the four operations with rational numbers, algebraic expressions and equations, ratios, proportions, and unit rates. (NJSLS.7.RP.A.1, NJSLS.7.NS.A.3, NJSLS.7.EE.A, NJSLS.7.EE.B) (0.5 week)	• SW understand and complete a multistep task. • SW understand the importance of group work. • SW understand and identify the possible constraints of a problem. • SW understand and identify viable solutions to varying real-world problems. • SWBAT distinguish and classify unreasonable and reasonable solutions for a given problem based on the given constraints. • SW understand how constraints limit possible solutions to a problem. • SWBAT evaluate a problem for constraints and create multiple solutions that are all plausible. • SWBAT compare and contrast multiple solutions to determine the best solution for a specific problem, including combining solutions in order to create an optimal solution. • SWBAT identify quantities and variables in a real-world

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
				mathematical problem. • SWBAT use various mathematical strategies to solve a variety of real-world mathematical problems.
Unit 2: Physics Design and Engineering	10 weeks	Mathematics: NJSLS.7.RP.A.1 NJSLS.7.RP.A.2 NJSLS.7.RP.A.3 NJSLS.7.NS.A.3 NJSLS.7.EE.A NJSLS.7.EE.B Science: NJSLS.MS.ETS-1-1 NJSLS.MS.ETS-1-2 NJSLS.MS.PS-2-2 21st Century Life and Career: NJSLS.9.3.ST.1 NJSLS.9.3.ST.2 NJSLS.9.3.ST.3 NJSLS.9.3.ST-ET.1 NJSLS.9.3.ST-ET.4 NJSLS.9.3.ST-ET.5 NJSLS.9.3.ST-ET.6 Career Ready Practices: CLKS.1 CRP2 CRP4 CLKS.3 CLKS.4 CLKS.5	• Students will be able to apply engineering skills in a situation that requires project management, process control and quality assurance. (NJSLS.9.3.ST.1, NJSLS.9.3.ST.2, NJSLS.9.3.ST.3, NJSLS.9.3.ST-ET.1, NJSLS.9.3.ST-ET.4, NJSLS.9.3.ST-ET.5, NJSLS.9.3.ST-ET.6) (5 weeks) • Students will be able to work as an individual and in a group to design a solution or product for a given problem with specific constraints. (CLKS.1, CRP2, CRP4, CLKS.3, CLKS.4, CLKS.5, CLKS.6, CLKS.11, CLKS.12, NJSLS.MS.ETS-1-1, NJSLS.MS.ETS-1-2) (5 weeks) • Students will be able to utilize digital design tools to create simulation of physical motion. (NJSLS.9.4.8.DC.7) (1 week) • Students will be able to analyze proportional relationships and use them to solve real-world and	• SWBAT work individually to create a product that matches a specific set of criteria and constraints. • SWBAT work with a group to compare and contrast design ideas. Come up with and agree upon a group design. • SWBAT analyze pros and cons of each design. • SWBAT calculate measurements for and draw a 2D scale model of design, with proper labeling and precision. • SWBAT calculate the force, mass, and acceleration of an object using the formula F = ma. • SWBAT work with a group to create and build a testable egg-drop prototype. • SWBAT calculate the amount of material needed for a design prototype under a specific budget and create various designs using the same exact materials/budget. • SWBAT understand and be able to calculate velocity, distance,

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
		CLKS.6 CLKS.11 CLKS.12 Technology: NJSLS.9.4.8.DC.7	mathematical problems. Compute unit rates associated with ratios of fractions, including ratios of lengths and other quantities measured in different units. (NJSLS.7.RP.A.1, NJSLS.7.RP.A.2, NJSLS.7.RP.A.3) (10 weeks) • Students will be able to calculate a budget needed in order to complete a design. Students will also demonstrate the ability to create multiple designs based on a specific budget. (NJSLS.7.NS.A.3, NJSLS.7.EE.A, NJSLS.7.EE.B) (1 week) • Students will be able to understand and calculate the simple force, mass, and acceleration of an object using the formula F = ma. Students will also be able to expand on this knowledge utilizing force models and formulas. (NJSLS.7.EE.A, NJSLS.7.EE.B, NJSLS.8.EE.B, NJSLS.MS.PS-2-2) (1 week) • Students will be able to understand and calculate velocity, distance, and time using the formula v = d/t and understanding that d and t are	and time using the formula v = d/t and understanding that d and t are direct variation. • SWBAT understand and demonstrate the ability to re-write algebraic expressions using properties of operations. F = ma is also equal to m = F/a and v = d/t is equal to d = vt. • SWBAT execute multiple tests and analyze final data to draw conclusions about various aspects of the tests. • SWBAT convert imperial units into metric units using proportions.

Unit Title:	Duration/ Month(s)	Related Standards:	Learning Goals:	Topics and Skills:
			direct variation. (NJSLS.7.RP.A.1, NJSLS.7.RP.A.2, NJSLS.7.RP.A.3, NJSLS.8.EE.B) (1 week)	
Unit 3: Career Exploration	5 weeks	21st Century Life and Career: NJSLS.9.2.8.B.4 NJSLS.9.3.ST.4 NJSLS.9.3.ST.5 NJSLS.9.3.ST.6 Technology: NJSLS. 8.1.12.A.1 Career Ready Practices: CLKS.1 CRP2 CRP4 CLKS.3 CLKS.4 CRP7 CLKS.5 CLKS.6 CLKS.10 CLKS.11	• Students will be able to research, identify, write, and present information on a STEM career. (NJSLS.9.2.8.B.4, NJSLS.9.3.ST.4, NJSLS.9.3.ST.5, NJSLS.9.3.ST.6, NJSLS. 8.1.12.A.1, CLKS.1, CRP2, CRP4, CLKS.3, CLKS.4, CRP7, CLKS.5, CLKS.6, CLKS.10, CLKS.11 (4 weeks)	• SWBAT describe key skills that are important in a STEM career; including analytical, creative, organizational, and leadership skills. • SWBAT discuss the personal characteristics STEM professionals share. • SWBAT describe at least five different careers in science, technology, engineering, or mathematics fields • SWBAT compare and contrast the education requirements needed in two different STEM careers. • SWBAT research and analyze the individual educational paths of a STEM career. • SWBAT communicate, using technology and presentation, various topics associated with a specific STEM career effectively to a large group.

Unit 1: Problem solving, reasoning, and critical thinking	Recommended Duration: 3 weeks – September – October
Unit Description: Unit 1 introduces the students to the application of real world problem solving using science, technology, engineering, and math (STEM) applications. In the problem-solving tasks presented, students work will emphasize precision, a focusing on the completion of multistep problems, and teamwork, such as focusing on how to work well with others to successfully complete multistep tasks.	

Essential Questions:	Enduring Understandings:
• How do teams efficiently and effectively solve problems in an increasingly complex world? • How are science and mathematics concepts used/applied in order to solve problems and issues in the real world? • How can we determine "reasonable" solutions to a problem?	• Researchers, mathematicians, scientists, and many other people work together to develop, assess, and maintain the world we live in today. • Mathematical and scientific principles form the foundation of the world we live in today. • Critical thinking is an essential skill in multiple disciplines.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJSLS.7.RP.A.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **NJSLS.7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers. **NJSLS.7.EE.A** Use properties of operations to generate equivalent expressions. **NJSLS.7.EE.B** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. **Science:** **NJSLS.MS.ETS-1-1** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and	• Students will be able to follow and give appropriate instructions to complete a multistep task, both individually and with a group. (CRP4, CLKS.12) (1 week) • Students will be able to define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and constraints that may limit possible solutions. (NJSLS.MS.ETS-1-1, NJSLS.MS.ETS-1-2) (1.5 weeks) • Students will be able to solve real-world and mathematical problems involving the four operations with rational numbers, algebraic expressions and equations, ratios, proportions, and unit rates.	• SW understand and complete a multistep task. • SW understand the importance of group work. • SW understand and identify the possible constraints of a problem. • SW understand and identify viable solutions to varying real-world problems. • SWBAT distinguish and classify unreasonable and reasonable solutions for a given problem based on the given constraints. • SW understand how constraints limit possible solutions to a problem. • SWBAT evaluate a problem for constraints and create multiple solutions that are all plausible. • SWBAT compare and contrast multiple solutions to determine the best solution for a specific problem, including combining solutions in order to create an optimal solution.

Relevant Standards:	Learning Goals:	Learning Objectives:
potential impacts on people and the natural environment that may limit possible solutions. **NJSLS.MS.ETS-1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.	(NJSLS.7.RP.A.1, NJSLS.7.NS.A.3, NJSLS.7.EE.A, NJSLS.7.EE.B) (0.5 week)	• SWBAT identify quantities and variables in a real-world mathematical problem. • SWBAT use various mathematical strategies to solve a variety of real-world mathematical problems.

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation Warm Ups Exit Slips Status Checks White-boarding Student Progress Charts & Reflections	Warm-ups Class discussions Academic journal Completion of multistep tasks	Experiments Hands-on-activities Multi-step tasks	**Major Assignments:** Unit test, Extended constructed response questions, Quizzes, Student logbook **Major Activities:** Task completions (individual & group)

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*

Special Education Students	English Language Learners (ELLs)	At-Risk Learners	Advanced Learners
• Chunk multi-step questions • Provide word banks • Split test into skill vs. content sections • Chunk lengthy word problems	• Chunk multi-step questions • Provide word banks with translations • Split test into skill vs. content sections • Chunk lengthy word problems	• Have students utilize additional time (Math working lunch, homeroom, etc.) to receive additional help with topics • Utilize error analysis, then utilize additional supports as needed	• Include additional higher-level questions/tasks to further challenge advanced learners

Instructional Strategies: *(List and describe.)*

Chunking Content into Digestible Bites (breaking down the process of problem-solving into focused sections: identifying the problem, constraints, reasonable solutions, etc.), Examining Similarities and Differences (will be used to compare and contrast solution/design ideas by utilizing lists, graphic organizers, and other strategies), Examining Errors in Reasoning (students will be given various solutions and determine if there is an error in reasoning), Engaging Students in Cognitively Complex Tasks Involving Solution Generation (problems varying in difficulty and complexity will be presented to students to create solutions

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Provide additional resources for at-home investigation of topics and skills. • Provide opportunities for students to think deeper and challenge themselves during activities.

Unit Vocabulary:
Essential: STEM, engineer, engineering, critical thinking, problem, criteria, constraint, solution, teamwork **Non-Essential:** brainstorm, reasonable, realistic

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
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 Equity Integration (Using James Banks' Levels of Multicultural Integration): https://diversity.asee.org/deicommittee/2021/05/04/two-strategies-towards-socially-just-engineering-integration-in-high-school-science/ Technology: NJ SLS.8.1.8.AP.7	A - Utilize website for problem solving and critical thinking task.		__x__ Creativity & Innovation – create solutions both individually and with others. __x__ Critical Thinking & Problem Solving – students will be asked to reason effectively and solve problems that they may not be familiar with. __x__ Life and Career Skills *(flexibility, initiative, cross-cultural skills, productivity, leadership, etc.)* – students will learn to be flexible and adapt to problems that may require multiple attempts or may have "no right answer". Students

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
Career Ready Practices: CLKS.1 CRP2 CRP4 CLKS.3 CLKS.4 CLKS.5 CLKS.6 CLKS.12			will also learn how to manage time and plan throughout a multi-step task. __x__ Communication & Collaboration – students will be asked to communicate their thoughts and ideas both verbally and on paper (written/drawn). Students will also be asked to collaborate and work effectively with group mates.

Resources:
Texts/Materials: These websites have a variety of digital resources or additional levels of information as well as a variety of activities: http://www.ece.umd.edu/~dilli/education/functional.html http://www.tryengineering.org/ http://www.teachengineering.org/ http://pbskids.org/designsquad/ http://www.sciencebuddies.org/

Unit 2: Design and Engineering	Recommended Duration: 10 weeks / October – January

Unit Description:
Unit 2 introduces the students to the engineering design process and basic concepts used in physics.
This unit emphasizes the engineering design process; a series of steps that engineering teams use to guide them as they solve problems. The steps of the engineering design process are as follows: Define the Problem, Research, Brainstorm, Develop and Prototype Solution, Test, And Feedback. In addition, engineers use their science and math knowledge to explore all possible options and compare many design ideas. Students will learn how to use the steps of the engineering design process as they complete a design challenge during this unit. During the design challenges, students will be introduced to basic concepts used in physics, while strengthening their algebraic thinking and skills.

Essential Questions:	Enduring Understandings:
• How do engineers solve problems using the engineering design process? • Why is the engineering design process so important to follow when creating a solution to a problem? • How do teams efficiently and effectively solve problems in an increasingly complex world? • How can the engineering design process be applied in a variety of situations? • How are skills learned in Pre-Algebra found in Physics? • What ways do we use math in other subject areas?	• The engineering design process is a series of steps that engineers follow to come up with a solution to a problem. • The engineering design process is different from the Scientific Method, which requires a hypothesis and experiments. • The engineering design process is a logical and organized way to generate, test, evaluate, and re-plan solutions to problems. • The engineering design process is not always completed in a sequential order, rather engineers are able to move back and forth between the steps as they move toward a final solution/design. • Working in groups or teams is a large part of many STEM careers and is a valuable life skill. • Understanding how math, particularly Algebra, is interwoven into other disciplines.

Relevant Standards:	Learning Goals:	Learning Objectives:
Mathematics: **NJSLS.7.RP.A.1** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. **NJSLS.7.RP.A.2** Recognize and represent proportional relationships between quantities.	• Students will be able to apply engineering skills in a situation that requires project management, process control and quality assurance. (NJSLS.9.3.ST.1, NJSLS.9.3.ST.2, NJSLS.9.3.ST.3, NJSLS.9.3.ST-ET.1, NJSLS.9.3.ST-ET.4, NJSLS.9.3.ST-ET.5, NJSLS.9.3.ST-ET.6) (5	• SWBAT work individually to create a product that matches a specific set of criteria and constraints. • SWBAT work with a group to compare and contrast design ideas. Come up with and agree upon a group design. • SWBAT analyze pros and cons of each design. • SWBAT calculate measurements for and draw a

Relevant Standards:	Learning Goals:	Learning Objectives:
NJSLS.7.RP.A.3 Use proportional relationships to solve multistep ratio and percent problems. **NJSLS.7.NS.A.3** Solve real-world and mathematical problems involving the four operations with rational numbers. **NJSLS.7.EE.A** Use properties of operations to generate equivalent expressions. **NJSLS.7.EE.B** Solve real-life and mathematical problems using numerical and algebraic expressions and equations. **NJSLS.8.EE.B** Understand the connections between proportional relationships, lines, and linear equations. **Science:** **NJSLS.MS.ETS-1-1** 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. **NJSLS.MS.ETS-1-2** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **NJSLS.MS.PS-2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	weeks) • Students will be able to work as an individual and in a group to design a solution or product for a given problem with specific constraints. (CLKS.1, CRP2, CRP4, CLKS.3, CLKS.4, CLKS.5, CLKS.6, CLKS.11, CLKS.12, NJSLS.MS.ETS-1-1, NJSLS.MS.ETS-1-2) (5 weeks) • Students will be able to utilize digital design tools to create simulation of physical motion. (NJSLS.9.4.8.DC.7) (1 week) • 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 and other quantities measured in different units. (NJSLS.7.RP.A.1, NJSLS.7.RP.A.2, NJSLS.7.RP.A.3) (10 weeks) • Students will be able to calculate a budget needed in order to complete a design. Students will also demonstrate the ability to create multiple designs based on a specific budget. (NJSLS.7.NS.A.3, NJSLS.7.EE.A, NJSLS.7.EE.B) (1 week) • Students will be able to understand and calculate the simple force, mass, and acceleration of an object using the formula F = ma. Students will also be able to expand on this knowledge utilizing	2D scale model of design, with proper labeling and precision. • SWBAT calculate the force, mass, and acceleration of an object using the formula F = ma. • SWBAT work with a group to create and build a testable egg-drop prototype. • SWBAT calculate the amount of material needed for a design prototype under a specific budget and create various designs using the same exact materials/budget. • SWBAT understand and be able to calculate velocity, distance, and time using the formula v = d/t and understanding that d and t are direct variation. • SWBAT understand and demonstrate the ability to re-write algebraic expressions using properties of operations. F = ma is also equal to m = F/a and v = d/t is equal to d = vt. • SWBAT execute multiple tests and analyze final data to draw conclusions about various aspects of the tests. • SWBAT convert imperial units into metric units using proportions.

Relevant Standards:	Learning Goals:	Learning Objectives:
	force models and formulas. (NJSLS.7.EE.A, NJSLS.7.EE.B, NJSLS.8.EE.B, NJSLS.MS.PS-2-2) (1 week) • Students will be able to understand and calculate velocity, distance, and time using the formula v = d/t and understanding that d and t are direct variation. (NJSLS.7.RP.A.1, NJSLS.7.RP.A.2, NJSLS.7.RP.A.3, NJSLS.8.EE.B) (1 week)	

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Exit Slips, Status Checks, Group Progress Charts & Reflections	Warm-ups, Class discussions, academic journal, Design portfolios, project calculations	Short-term projects, design submissions, prototypes, egg-drop prototype testing	**Major Assignments:** Unit tests, Extended constructed response questions, Quizzes, Student logbook **Major Activities:** Egg Drop Project, Velocity and Acceleration Lab

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*			
Special Education Students	**English Language Learners (ELLs)**	**At-Risk Learners**	**Advanced Learners**
• Chunk multi-step questions • Provide word banks • Split test into skill vs. content sections • Chunk lengthy word problems	• Chunk multi-step questions • Provide word banks with translations • Split test into skill vs. content sections • Chunk lengthy word problems	• Have students utilize additional time (Math working lunch, homeroom, etc.) to receive additional help with topics • Utilize error analysis, then utilize additional supports as needed	• Include additional higher-level questions/tasks to further challenge advanced learners

Instructional Strategies: *(List and describe.)*
Chunking Content into Digestible Bites (breaking down multi-step projects into manageable parts), Examining Similarities and Differences (will be used to compare

and contrast design ideas by utilizing lists, graphic organizers, and other strategies), Engaging Students in Cognitively Complex Tasks Involving Design Generation (students will be given a set of constraints and be asked to produce multiple designs for group selection), Cooperative Learning (students will work together in groups to create a design and build a prototype)

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*

Special Education Students	English Language Learners (ELLs)	At-Risk Learners	Advanced Learners
• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Chunking instructions. • Providing written instructions along with re-wording and repeating of instructions. • Providing graphic organizers.	• Provide additional resources for at-home investigation of topics and skills. • Provide opportunities for students to think deeper and challenge themselves during activities.

Unit Vocabulary:

Essential: Product, prototype, engineering design process, three-dimensional, scale, simulation, velocity, force, mass, acceleration, time, distance
Non-Essential: constraints, proportional, ratio, metric system, imperial system

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
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 Equity Integration (Using James Banks' Levels of Multicultural Integration): https://diversity.asee.org/deicommittee/2021/05/04/two-strategies-towards-socially-just-engineering-integration-	S – calculators M – Various websites allow students to create simulation that would not be possible in the classroom.	__x__ Financial, Economic, Business, & Entrepreneurial Literacy – students will get to experience designing a product within a budget and how to adapt that budget.	__x__ Creativity & Innovation – create solutions both individually and with others. __x__ Critical Thinking & Problem Solving – students will be asked to reason effectively and create designs that meet a certain set of constraints. __x__ Life and Career Skills *(flexibility, initiative, cross-cultural skills, productivity, leadership, etc.)*

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
in-high-school-science/ Technology: NJSLS.9.4.8.DC.7 Career Ready Practices: CLKS.1 CRP2 CRP4 CLKS.3 CLKS.4 CLKS.5 CLKS.6 CLKS.11 CLKS.12			– Students will also learn how to manage time and plan throughout a multi-step task. Students will also work together to market a design to a specific organization. __x__ Communication & Collaboration – students will be asked to communicate their thoughts and ideas both verbally and on paper (written/drawn). Students will also be asked to collaborate and work effectively with group mates.

Resources:
Texts/Materials: These websites have a variety of digital resources or additional levels of information as well as a variety of activities: http://www.ece.umd.edu/~dilli/education/functional.html http://www.tryengineering.org/ http://www.teachengineering.org/ http://pbskids.org/designsquad/ http://www.sciencebuddies.org/ https://phet.colorado.edu/en/simulations/category/physics/motion https://www.myphysicslab.com/

Unit 3: Career Exploration	Recommended Duration: 4 weeks / January - February
Unit Description: Unit 3 presents students with several STEM-based opportunities to discover and demonstrate the knowledge, technical skills, and even character traits needed to obtain and succeed in a chosen STEM field. The lessons and activities in this unit will help students realize the importance of critical thinking abilities and skills needed to for various STEM careers.	

Essential Questions:	Enduring Understandings:
• What traits are commonly seen across all aspects of STEM careers? • Why is it important to understand the educational path to a specific career?	• Skills like: analysis, creativity, organization, and leadership are often sought after in numerous STEM careers. • Many STEM careers can be obtained in using more than one educational route. • Research is useful in understanding a potential future career path.

Relevant Standards:	Learning Goals:	Learning Objectives:
21st Century Life and Career: **NJSLS.9.2.8.B.4** Evaluate how traditional and nontraditional careers have evolved regionally, nationally, and globally. **NJSLS.9.3.ST.4** Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster and the role of STEM in society and the economy. **NJSLS.9.3.ST.5** Demonstrate an understanding of the breadth of career opportunities and means to those opportunities in each of the Science, Technology, Engineering & Mathematics Career Pathways. **NJSLS.9.3.ST.6** Demonstrate technical skills needed in a chosen STEM field.	• Students will be able to research, identify, write, and present information on a STEM career. (NJSLS.9.2.8.B.4, NJSLS.9.3.ST.4, NJSLS.9.3.ST.5, NJSLS.9.3.ST.6, NJSLS. 8.1.12.A.1, CLKS.1, CRP2, CRP4, CLKS.3, CLKS.4, CRP7, CLKS.5, CLKS.6, CLKS.10, CLKS.11 (4 weeks)	• SWBAT describe key skills that are important in a STEM career; including analytical, creative, organizational, and leadership skills. • SWBAT discuss the personal characteristics STEM professionals share. • SWBAT describe at least five different careers in science, technology, engineering, or mathematics fields • SWBAT compare and contrast the education requirements needed in two different STEM careers. • SWBAT research and analyze the individual educational paths of a STEM career. • SWBAT communicate, using technology and presentation, various topics associated with a specific STEM career effectively to a large group.

Formative Assessments	Summative Assessments:	Performance Assessments:	Major Activities/ Assignments (required):
Teacher Observation, Class Participation, Warm Ups, Exit Slips, Status Checks, Popsicle Sticks, Thumbs Up/Thumbs Down, White-boarding, Student Progress Charts & Reflections	Warm-ups, Class discussions, academic journal, research notes	Career project components, research tasks	**Major Assignments:** Extended constructed response questions, Career Research portfolio **Major Activities:** Choice career research project

Possible Assessment Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **EXPRESS** their understanding and comprehension of the content/skills taught?*

Special Education Students	English Language Learners (ELLs)	At-Risk Learners	Advanced Learners
• Chunk multi-step questions • Provide word banks • Split test into skill vs. content sections • Chunk lengthy word problems • Allow for choice of information representation (words vs. pictures, videos, etc.) • Conference check-ins to assess timely completion	• Chunk multi-step questions • Provide word banks with translations • Split test into skill vs. content sections • Chunk lengthy word problems • Allow for choice of information representation (words vs. pictures, videos, etc.) • Conference check-ins to assess timely completion	• Have students utilize additional time (Math working lunch, homeroom, etc.) to receive additional help with topics • Conference check-ins to assess timely completion	• Include additional higher-level questions/tasks to further challenge advanced learners

Instructional Strategies: *(List and describe.)*

Chunking Content into Digestible Bites (breaking down multi-step projects into manageable parts), Research Strategies (utilizing a research folder and guided questions to aide in proper research)

Possible Instructional Adjustments (Modifications /Accommodations/ Differentiation): *How will the teacher provide multiple means for the following student groups to **ACCESS** the content/skills being taught?*

Special Education Students	English Language Learners (ELLs)	At-Risk Learners	Advanced Learners
• Chunking instructions. • Providing written instructions	• Chunking instructions. • Providing written instructions	• Chunking instructions. • Providing written instructions	• Provide additional resources for at-home investigation of topics

along with re-wording and repeating of instructions. • Providing graphic organizers.	along with re-wording and repeating of instructions. • Providing graphic organizers.	along with re-wording and repeating of instructions. • Providing graphic organizers.	and skills. • Provide opportunities for students to think deeper and challenge themselves during activities.

Unit Vocabulary:
Essential: educational degrees, secondary education, post-secondary education, doctorate, engineer, career titles (various) **Non-Essential:** salary, benefits

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
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 Equity Integration (Using James Banks' Levels of Multicultural Integration): https://diversity.asee.org/deicommittee/2021/05/04/two-strategies-towards-socially-just-engineering-integration-in-high-school-science/ Technology: NJSLS. 8.1.12.A.1 Career Ready Practices: CLKS.1 CRP2 CRP4	R – creation of an online presentation	__x__ Financial, Economic, Business, & Entrepreneurial Literacy – Students will research a STEM career and understand how that career plays a role in society	__x__ Life and Career Skills *(flexibility, initiative, cross-cultural skills, productivity, leadership, etc.)* - students will independently research a career and complete a presentation in a timely manner. __x__ Information & Communication Technologies Literacy – students will utilize technology to create and present research on a specific career. __x__ Communication & Collaboration – Students will give a presentation in order to educate their peers on a specific STEM career. __x__ Information Literacy - students will utilize databases and the internet to gather information

Interdisciplinary Connections & Career Ready Practices (Note Applicable Standards):	**Integration of Technology:** *(Note the SAMR Model elements used and how.)*	**21st Century Themes:** *(Check and explain how the connection is made.)*	**21st Century Skills:** *(Check and explain how the connection is made.)*
CLKS.3 CLKS.4 CRP7 CLKS.5 CLKS.6 CLKS.10 CLKS.11			on a specific STEM career.

Resources:
Texts/Materials: These websites have a variety of digital resources or additional levels of information as well as a variety of activities: http://www.ece.umd.edu/~dilli/education/functional.html http://www.tryengineering.org/ http://www.teachengineering.org/ http://pbskids.org/designsquad/ http://www.sciencebuddies.org https://www.krsd.org/Page/1008 https://www.bls.gov/ooh/ https://www.onetonline.org/