Madison Public Schools
Applied Mathematics

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Approval date:
August 2017

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Course Overview

Description
Applied Mathematics is an elective course where students will have the opportunity to explore Mathematical applications in the real world. The course is project based allowing students to develop their creative problem solving skills and take ownership of their learning. Students will have the opportunity to explore careers and local and global issues involving mathematics, as well as interact with experts within the field. The course will cover various New Jersey Student Learning Standards from each of the six conceptual categories: Number and Quantity, Algebra, Functions, Geometry, Statistics and Probability, and Modeling. In addition, the course will also incorporate 21st Century life and career skills to ensure students are prepared for what comes beyond high school. This course's unique design allows for students of all mathematical levels to be appropriately challenged and engaged without repeating content from other courses. As a culminating activity, each Applied Mathematics participant will be responsible for a portfolio presentation to demonstrate her/his learning and growth throughout the year and progress towards goals for college and/or career readiness.

Goals
This course aims to: - Use, apply, and model mathematics to solve problems arising in everyday life, society, and the workplace.   - Make connections between important math concepts and the real-world applications that make use of these concepts   - Utilize self-assessment to identify strengths and weaknesses in mathematics and use these findings to select project-based activities that bolster strengths and improve weaknesses.   - Promote the use of responsible research strategies.   - Emphasize discovery learning and investigation to allow for students to arrive at important conclusions through the use of a wide variety of technology tools.   - Apply problem-solving strategies to non-routine problems involving real-world and authentic data..   - Learn how technology can aid in solving complicated problems.   - Discover ways to analyze the data behind decision making that affects all of us as global citizens.

Materials
Core: Teacher will create core materials **Supplemental:** problem-solving self-assessment, portfolio software,resources collected from the internet

Resources
Suggested activities and resources page

Benchmark Assessments

Common Benchmark Assessment are given for each unit with common types of questions across the levels including problems that focus on the main ideas and anchor standards of the course.

(Gifted and Talented Students, English Language Learners, Special Education Students, At-Risk Students)

Scope and Sequence
(Pacing Guide)

Unit Number	Topic of Study	Duration (days Taught)
Intro	Team Building through Effective Research and Problem-Solving Activities	4
1	Math Skills That Help Make Our Town a Success	20-25
2	Who is Number One?	15-20
3	Madison Counts!	30-35
4	We Find Math Here, There, and Everywhere!	20-25
5	Exploring Mathematics with Cool Tools of Technology	15-20
Closing	Personal Digital Portfolio Design/Development and Year-End Presentation	5-10

Course Introduction
Unit Title: **Team Building through Effective Research and Problem-Solving Activities**
Unit Summary: This unit provides a variety of activities that allows each member of our class to get to know each other better. At the beginning of this brief unit, students participate in a self-assessment that illuminates her/his strengths and weaknesses in problem-solving. Then, the group works through a variety of important team-building events that help to foster an environment of learning and growth while promoting great enthusiasm for a success year-long experience. The unit concludes with a celebration of the individual, partner, and/or group achievements experienced over the 3-day action packed unit.
Suggested Pacing: 4 days
Learning Targets

Unit Essential Questions:
- What are the characteristics that make me who I am?
- When am I at my best to solve problems that affect the lives of those around me?
- What role do I see myself playing when it comes to solving a problem, searching for answers, and working together with others toward a common goal?
- Can I identify the characteristics in others that I value when working toward a common goal? If so, what are the important qualities?
- How can I use mathematics to quantify, communicate out, and document for future use both the individual achievements, as well as the team accomplishments experienced in the unit?

Unit Enduring Understandings:
- A student's sense-of-self is enhanced and validation is given to the variety of ways it often takes to solve a problem.
- Working with others, starting with a positive experience, and developing strong communication skills fosters an environment of dialogue and focus toward a common goal.
- Math can be a fun way to document and share out to others important successes and common ideas to develop a collective vision.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Students will create a digital portfolio and participate in a celebration of the unit

Alternative Assessment: students will create a reflection of the unit

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Complete a self-assessment quiz Develop a data display to keep record for future use	Content: Data Display and Analysis Skills: Identify strengths and weaknesses as it relates to leadership and problems-solving. Select and create a type of data display that best	Participate, score, and analyze the data received from your own self-assessment quiz. Then, select a method of data display to keep accurate record of the findings. Store this information on the Google Drive as a means to begin the process developing a portfolio of achievements for the year.	S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots) S.IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each	2 lessons

	represents the results of the self-assessment.	http://wvde.state.wv.us/abe/tcher_handbook_pdf/section5.pdf		
Participate in a variety of team-building activities in order to foster enthusiasm toward a common goal. Use the results of the activities to share in successes and keep record for future use.	Content: Data Display and Analysis Skills: Compare and contrast classmates skills in problem-solving. Create an assessment tool that evaluates such skills. Collect data from classmates using this tool and use the results to decide if this assessment is consistent with results from the previous self-assessment.	Participate, score, and analyze the data received from the self-assessment quiz created by the class.. Then, select a method of data display to keep accurate record of the findings. Compare and contrast these findings from those in the previous self-assessment. Store this information on the Google Drive as a means to begin the process developing a portfolio of achievements for the year. http://wvde.state.wv.us/abe/tcher_handbook_pdf/section5.pdf	S.IC.A.2 Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. *For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?* S.IC.B.6 Evaluate reports based on data.	2 lessons

Unit 1 Overview

Unit Title: <u>Math Skills That Help Make Our Town a Success</u>

Unit Summary:
Unit 1 calls upon each student's learning and leadership style and tasks individuals to select a project from one of three major choices: Agriculture, Architecture, or Business Start-Up. The challenge of each project will involve the expansion of each entity within the town of Madison. Groups will be formed and a deep investigation into the connection between the project and the real-world mathematics behind its function will begin. Students will investigate, collect important

data and facts, synthesize findings, and plan for completion of the project. The culminating activity has each group present a comprehensive venture that ties directly to our community. Groups will then evaluate each other and select the top project(s) to be proposed to a group of professionals from the community for critical review.

Suggested Pacing: 20 - 25 days

Learning Targets

Unit Essential Questions:
- How has the subject of mathematics prepared me to problem-solve in the real-world?
- What operations, formulas, and functions are commonly used in spreadsheets?
- Who are the experts that I will rely on when investigating, planning, and executing my project and what important math concepts do they use in their field?
- What impact can I have on my community and its ever-changing needs?

Unit Enduring Understandings:
- Students will enjoy discovering and investigating how mathematics shapes our world and connects to topics of interest.
- Working with others, starting with a positive experience, and developing strong communication skills fosters an environment of dialogue, togetherness, and focus toward a common goal.
- Learning through investigation, documenting the process, and reporting out important findings is critical to the success of any activity initiated in order to complete tasks from small to large.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Presentation of project to class and creation of online portfolio materials

Alternative Assessment: Presentation of project to community professionals

Objectives (Students will be able to…)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Select a project and form groups within each project based on strengths and weaknesses assessed in the introductory unit. Use a problem-solving process(NJSLS Modeling - see Essential Content/Skills) to tackle a real-world challenge concerning the expansion	Content: Algebra Data Display and Analysis Geometry Modeling Number and Quantity Technology Skills: Create equations that describe numbers or relationships.	(1) Have each project group devise an action plan to be used to address the real-world challenge faced. Project groups report the plan to the class facilitator and make adjustments as necessary based on feedback/critical review. (2) Class facilitator assesses participation by individual members of	A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. *For example,*	12 - 15 lessons

of the existing entity defined in the project. Demonstrate an understanding of and apply key concepts of mathematics when real-world problem solving. - Enter data in a spreadsheet and format a table. - Sort data in a table. - Perform automatic, repeated calculations using mathematical formulas. - Use logic formulas and reference formulas to categorize data. - Explain volume formulas and use them to solve problems. - Visualize relationships between two-dimensional and three-dimensional objects. - Apply geometric concepts in modeling situations.	Explain volume formulas and use them to solve problems. Apply geometric concepts in modeling situations. Select and create a type of data display that best represents the results of data collection. Reason quantitatively and use units to solve problems. NJSLS Modeling: (1) identifying variables in the situation and selecting those that represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the model or, if it (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle.	each group using a basic scoring rubric made available for all to see prior to beginning the selected project.(An example from the Buck Institute of Education is attached: https://www.bie.org/object/document/project_design_rubric) (3) Project groups collect information and report data using tools in the Google Drive, as well as portfolios in the classroom. Class facilitator provides feedback, as necessary. (4) Project groups prepare a final presentation using any means with which both a verbal and visual presentation can occur. (5) A collectively agreed upon scoring rubric with scoring sheet can be created by the class in preparation for use during group presentations in order to foster transparency and clarity in evaluation.	*represent inequalities describing nutritional and cost constraints on combinations of different foods.* G.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). G.MG.A.2 Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots) S.IC.B.3 Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each N.Q.A.1 Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **Technology** 8.1.12.4 Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts, and data from all worksheets to convey the results. 8.2.12.A.5 Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	
Prepare a formal presentation of all group findings and plan to address the challenge of the entity's expansion. - Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation. Present the group project in a formal setting to all	Content: Modeling Number and Quantity Technology NJSLS Modeling: (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the	(1) Project groups give a final presentation of a proposed project solution to peers in the classroom. Groups are assessed based upon the scoring rubric agreed upon by all members of the class. Time should be given for critical review by classmates, as well as opportunities for each group to respond to criticism. (2) The class will then elect a group(s) to present its findings to invited guests	N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Technology** 8.2.12.A.5 Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	8 - 10 lessons

classmates providing complete details, data, and a visual representation of the proposed solution to the real-world challenge. Rate each group performance in addressing the expansion of the entity, providing constructive criticism by way of the pros/cons for the group's proposed solution. Recommend and select a group(s) to articulate project findings to a group of professionals from the community connected to each project.	model or, if it (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle.	who represent professionals from the community with experience connected to each project.	8.1.12.A.1 Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools. 8.1.12.C.1 Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community. 8.1.12.C.7 Use a design process to devise a technological product or system that addresses a global problem, provide research, identify trade-offs and constraints, and document the process through drawings that include data and materials. 8.1.12.D.1 Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work. **ELA** NJSLSA.SL1. Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. **21st Century Life and Skills** 9.1.12.A.6 Summarize the financial risks and benefits of entrepreneurship as a career choice.	

Unit 2 Overview

Unit Title: **Who is Number One?**

Unit Summary:
Who is Number One? Is it Jeter or Wright, Perry or Swift, Nike or Yeezy, or Pepsi or Coke? The argument could go on and on, so the challenge of unit 2 is for each student to pick a pair of competitors in any field whether it be sports, fashion, entertainment, or products/services. Then, the student must make her/his case using all of the following mathematical approaches: data, formulas, statistics, analytics, correlations, patterns, predictive modeling and testing. Each student will act as a marketing analyst who must create a presentation that uses all of the information gathered to make the strongest case for the top candidate of choice. All presentations will then be on display for our school to see in a glass showcase at the Madison High School.

Suggested Pacing: 15 - 20 days

Learning Targets

Unit Essential Questions:
- What sources of data helped me best make my argument(s)?
- When surveying in a population, how do I know that my findings are valid?
- Which methods of data display and analysis helped to convince others of my argument(s)?
- How do I see myself applying what I learned through mathematics in the unit to real-life decision-making?

Unit Enduring Understandings:
- Mathematics approaches to proving a real-world argument rely on a cycle of continued re-evaluation of the facts and data presented and are subject to change based on forces that often remain out of the control of the subject being evaluated.
- Making an argument by way of a mathematical approach must involve investigating a variety of sources to be checked for accuracy and consistency in reporting.
- Learning through investigation, documenting the process, and reporting out important findings is critical to the success of any activity initiated in order to complete tasks.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Presentation to class and online portfolio materials.

Alternative Assessment: Debate with peers on their choice of number one

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Investigate, collect data, and synthesize findings in	Content: Algebra	(1) Show a video of a program like ESPN's First	A.CED.A.2	11 - 13 lessons

order to provide proof that a select performer in the entertainment, sports, fashion, and/or products/services industry represents the best in their business. Use reliable sources of information and document each source in M.L.A. style. Understand and apply such statistics concepts as randomization, bell curves, distribution of data, measures of central tendency, correlation, generalizability, reliability, and validity. Create and administer a sample survey in an attempt to validate a hypothesis. Predict the outcome of the sample survey using statistical measures and algebraic formulas.	Career Readiness Practices Functions Modeling Number and Quantity Technology Skills: Create equations that describe numbers or relationships. Understand solving equations as a process of reasoning and explain the reasoning. Build a function that models a relationship between two quantities. Construct and compare linear and exponential models and solve problems. Reason quantitatively and use units to solve problems. Summarize, represent, and interpret data on a single count or measurement variable. Summarize, represent, and interpret data on two categorical and quantitative variables. Interpret linear models. Make inferences and justify conclusions from sample surveys, experiments and observational studies.	Take where a moderator poses a question about two star athletes and two reporters argue with each other about who is the best. Check out this classic clip as an example of Stephen A. Smith making his case: https://www.youtube.com/watch?v=gkS6nErDPJI (2) Class facilitator proposes a similarly styled debate and asks for important topics from the entertainment, sports, fashion, and/or products/services industry. Each Student selects a topic of choice and spend time,without preparation, and debates a classmate(s) their choice as best in the business. (3) The challenge of Unit 2 is then presented to the class. Each student must follow a process that includes, but is not limited to the following steps: (a) Research your choice. (b) Document all sources of data/information collected. (c) Create a statistical analysis(including charts, tables, data displays, etc.) of all findings. (d) Summarize the analysis in a report format of your choosing. (e) Develop a sample survey and administer it to a group of students in our school. (f) Compare and contrast your survey results with your statistical analysis. (g) Prepare a visual representation of this compare and contrast with the use of the following methods: 1. Poster 2. Tri-Fold Brochure(Single-Sided) 3. Article and Photos(Single-Sided)	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. A.REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method. CRP7 Employ valid and reliable research strategies. F.LE.A.1 Distinguish between situations that can be modeled with linear functions and with exponential functions. N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. S.ID.A.1 Represent data with plots on the real number line (dot plots, histograms, and box plots). S.ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. S.ID.A.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). S.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. S.IC.B.4 Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling. **Technology** 8.1.12.D.1 Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.	
Prepare a formal presentation to include all	NJSLS Modeling:	(4) Each student is allowed to gather her/his findings	**Career Ready Practices** CRP7	4 - 7 lessons

findings that demonstrates the validity of these findings. Refer to an established scoring rubric as work progresses on the unit.	(1) identifying variables in the situation and selecting those that represent essential features, (2) formulating a model by creating and selecting geometric, graphical, tabular, algebraic, or statistical representations that describe relationships between the variables, (3) analyzing and performing operations on these relationships to draw conclusions, (4) interpreting the results of the mathematics in terms of the original situation, (5) validating the conclusions by comparing them with the situation, and then either improving the model or, if it (6) reporting on the conclusions and the reasoning behind them. Choices, assumptions, and approximations are present throughout this cycle. Skills Career Readiness Practices Statistics and Probability Technology Present conclusions from sample surveys, experiments and observational studies.	in a final presentation that must include both a verbal and visual presentation to all classmates. (5) Class facilitator scores each student based on a rubric best fit for the presentation of statistical data and analysis. An example is listed here: http://www.amstat.org/asa/files/pdfs/EDU-ProjectJudgingRubric.pdf (6) All student work is displayed in a glass showcase in the halls of our school.	Employ valid and reliable research strategies. CRP4 Communicate clearly and effectively and with reason. CRP7 Employ valid and reliable research strategies. S.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. S.IC.B.6 Evaluate reports based on data. **Technology** 8.1.12.A.1 Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools. **ELA** NJSLSA.SL5. Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations.	

Unit 3 Overview

Unit Title: **<u>Madison Counts!</u>**

Unit Summary: Our town of Madison counts on its citizens to be active participants in its everyday success. This unit explores three different ways in which community members contribute to the spirit and energy of the town: Health/Wellness/Education, Electing a Government, and Safety and Security on our Streets. Students will participate in projects selected from two(2) of the three(3) topics listed. Each project will task the participant with finding the connection between how programs in our town run effectively and the mathematics concepts that help fuel this success. Activities will enable students to conduct important research, visit related institutions, interview valued professionals, and report to classmates all findings in a clear and concise manner. The culminating activity in the <u>Madison Counts!</u> unit has our parents participate in a student created survey built to measure active involvement and community awareness in our great town.

Suggested Pacing: 30 - 35 days

Learning Targets

Unit Essential Questions: ● How can budgeting influence personal decisions about my future? ● What are the differences between fixed, variable, and discretionary expenses? Use examples to demonstrate your understanding. ● Where did sources of revenue appear during my investigations? ● How are voting methods alike and how are they different? ● Is there one best voting method? Why or why not? ● In what ways can a voting system be manipulated? ● How does automotive technology impact society? The environment? ● What are the ways in which the safety of travel in our community can be improved?

Unit Enduring Understandings: ● Recognizing everyone has income limits, students will create an overall financial plan for spending and saving in order to achieve personal or professional goals. ● To select a voting system is to compromise between the shortcomings inherent in each system. ● The automobile is an integral part of our society and culture. ● Learning through investigation, documenting the process, and reporting out important findings is critical to the success of any activity initiated in order to complete tasks .

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Addition of resume, newsprint ad, interview notes, and bridge report to the online portfolio.

Alternative Assessment: Presentation of findings and recommendations to parents panel

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Explore post-secondary options and investigate areas of interest for future career pursuits. Understand that mastery of fractions, decimals, and percentages can help address real-world situations. (financial literacy and math) Research and account for all costs relative to the revenue and expenses of a business or personal investment. Through the use of standardized testing sample tests, assess level of knowledge needed in order to enter college programs for career preparation. Prepare a resume to reflect educational knowledge learned and activities achieved toward a select career.	Content: Building and Updating a Resume Career Readiness Strategies Modeling Linear Functions Number and Quantity Operations Solving Algebraic Equations Test Preparation Technology Skills: Compile and organize data in a budget using properties of rational numbers. Reason quantitatively and use units to solve problems when performing research and creating a budget. Use linear functions to model expense/income projections in a budget. Plan educational and career paths aligned to personal goals.	Student selects a career and outlines goals for him/herself in this career. Then, she/he investigates the steps necessary to prepare for this vocation by way of online research, data collection and possible site visitation. An interview of a professional who can share with the student important details of the day-to-day operations within her/his workplace follows. The student then prepares a budget outlining expense and incomes required in order to attend schooling to prepare for this career. Locating a math placement test that is an important prerequisite for admission to the desired program of study follows. Completing sample tests and using valuable time to prepare for the placement test is next. Finally, prepare a resume for a mock interview in preparation for admission to your desired program.	A.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables. A.REI.D.12 Graph the solutions to a linear inequality in two variables as a half-place (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **Career Ready Practices** CRP8 Utilize critical thinking to make sense of problems and persevere in solving them. CRP10 Plan educational and career paths aligned to personal goals. F.LE.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations and translate between the two forms. N.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. N.RN.B.3 Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. **Technology** 8.1.12.A.1 Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools. 8.1.12.A.2 Produce and edit a multi-page digital document for a commercial or	12 - 13 lessons

		professional audience and present it to peers and/or professionals in that related area of review.	
Determine the advantages and disadvantages of various voting systems.	Content: Career Ready Practices Statistics and Probability Technology Skills: Use plurality to determine the winner of an election. Use the Borda count to determine the winner of an election. Use Sequential Pairwise voting to determine the winner of an election. Use the Hare system to determine the winner of an election. Make inferences about and just conclusions made concerning a voting system that best fits a given real life situation.	All suggested assessments below are taken from the textbook, For All Practical Purposes - Mathematical Literacy in Today's World - 9th Edition(2013) - *See suggested activities and resources page in this document :* https://docs.google.com/document/d/134X4Pahx_AjkAK14ygwjBdPTPTOFYIE1PbqmeJrLQ8E/edit . Example: 15 Votes for four candidates: A B C D. Who is the plurality winner? **Rank 6 5 3 1** First B A D C Second C B C D Third C B B A Fourth D C C D Five family members want to decide what music to play at a party. They voted using Borda's method. **Music 1 1 3** Country 1 3 2 Jazz 4 2 1 Rock 3 1 4 Pop 2 4 3 Which musical style will win using Borda's method? Assume we have four candidates and that the agenda is A, B, C, D. Consider the following sequence of three preference list ballots: **Rank** 1st A C B 2nd B A D 3rd D B C 4th C D A Who is the winner under Sequential Pairwise voting?	**Career Ready Practices** CRP1 Act as a responsible and contributing citizen and employee. S.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.	3 lessons
Determine the advantages and disadvantages of various voting systems. Explain how to manipulate a voting system.	Content Career Readiness Practices Statistics and Probability Technology Skills: Use the manipulability criteria to determine if a	Given the following sequence of preference list ballots for 13 voters, determine the winner under the Hare system: **Rank 5 4 3 1** 1st A C B B 2nd B B C A 3rd C A A C	S.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. **Career Ready Practices** CRP1	3-5 lessons

Explain how weighted voting works. Make connections between experimental inquiry/data collection and real-life situations.	voting system is manipulable. Use agenda manipulation to control who wins an election. Use notation for weighted voting systems. Investigate the voting systems used in the community during election season(s).	Explain how Ralph Nader impacted the 2000 election. How could this election been manipulable? Suppose there are two voters and four candidates and the true preferences are shown here: Voter 1: A B C D Voter 2: B C A D Using the Borda count, who will win? Could voter 1 submit a disingenuous ballot to change the outcome in favor of A? Given the system: [62: 40, 70, 10] How many votes are needed to pass a motion? Contact an election official to interview and investigate how local elections in our town are carried out and in what ways the voting impacts the community.	Act as a responsible and contributing citizen and employee. CRP2 Apply appropriate academic and technical skills. S.IC.B.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. **Technology** 8.1.12.A.1 Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools. **Career Ready Practices** CRP1 Act as a responsible and contributing citizen and employee. CRP2 Apply appropriate academic and technical skills. CRP4 Communicate clearly and effectively and with reason. CRP7 Employ valid and reliable research strategies.	
Demonstrate an understanding of and apply key concepts of mathematics when real-world problem solving related to safe travel on our roadways and bridges.	Content: Career Readiness Practices Geometry Number and Quantity Technology Skills: Collect, analyze, and recreate scale models/drawings. Sketch a scale drawing from a life-sized object. Experiment with 3-D drawing by way of computer software (ie: CAD). Research a physical structure/vehicle used in transportation and prepare questions for the interview of an expert in a related field. Design a physical structure/vehicle used in transportation and prepare	Task the students with researching several of their favorite types of cars, finding vehicle specifications and pictures through an internet search. Then, have them select a vehicle to sketch to scale using a video guide like the one linked below: https://www.youtube.com/watch?v=Qs50C6zCNGk Finally, have them use the sketch to create a newsprint ad advertising the top qualities of the car related to safety, reliability, fuel-efficiency, and green technology. Students then perform a gallery walk and vote on the top choice in the class. Students will take a virtual tour through Google Maps around the community, noting the locations of all bridges that support roadways. Then, the students will investigate	**Career Ready Practices** CRP2 Apply appropriate academic and technical skills. CRP5 Consider the environment, social, and economic impacts of decisions. CRP11 Use technology to enhance productivity. G.SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor. G.SRT.B.5 Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures. G.MG.A.1 Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder). G.MG.A.2	12-14 lessons

to receive feedback regarding its durability and functionality.

Perform automatic, repeated calculations using mathematical formulas.

Explain volume formulas and use them to solve problems.

Apply geometric concepts in modeling situations.

Visualize relationships between two-dimensional and three-dimensional objects.

Create a report through the use of a Chromebook or Youtube that best represents the analysis of data collected, displays the structure/vehicle design, and outlines the important impact of the structure/vehicle on the community.

the components of the bridge, differentiating between the superstructure and substructure and compiling data as it relates to costs of construction. Next, students will prepare questions and interview an engineer responsible for the maintenance and repair of these important structures. Finally, the students will pick a bridge to visit in the community. Students will then prepare a report detailing bridge type, function/usage, construction materials, pictures/video, and general condition. Reports will then be assessed by the facilitator by way of a rubric similar to the one linked to below: https://www.bie.org/object/document/6_12_creativity_innovation_rubric_ccss_aligned

Divide students into groups of 2-3 students, providing a set of materials per group. Explain that students must develop their own bridge from up to 200 popsicle sticks and glue. Bridges must be able to hold a five pound weight for younger students and a twenty pound weight for older students. The bridge must span at least 14 inches (so it must be longer than 14 inches). When the bridge has been constructed, it will be placed at least one foot above the floor (place it between two chairs, as an example) and tested with a weight bearing test. In addition to meeting the structural and weight bearing requirements, the bridge will also be judged on its aesthetics, so students should be encouraged to be creative. Students will be encouraged to use the fewest number of popsicles possible to achieve their goal. Students meet and develop a plan for their bridge. They draw their plan, and then present their plan to the class. Student groups next execute their plans. They may need to rethink their design, or even start over. Next....teams will test their bridge's weight capacity by

Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

N.Q.A.1
Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

Technology
8.1.12.C.1
Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in online community.

8.2.12.C.5
Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.

		placing it at least one foot above the floor (try using blocks or a chair supporting each end of the bridge). The bridge must be able to bear the assigned weight (depending upon student age) for a full minute. **http://tryengineering.org/lessons/popsiclebridge.pdf**		

Unit 4 Overview

Unit Title: **We Find Math Here, There, and Everywhere!**

Unit Summary:
Math can be found everywhere! This unit tasks students with finding it in places we don't often first look, using the subject to solve problems in a logical manner, and identifying those who have made significant impacts on our lives through the application of mathematics. The unit will begin with a look at the art world for inspiration through numbers, patterns, and structure. Students will select from the specialties of painting, sculpture, dance, and/or music and investigate the influence of math behind the beauty that inspires us. A personal performance via the selected artform will follow. Next, students will explore the mathematics behind the subject of Logic. All students will participate in activities, lessons, and assessments that guide them to making valid arguments when discussing important topics of the day.The unit will culminate with student exploration into important figures in the history of mathematics. The students will use websites to gather information about a mathematician and her/his career. The students will work in small groups to plan a slideshow presentation.. The students will then present their shows to the class. Students will evaluate these presentations with the use of a class rubric that they collectively developed. The final piece of this project will be Tri-Board/poster displays created from the slides of the presentations of each famous mathematician that are to be displayed in March showcase.

Suggested Pacing: 20 - 25 days

Learning Targets

Unit Essential Questions:
- What influences does mathematics have on art and enlightenment?
- In what ways did you use mathematics as you created your work of art?
- How can we model and solve real-life problems using logic?
- Whose mathematical discoveries are most important to our everyday life?
- How would our world be different if not for certain mathematical discoveries?
- Does the use of tools of technology influence mathematical discovery?

Unit Enduring Understandings:
- Subject matter and studies that at first appear to be separate from each are often discovered to be interconnected in a variety of ways.
- Using logical rules can help find information in a search.
- Logical rules can help determine automatically if certain information is correct.
- Knowledge of the past helps one understand the present and make decisions about the future.
- People respond to and resolve problems of the day in a variety of ways.
- Learning through investigation, documenting the process, and reporting out important findings is critical to the success of any activity initiated in order to complete tasks.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Students will present a slideshow on a chosen mathematician and create a tri-fold to be displayed in a showcase. Addition of performance, powerpoint, rubrics, and other materials to online portfolio.

Alternative Assessment: Wax works presentation on their chosen mathematician

Objectives (Students will be able to…)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Select a work of art to research. Use reliable sources of information and document each source in M.L.A. style. Connect your research to important math concepts that guided the artist when creating her/his masterpiece. Use time to create an original work of art or reproduce a similar art form, following practices used by the original artist(s). Accept critical review and feedback of your work and be prepared to articulate the methods used in its design.	Content: Career Readiness Practices Core Art Standards Geometry Number and Quantity Technology Skills: Analyze, interpret, and select artistic work for presentation. Make inferences and justify conclusions from experiments and observational studies. Develop and refine artistic work for presentation. Convey understanding of important math concepts through the presentation of artistic work. Interpret another artist's intent and use of math concepts used in an artistic work. Apply commonly accepted criteria to evaluate artistic work.	-Select a work of art known around the world and research important facts about it's creation(ie: artist(s), time period, style, location, brief history, value, critical review). -Explore the math concepts behind the rough sketching, scale modeling, construction, and/or arrangement. -Create/re-create a work of art in the form of your choice. Display the artwork or record/perform the arrangement for all to see in our classroom. -Self-assess your work and allow for critical review by classmates.	**Career Ready Practices** CRP2 Apply appropriate academic and technical skills. CRP6 Demonstrate creativity and innovation. CRP7 Employ valid and reliable research strategies. NCASS.CR.AS1 Generate and conceptualize artistic ideas and work. NCASS.CR.AS2 Organize and develop artistic ideas and work. NCASS.CR.AS3 Refine and complete artistic work. G.CO.A.2 Represent transformations in the plane using, e.g., transparencies and geometry software; describe transformations as functions that take points in the plane as inputs and give other points as outputs. Compare transformations that preserve distance and angle to those that do not (e.g., translation versus horizontal stretch). G.MG.A.3 Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios. G.SRT.A.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. N.Q.A.3	8 - 10 lessons

			Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Technology** 8.1.12.D.1 Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.	
Participate in activities, lessons, and assessments that teach Logic. Use Logic in making arguments and judging the validity of such arguments or the arguments of others.	Content: Career Readiness Practices Number and Quantity Skills: Translate a sentence between English and symbolic form. Construct truth tables to evaluate the validity of an expression. Determine if a logical argument is valid with the use of a truth table. Evaluate a truth table given unknown values. Create your own argument and challenge a classmate to prove its validity.	Sample Assessment Questions: 1. If p represents "I studied," and q represents "I passed," translate: a) $p \wedge q$ b) $p \vee q$ c) $p \rightarrow q$ 2. Show that: $\sim(p \vee q) \leftrightarrow \sim p \wedge \sim q$ 3. Determine the validity of: $p \vee q$ $\underline{\sim q}$ $\therefore p$ 4. Show the truth table for $p \wedge q$ by filling it in below: $\underline{p \; q \quad p \wedge q}$ T F T T T ? F F F T F ? ? F ? T ? ?	**Career Ready Practices** CRP4 Communicate clearly and effectively and with reason. CRP8 Utilize critical thinking to make sense of problems and persevere in solving them. N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling.	6 - 8 lessons
Identify a mathematician in history whose discoveries had cultural and/or environmental impacts. Use reliable sources of information and document each source in M.L.A. style. Create a historically accurate presentation with the use of tools of technology that describes the life and accomplishments of the mathematician. Give the presentation in front of a group of classmates and allow for	Content: Career Readiness Practices Technology Skills: Choose one historical figure to research using no less than six(6) sites of reference to gather information. Keep track of the sources and provide a bibliography at the end of this assignment. Present information, findings, and supporting	Students will select an important figure in the history of mathematics. She/he will use a website to gather information about the mathematician. Form small groups to plan a slide show presentation. Present presentation and evaluate each group's' performance based upon a collectively agreed upon rubric.	**Career Ready Practices** CRP5 Consider the environmental, social and economic impacts of decisions. CRP7 Employ valid and reliable research strategies. **Technology** 8.2.12.A.3 Research and present information on an existing technological product that has been repurposed for a different function. 8.2.12.B.4 Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify	6 - 7 lessons

critical review and feedback. Provide critical review and feedback to other classmate presentations by way of a collectively agreed upon rubric.	evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. Evaluate a classmate's presentation, rating the student's performance for accuracy, engagement, and preparedness.		their impact and how they may have changed to meet human needs and wants. 8.1.12.D.1 Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.	

Unit 5 Overview

Unit Title: **Exploring Mathematics with Cool Tools of Technology**

Unit Summary: Students will be tasked with investigating how the tools of technology we use every day connect to the world of mathematics. Three separate challenges compose this unit. The students will first be challenged to investigate the Geometry of cell phones. Student groups will be formed to research how these devices perform operations and access information off of such tiny screens. Each group then creates a short informational video as a way to inform others about this innovative tool of technology. All videos are to be uploaded on Google Classroom for others to view. The second challenge tasks each student with writing an App for their cellphone. Computer coding is the key and students will experiment with basic programming through Code.org. Then, thanks to a tutorial from a university mathematics professor, each student will learn how to write a rudimentary App for her/his cellphone that he/she could use in their daily lives. This challenge will culminate with each student creating a 30-second advertisement marketing her/his product. Student groups are formed at the beginning of this third and final challenge. The task will be to complete task cards containing math problems ranging in topics including, but not limited to linear programming, conic sections, matrices, and trigonometric function graphs. Groups will be assessed on the ability to complete the tasks cards with the use of Desmos – The Online Graphing Calculator, as well as describe important attributes discovered during the problem-solving process. The entire internet will be a group's reference, and challenge problems can be researched by all necessary means. The task cards will then be collected and assessed. Each group will then be responsible for creating a short tutorial of a particular topic to screen cast via the interactive whiteboard and video technology. The video can then be placed on the MHS Mathematics website as a helpful resource for other students in our school to access at any time.

Suggested Pacing: 15 - 20 days

Learning Targets

Unit Essential Questions: ● How can transformations be applied to real-world situations? ● How has technological innovation changed the way I've lived my life? ● How can I use tools of technological to complete particular tasks?

Unit Enduring Understandings: ● Rotations, reflections and translations are examples that preserve angles and distances. ● Scientific and technological developments affect people's lives, the environment and transform societies. ● Learning through investigation, documenting the process, and reporting out important findings is critical to the success of any activity initiated in order to complete tasks.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Students will create an app for their phone. Each student will create a 30-second advertisement marketing for her/his product. Addition of video tutorials and created App to the online portfolio.

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing
Develop concepts and language surrounding transformations, congruence, and similarity. Identify and categorize particular transformations. Describe transformations with intuitive language. Use on-screen coordinates to calculate the results of zooming within an application. Create a short video tutorial that can be used to teach others about the geometry behind cell phone technology.	Content: Career Readiness Practices Geometry Technology Skills: Identify and describe geometric transformations that occur on smartphone screen. Determine whether given transformations (or a sequence of transformations) produce figures that are congruent, similar, or neither. Reason about and discuss how smartphones determine the center of dilation for zooming applications. Given various points and scale factors in the coordinate plane, calculate the images of points under dilation. Construct arguments about whether larger screens are worth the additional cost, based on dilations.	-Form a student group and discuss the pros and cons of the cell phones of the students in the group. - Identify key features of each cell phone and document the geometry concepts behind the technology. - Share opinions with group members about these applications and their effectiveness. - Experiment with each device, applying and taking note of important geometric concepts along the way. - Create a short video tutorial that can be viewed by all in the classroom that provides a better understanding of each type of tool of technology.	**Career Ready Practices** CRP2 Apply appropriate academic and technical skills. CRP4 Communicate clearly and effectively and with reason. CRP7 Employ valid and reliable research strategies. G.CO.A.4 Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments. G.CO.B.6 Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent. G.SRT.A.1 Verify experimentally the properties of dilations given by a center and a scale factor. G.SRT.A.2 Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity	6-8 lessons

			transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides. **Technology** 8.2.12.B.1 Research and analyze the impact of the design constraints (specifications and limits) for a product or technology driven by a cultural, social, economic or political need and publish for review.	
Use a problem-solving process to address a series of puzzles, challenges, and/or real world scenarios. Learn how computers input, output, store, and process information to help people solve problems. Explore the role of hardware platforms in computing and how different sensors can provide more effective input and output than the traditional mouse, keyboard, and monitor. Develop an App using hardware inputs and outputs from one's personal mobile device that demonstrates innovation and creativity.	Content: Career Readiness Practices Functions Number and Quantity Technology Skills: Experiment with simple, primitive shapes and building up to more sophisticated sprite-based games. Become familiar with the programming concepts and the design process computer scientists use daily. Build on coding experience by creating programmatic images, animations, interactive art, and games. Learn how these simpler constructs can be combined to create more complex programs. Develop a personalized, interactive program. Practice design, testing, and iteration and discover that failure and debugging are an expected and valuable part of the programming process.	Perform an Entertainment Exploration as described in this link from the website code.org: https://docs.google.com/document/d/1RtwJU7Lh2dKdGoj-zfF1pjn-yxhkwP-05G8pgdYi-BY/edit Plot shapes as described in this link from the website code.org: https://docs.google.com/document/d/1BKFLM2cmov3Lh23vsw1hGfUwTz9bM-diFCGHBf_GH6Y/edit Use MIT's App Inventor to teach students computing concepts (without any programming background). See the many resources they offer on the link below: http://appinventor.mit.edu/explore/ - (Look under the Resources Tab for Tutorials and Teach.)	**Career Ready Practices** CRP2 Apply appropriate academic and technical skills. CRP4 Communicate clearly and effectively and with reason. CRP7 Employ valid and reliable research strategies. CRP11 Use technology to enhance productivity. F.BF.A.1 Write a function that describes a relationship between two quantities. N.Q.A.2 Define appropriate quantities for the purpose of descriptive modeling. **Technology** 8.1.12.F.1 Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs. 8.2.12.D.1 Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review. **21st Century Life and Skills** 9.3.IT-PRG.5 Apply an appropriate software development process to design a software application.	5-7 lessons

Use technology as a data gathering and analysis tool to improve learning in mathematics. Use technology as a problem-solving tool to improve learning in mathematics. Use instructional technologies and create a short video tutorial to assist classmates with the attainment of concept development, higher-order thinking, critical thinking, and applied problem solving skills.	Content: Algebra Career Readiness Practices Functions Geometry Number and Quantity Technology Skills: Identify and use a graphing tool of technology to solve problems involving difficult math concepts. Share and assist others using information discovered from the graphing tool of technology. Select features of the graphing tool of technology that best enabled the problem-solving process to occur. Create a tutorial that showcases a mastery of the graphing tool of technology in order to solve a difficult mathematics problem.	-Student groups are formed and are tasked with completing task cards of math problems ranging in topics from linear programming, conic sections, matrices, and trigonometric function graphs. -Groups go to desmos.com and use the online graphing calculator as an aide to complete the problems. -Groups must also use internet as a reference, as challenge problems can be researched by all necessary means. -Task cards will then be collected and assessed. -Groups will then be tasked with creating a short tutorial of a particular topic to screen cast via the interactive whiteboard and video technology. - Based on feedback, student can edit videos which then will placed on the MHS Mathematics website as a helpful resource for other students to access in our school at any time.	**A.REI.12** Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes. **Career Ready Practices** CRP2 Apply appropriate academic and technical skills. CRP4 Communicate clearly and effectively and with reason. CRP7 Employ valid and reliable research strategies. F-IF.7 Graph functions expressed symbolically and show key features of the graph, by F.IF.7.e *Graph exponential and logarithmic functions, showing intercepts, and end behavior*, and trigonometric functions, showing period, midline, and amplitudehand in simple cases and using technology for more complicated cases. G.GPE.1 Derive the equation of a circle given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation. G.GPE.3 Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant. G.MG.1 Use geometric shapes, their measures, and their properties to describe objects. N.VM.6 Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network **Technology** 8.1.12.A.2 Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	4-5 lessons

Course Closing Activity

Unit Title: <u>Personal Digital Portfolio Design/Development and Year-End Presentation</u>

Unit Summary:
This final unit culminates with a celebration of the many wonderful experiences we've had over the past school year. Students will be tasked with arranging a personal digital portfolio that reflects all that was researched, discovered, designed, tested, re-tested, and reported out during the entire journey. Students will be mindful of a future audience for the presentation of the portfolio and will use valuable time to identify both the successes, as well as the struggles while participating in each of the courses challenges. Once portfolios are completed, time will be given for critical review and feedback by peers. Students will make appropriate adjustments and then plan to participate in a celebration of achievement during a school board of education meeting.

Suggested Pacing: (# of days/lessons) 5 - 10 days

Learning Targets

Unit Essential Questions:
- When am I at my best to solve problems that affect the lives of those around me?
- How does mathematics play a role in my future pursuits?
- What kinds of experiences help develop number sense?
- How do I decide what strategy will work best in a given problem situation?
- How can I use mathematics to quantify, communicate out, and document for future use both the individual achievements, as well as the team accomplishments experienced in the unit?

Unit Enduring Understandings:
- The ability to solve problems is the heart of mathematics.
- Working with others, starting with a positive experience, and developing strong communication skills fosters an environment of dialogue, togetherness, and focus toward a common goal.
- In certain situations, an estimate is as useful as an exact answer.
- Math can be a fun way to document and share out to others important success and common ideas to develop a collective vision.

Evidence of Learning

Formative Assessment: A variety of formative assessments will be used throughout the lesson, such as warm-up and closure questions completed on paper and handed in and on Google Classroom, self assessments, Think-Pair-Share, Jigsaw and Socrative.

Summative Assessment: Students will complete their digital portfolio and present it at a BOE meeting (if schedule allows)

Objectives (Students will be able to...)	Essential Content/Skills	Suggested Assessments	Standards (NJSLS)	Pacing

Evaluate the successes and struggles from all class challenges faced during the school year. Develop a personal digital portfolio used to highlight all accomplishments from the past year and to serve as a resume for future academic and/or professional experiences. Allow for critical peer review of each student's portfolio. Edit and adjust the portfolio to meet with professional standards of highly-effective resumes.	Content: Career Readiness Practices Technology Skills: Identify strengths, as well as areas of improvement to be included in a personal digital portfolio. Use a desired platform through Google to create the personal digital portfolio. Review and refine the quality and clarity of the personal digital portfolio. Practice presentation skills in preparation for school board of education appearance.	Click on the link below to view a brief tutorial about creating a portfolio in Google Drive: https://www.youtube.com/watch?v=OlvEMcGak6A Click on the link below to view a tutorial about creating an powerful Powerpoint portfolio: https://www.youtube.com/watch?v=Ais9wjj1MyU	**Career Ready Practices** CRP4 Communicate clearly and effectively and with reason. CRP10 Plan education and career paths aligned to personal goals. **Technology** 8.1.12.A.1 Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources. 8.1.12.A.2 Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	4-9 lessons
Present key accomplishments from the year's activities at a school board of education meeting.	Content: Career Readiness Practices Technology Skills: Use valuable time to practice effective public speaking skills to present to an audience of adults.	Click on the link below to view a great video about public speaking skills for students: https://www.youtube.com/watch?v=fUgwc2WlPrk	**Career Ready Practices** CRP1 Act as a responsible and contributing citizen and employee. CRP4 Communicate clearly and effectively and with reason. **Technology** 8.1.12.A.2 Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	1 lesson