Unit 3: Solving Equations

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

UNIT RATIONALE

Students will begin this unit with knowledge of expressions and order of operations. Students will find the importance of solving equations through real world examples, and the importance using the reverse of order of operations to solve. They will continue the unit with solving inequalities, and learning about how more than one solution may work in the scenario, and how it relates to the real world.

ESSENTIAL QUESTIONS

- Why do we use mathematical expressions/equations to model different situations?
- Why do we use variables in math?
- How does having a strong foundation help us?
- How does working together get us to an answer?
- How does perseverance and determination get us to be successful?

STANDARDS

NEW JERSEY STUDENT LEARNING STANDARDS: CONTENT AREA

New Jersey (NJSLS) - High School - Mathematics (2020)

MA.A-SSE	Seeing Structure in Expressions
MA.N-RN	The Real Number System
MA.A-SSE.A	Interpret the structure of expressions
MA.A-SSE.A.1	Interpret expressions that represent a quantity in terms of its context.
MA.A-SSE.A.1a	Interpret parts of an expression, such as terms, factors, and coefficients.
MA.A-SSE.B	Write expressions in equivalent forms to solve problems
MA.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.
MA.N-Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
MA.A-APR.A	Perform arithmetic operations on polynomials
MA.A-APR.A.1	Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
MA.A-CED	Creating Equations
MA.A-CED.A	Create equations that describe numbers or relationships
MA.A-CED.A.1	Create equations and inequalities in one variable and use them to solve problems.
MA.A-CED.A.2	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.
MA.A-CED.A.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.
MA.A-REI.A	Understand solving equations as a process of reasoning and explain the reasoning
MA.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.
MA.A-REI.B	Solve equations and inequalities in one variable
MA.A-REI.B.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
MA.A-REI.C	Solve systems of equations
MA.A-REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MA.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.

New Jersey (NJSLS) - K-12 - Math Practice Standards (2020)

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.

NEW JERSEY STUDENT LEARNING STANDARDS: CAREER READINESS, LIFE LITERACIES AND KEY SKILLS

PFL.9.1.12.CFR.2	Summarize causes important to you and compare organizations you seek to support to

	other organizations with similar missions.
PFL.9.1.12.CFR.4	Demonstrate an understanding of the interrelationships among attitudes, assumptions, and patterns of behavior regarding money, saving, investing, and work across cultures.
9.3.12.ED.1	Apply communication skills with students, parents and other groups to enhance learning and a commitment to learning.
9.3.12.ED.3	Use critical thinking to process educational communications, perspectives, policies and/or procedures.
9.3.12.ED.5	Demonstrate group collaboration skills to enhance professional education and training practice.
9.3.12.AC-DES	Design/Pre-Construction
9.3.12.AC-DES.5	Identify the diversity of needs, values and social patterns in project design, including accessibility standards.
9.3.12.AC-DES.6	Apply the techniques and skills of modern drafting, design, engineering and construction to projects.
9.3.12.AC-DES.7	Employ appropriate representational media to communicate concepts and project design.
9.3.12.AC-DES.8	Apply standards, applications and restrictions pertaining to the selection and use of construction materials, components and assemblies in the project design.
WRK.9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
WRK.9.2.12.CAP.6	Identify transferable skills in career choices and design alternative career plans based on those skills.

NEW JERSEY STUDENT LEARNING STANDARDS: COMPUTER SCIENCE AND DESIGN THINKING

CS.9-12.8.1.12.AP.1	Design algorithms to solve computational problems using a combination of original and existing algorithms.
CS.9-12.8.1.12.AP.4	Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
CS.9-12.8.1.12.AP.5	Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects.
CS.9-12.8.1.12.AP.9	Collaboratively document and present design decisions in the development of complex programs.
CS.9-12.8.1.12.DA.1	Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.
CS.9-12.8.1.12.IC.3	Predict the potential impacts and implications of emerging technologies on larger social, economic, and political structures, using evidence from credible sources.
CS.9-12.8.2.12.NT.1	Explain how different groups can contribute to the overall design of a product.

PRE-ASSESSMENTS

Non-curricular tasks to identify students' readiness levels with problem solving.

Rubric Based Reassessments and Algebra 1 assignments.

INSTRUCTIONAL PLAN

MODULE 1

Student Learning Intentions (SLI) WALT: (We are learning to…)	I will use inverse operations to solve equations. I will be able to describe each step to solve an equation. I will be able to find a mistake when solving equations.
Student Learning Strategies	Students will use brain teasers to determine the order of operations and missing variables. Filter up activity(filling in numbers using order of operations and equations to solve) Find the mistake activities Interactive Notebook Resources Sum-It-Up Activity
Success Criteria	I will find the missing variable in equations. I will correctly find the mistake made when solvin equations. I will be able to describe each step in solving equations.
Formative Assessment (drives instructional decisions)	Rubrics for activities
Activities and Resources	Filtering up equations Elvira Cafeteria Problem Central Park Activity(SEARCH ON DESMOS) SPLAT (SEARCH ON DESMOS)

	Interactive Notebooks
Suggested Modifications	Students will be placed in groups and can work w teacher through out the activities.

Filtering_Up_Equations_Task_Problem_of_the_Week.pdf

Elvira_Cafeteria_Problem.pdf
TwoStepEquationsNotesMazeActivity-1.pdf
Various_Fractional_Equations.pdf
solvingequationsSUM.pdf
MultiplyingWithNegativeNumbersGameMultiplicationBingo-1.pdf
MultistepEquationsMathPennantActivitywithdistribution-1.pdf

MODULE 2

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will practice adding and subtracting integers so they will be successful at inverse operations in Solving Equations
Student Learning Strategies	Integer Operations Escape Room
Success Criteria	I can add and subtract integers. I can determine whether to add or subtract intege when combining the integers.
Formative Assessment (drives instructional decisions)	Completion of Breakout Room
Activities and Resources	Integer Operation Breakout Room
Suggested Modifications	Students can complete less escape rooms if necessary.

AddingandSubtractingIntegersDigitalMathEscapeRoom-1.pdf

MODULE 3

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will multiply fractions so they can use inverse operations to solve equations.

Student Learning Strategies	Students will use a scavenger hunt and/or a deltamath to practice multiply fractions
Success Criteria	I can simplify fractions using factors. I can put integers over one while multiplying fractions. I can correctly multiply fractions.
Formative Assessment (drives instructional decisions)	Completing Scavenger hunt
Activities and Resources	Scavenger hunt Deltamath "multiply fractions"
Suggested Modifications	Partner up on scavenger hunt, use easier proble on deltamath.

Fractions.pdf

fractionsscavengerhuntsheet.pdf

MODULE 4

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will use their critical thinking skills to create a catapult to launch pumpkins.
Student Learning Strategies	Punkin Chunkin Videos Photos of other pumpkin catapults Practice using the launcher and editing their design.
Success Criteria	I can create a pumpkin launcher that will succeed in few different competitions. I can use my collaboration skills to work with partner
Formative Assessment (drives instructional decisions)	Rubric
Activities and Resources	Pumpkin Launcher
Suggested Modifications	Supply more materials to students.

File_1_Pumpkin_Launchers.pdf

File_2_Editable_Forms.pptx
Pumpkin Launcher Competitions

MODULE 5

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will determine the relationship between calories, diet and exercise so we can evaluate inequalities.
Student Learning Strategies	Meal Plans Practice Inequality Problems Working together
Success Criteria	I can find the calorie allotment allowed for each person with my knowledge of inequalities. I can solve the inequality for the missing variable I can reach a calorie sheet to determine the numl of calories used.
Formative Assessment (drives instructional decisions)	Answer key
Activities and Resources	Calorie Counter Project
Suggested Modifications	Only use one of 3 activities. Eliminate parts of the project to reach our students more.

Calorie_Cruncher_Interactive_--_Algebra_Edition.pdf
Calorie_Cruncher_--_Algebra_Edition.pdf

MODULE 6

Interactive Notebook Pages for this Unit

Student Learning Intentions (SLI) WALT:	Students will fill out interactive notebook pages to them in their algebra 1 class.

(We are learning to…)	
Student Learning Strategies	Interactive notebook pages Common mistakes Resource and flip books
Success Criteria	Students can fill out the pages of their interactive notebook so they have a resource for their classrc
Formative Assessment (drives instructional decisions)	There is no formative assessment for this introduction to each topic
Activities and Resources	Interactive Notebook Pages Listed
Suggested Modifications	fill out pages for absent students.

compoundinequality.docx

Graphing-Inequalities-Foldable.pdf
Rational_IrrationalNumbersInteractive.docx
Various_Fractional_Equations.docx
Rational_IrrationalNumbersInteractive.pdf
compoundinequality.pdf
Interval_Notation.pdf
Various_Fractional_Equations.pdf
Graphing-One-Variable-Inequalities-Graphic-Organizer.pdf
Graphing-Solutions-of-Equations-and-Inequalities-Foldable.pdf
Inequalities-Investigation-Adapted-from-Discovering-Algebra-Toe-the-Line.pdf
ProductandSumofRationalandIrrationalNumbersFoldableNotesforAlgebra1-1.pdf
_Interval_Notation.docx
solving-equation-foldable.pdf
SpecialCaseSolutionsFoldable-1.pdf
Flip-Flop-Page-for-Inequalities.pdf

MODULE 7

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will practice solving inequalities using a various amount of activities.
Student Learning Strategies	Partners Self checking by finding the one that matches.

Success Criteria	I can graph inequalities. I can rearrange an inequality so that I can graph t inequality the correct way. I can solve compound inequalities by using invers operations. I can break down an compound inequality into tw inequalities.
Formative Assessment (drives instructional decisions)	Self-checking and teacher checking if answers ar correct.
Activities and Resources	Activity listed below.
Suggested Modifications	Put students in groups. Eliminate problems when necessary.

Stem_Lab_Warm_Up.pdf

Stem_Lab_Warm_Up.docx
matchingcompoundinequality_activity.pdf
GraphingInequalitiesScavengerHunt-1.pdf

MODULE 8

Student Learning Intentions (SLI) WALT: (We are learning to…)	Students will solve absolute value equations so t can graph absolute value equations
Student Learning Strategies	Matching activity.
Success Criteria	I can break an absolute value equation into two equations and solve. I can use inverse operations to solve the absolut value equations. I can match solutions to the equations.
Formative Assessment (drives instructional decisions)	Results of matching activity
Activities and Resources	Matching activity below
Suggested Modifications	can eliminate some problems so that the student can complete more of it.

Stem_Lab_Solving_Absolute_Value_Equations_Drag_and_Drop.pdf

SolvingAbsoluteValueEquationsActivityGoogleSlidesandWorksheet-1.pdf

REFLECTIONS

After beginning this unit, I discovered students really struggle with the basics of adding, subtracting and multiplying integers. I took the opportunity to slow down and practice these. While also noticing they struggle with multiplying and simplifying fractions so I took a day to practice this as well. I saw a huge improvement in their ability to use inverse operations after we practiced the fundamental skills. While we did these, I also incorporated notes for the interactive notebook you can find above.

PUMPKIN LAUNCHER- I gave the students three days to complete this project. They struggled with time management as well as making sure to fill out the worksheet that goes with it. I believe one more day to complete their launcher would work since they needed to test it and a lot of students wasted time. However, I also believe even if they were given another day they would have wasted time. I hope as the year continues students will use time management better and successfully finish projects on time.

ABSOLUTE VALUE MATCHING- I deleted a few problems so they did not need to complete them.

INTERDISCIPLINARY CONNECTIONS: NEW JERSEY STUDENT LEARNING STANDARDS FOR ELA, SOCIAL STUDIES, SCIENCE AND/OR MATHEMATICS

LA.K-12.NJSLSA.W4	Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
LA.K-12.NJSLSA.W6	Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.
LA.K-12.NJSLSA.W8	Gather relevant information from multiple print and digital sources, assess the credibility and accuracy of each source, and integrate the information while avoiding plagiarism.
LA.K-12.NJSLSA.SL2	Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.
LA.K-12.NJSLSA.SL4	Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.
LA.W.9-10.2.D	Use precise language and domain-specific vocabulary to manage the complexity of the topic.
LA.W.9-10.3.C	Use a variety of techniques to sequence events so that they build on one another to

	create a coherent whole.
LA.SL.9-10.5	Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance findings, reasoning, and evidence and to add interest.