Unit 02: Expressions and Equations

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **7 Weeks**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

MA.7.EE	Expressions and Equations
MA.7.EE.A	Use properties of operations to generate equivalent expressions.
MA.7.EE.A.1	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MA.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MA.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.EE.B.4	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MA.7.EE.B.4a	Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MA.7.EE.B.4b	Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.

CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.8	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.8.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
TECH.8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

Capacities of the Literate Individual
Students Who are College and Career Ready in Reading, Writing, Speaking, Listening, & Language

They demonstrate independence.

They build strong content knowledge.

They respond to the varying demands of audience, task, purpose, and discipline.

They comprehend as well as critique.

They value evidence.

They use technology and digital media strategically and capably.
They come to understand other perspectives and cultures.

MATH.K-12.1	Make sense of problems and persevere in solving them
LA.K-12.NJSLSA.R	Reading
	Key Ideas and Details
LA.RL.7.1	Cite several pieces of textual evidence and make relevant connections to support analysis of what the text says explicitly as well as inferences drawn from the text.
LA.K-12.NJSLSA.R1	Read closely to determine what the text says explicitly and to make logical inferences and relevant connections from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.
MATH.K-12.2	Reason abstractly and quantitatively
MATH.K-12.3	Construct viable arguments and critique the reasoning of others
MATH.K-12.4	Model with mathematics
MATH.K-12.5	Use appropriate tools strategically
MATH.K-12.6	Attend to precision
MATH.K-12.7	Look for and make use of structure
MATH.K-12.8	Look for and express regularity in repeated reasoning
LA.K-12.NJSLSA.W	Writing
	Text Types and Purposes
LA.K-12.NJSLSA.W1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.7.1	Write arguments to support claims with clear reasons and relevant evidence.
LA.W.7.1.A	Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically.
LA.W.7.1.B	Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text.
LA.W.7.1.C	Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence.
LA.W.7.1.D	Establish and maintain a formal style/academic style, approach, and form.
	Comprehension and Collaboration
LA.K-12.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.
LA.W.7.1.E	Provide a concluding statement or section that follows from and supports the argument presented.
LA.SL.7.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.
LA.SL.7.1.A	Come to discussions prepared, having read or researched material under study; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion.
LA.SL.7.1.B	Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed.
LA.SL.7.1.C	Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed.
LA.SL.7.1.D	Acknowledge new information expressed by others and, when warranted, modify their own views.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media Literacy New Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit… The purpose of teaching the unit Expressions and Equations is to allow students to model real-world situations through algebraic expressions, equations, and inequalities in order to solve problems and predict unknowns.

Meaning

Essential Questions

Essential Questions

- What are the methods we can use to simplify an expression?

- How can properties of equality isolate the variable when solving a one- or two-step equation or inequality?

- Why is the order in which we solve an equation or inequality important when determining the solution?

- How is an inequality different from an equation in terms of solving, solutions, and graphing?

- How can we represent unknowns in real-world situations that involve a constant rate of change and initial value by use of an equation or inequality?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

- Reducing an expression to its simplest terms eases the process of solving and is at times necessary in solving for unknown variables.

- Properties of equality and inequality or inverse operations are used to solve an equation or inequality in order to maintain an equation's balance (or the temporary use of the inequality's balance) and therefore determine its solution.

- Eliminating zero pairs is the first step in solving for a missing variable in a two-step equation or inequality.

- An inequality contains a multitude of solutions that can be represented by use of an inequality sign or a number line.

- Real-world situations can be represented by equations and inequalities and solved by solving for the unknown variable.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge
Students will know…

- Combining like terms in a linear equation

- Distributive property

- The definition of a linear expression

- Solving one- and two-step equations and inequalities

- Properties of equality and inequality

- How to create a relevant number line to graph an inequality

- Order of operations

- Write and graph equations and inequalities from real-world problems.

- Substitution to check a solution to an equation or inequality.

- how to apply the GIWAR method or other problem solving strategies to investigate real-world problems

Skills

Skills
Skills
Student will be skilled at …
- Transform expressions into simplest form using properties of operations such as combining like terms and distributive property.
- Determine whether an expression is linear.
- Evaluate one- and two-step equations using equality of addition, subtraction, multiplication,and division equality properties.
- Determine the order of evaluating a multi-step equation or inequality.
- Develop and complete an appropriate number line based on a given inequality.
- Support a solution using substitution.
- Apply knowledge of solving one- and two-step equations and inequalities to create and solve equations/inequalities from real-world problems.
- Interpret the question and solution of a real-world problem by applying strategies such as GIWAR or other problem solving methods.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

Unit 2 activities.docx
Unit 2-Cycle 1-distributive property activity.docx
Unit 2-Cycle 2 scavenger hunt answer sheet.docx
Unit 2-Cycle 2 scavenger hunt teacher instructions.docx
Unit 2-Cycle 3 scavenger hunt answer sheet.docx
Unit 2-Cycle 3 scavenger hunt teacher instructions.docx
Unit 2-Cycle 4-using inequality signs.docx
Unit 2-Cycle 6 scavenger hunt answer sheet.docx
Unit 2-Cycle 6 scavenger hunt teacher instructions.docx
Unit 2-PARCC.docx

Formative Assessment Strategies

Formative Assessment Strategies

- ixl.com scores
- tenmarks.com scores
- teacher center observation
- STEM projects

Learning Activities/Unit of Study

Learning Activities/Unit of Study

Expressions and Equations: Approximately Six Cycles

Cycle 1: Topics Covered

- Like terms
- Distributive Property
- Simplifying algebraic expressions
- Adding and subtracting linear equations

- <u>Activities/Centers</u>
    - IXL.com centers
        - R.8 Add and subtract like terms
        - S.2 Distributive property
        - (Algebra I) I.2 Simplify variable expressions involving like terms and the distributive property
        - R.11 Identify equivalent linear expressions
        - R.9 Add, subtract, and multiply linear expressions
    - Tenmarks centers (can be used throughout the entire unit)
        - 7.EE.1 Solve & Expand: Linear Expressions with Rational Coefficients
        - 7.EE.2 Identifying Multiple Forms of an Expression
        - 7.EE.3 Properties of Operations
        - 7.EE.3 Properties of Operations: Rational Numbers-Word Problems
    - Hands-On/Creative Centers
        - Distributive property M&M activity*
    - Online games
        - Identifying like terms https://campus.mangahigh.com/en-us/px/150/0/0
        - Distributing and add/subtract expressions https://campus.mangahigh.com/en-us/px/152/0/0
    - Xtramath: review flashcards
    - Teacher Directed Stations
        - Bellringers: Week 33—page 263-264
        - Bellringers: Week 33—page 261-262
        - Teacher created problems for simplifying expressions and add/subtracting linear equations on white boards
- STEM activity
    - Create a discovery jar. Have students brainstorm all of the questions or ideas he/she is curious about related to science, technology, engineering, art, or math . Maybe it is why grass is green or how space travel started. Or how many varieties of leaves exist on the trees in the yard. Then put all of the questions into a mason jar. Each group chooses out of the jar at a center and will research and explore the topic. (This activity can be repeated throughout the year and questions can be added as well). (see resource from unit 1)

<u>Cycle 2: Topics Covered</u>

- Solving equations with addition or subtraction
- Solving equations with multiplication or division

- <u>Activities/Centers</u>
    - IXL.com centers
        - T.1 Which x satisfies an equation?
        - T.2 Write an equation from words
        - T.5 Solve one-step equations
    - Tenmarks centers
        - 7.EE.4a Solving One-Step Equations: Addition and Subtraction
        - 7.EE.4a Solving One-Step Equations: Multiplication and Division
        - 7.EE.4a Reviewing One-Step Linear Equations
    - Hands-On/Creative Centers

- One-step equation scavenger hunt*
  - Online games
    - One-step equation game http://www.math-play.com/soccer-math-one-step-equations-game/one-step-equations-game.html
  - Xtramath: review flashcards
  - Teacher Directed Stations
    - Bellringers: Week 33—page 259-260
    - Bellringers: Week 33—page 257-258
    - Teacher created one-step equation problems on white boards

Cycle 3: Topics Covered

- Solving two-step equations

- Activities/Centers
  - IXL.com centers
    - T.6 Solve two-step equations
    - T.7 Solve equations: word problems
    - T.8 Solve equations involving like terms
  - Tenmarks centers
    - 7.EE.4a Solving Multi-Step Equations with Integers
    - 7.EE.4a Solving Multi-Step Equations with Fractions and Decimals
  - Hands-On/Creative Centers
    - Two-step equation scavenger hunt*
  - Online games
    - Two-step equation game http://www.xpmath.com/forums/arcade.php?do=play&gameid=64
  - Xtramath: review flashcards
  - Teacher Directed Stations
    - Bellringers: Week 32—page 255-256
    - Bellringers: Week 32—page 253-254
    - Teacher created one-step equation problems on white boards
- STEM activity (to take multiple weeks)
  - http://www.21stcenturymathprojects.com/2012/10/csi-algebra-stem-project-unit-3-solving.html
  - Equation Inquiry https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/29433-Solving%20equations%20inquiry.pdf and https://www.stem.org.uk/system/files/elibrary-resources/legacy_files_migrated/29434-Lesson%20Notes.pdf

Cycle 4: Topics Covered

- Writing inequalities
- Graphing inequalities

- Activities/Centers
  - IXL.com centers
    - U.1 Solutions to inequalities
    - U.2 Write inequalities from number lines
    - U.3 Graph inequalities on number lines
  - Tenmarks centers

- 7.EE.4b Solving Inequalities
  - ○ Hands-On/Creative Centers
    - ▪ Lesson on comparing using inequality signs*
    - ▪ Inequality memory https://drive.google.com/a/collsk12.org/file/d/0B6i7oME7DkjZdzhMREdUQXJxdXc/view
  - ○ Online games
  - ○ Xtramath: review flashcards
  - ○ Teacher Directed Stations
    - ▪ Bellringers: Week 32—page 251-252
    - ▪ Bellringers: Week 32—page 249-250
    - ▪ Teacher created inequalities where students write and graph on white boards
  - ○ STEM activity: logic puzzle https://www.pinterest.com/pin/415034921891637816/

Cycle 5: Topics Covered

- Solving inequalities addition or subtraction
- Solving inequalities multiplication or division

- Activities/Centers
  - ○ IXL.com centers
    - ▪ U.4 Solve one-step inequalities
    - ▪ U.5 Graph solutions to one-step inequalities
  - ○ Tenmarks centers
    - ▪ 7.EE.4b Solving Inequalities
  - ○ Online games
    - ▪ Solving one-step inequality game https://www.quia.com/rr/374262.html
  - ○ Xtramath: review flashcards
  - ○ Teacher Directed Stations
    - ▪ Bellringers: Week 31—page 247-248
    - ▪ Bellringers: Week 31—page 245-246
    - ▪ Teacher created one-step inequality problems on white boards

Cycle 6: Topics Covered

- Solving two-step inequalities addition or subtraction

- Activities/Centers
  - ○ IXL.com centers
    - ▪ U.6 Solve two-step inequalities
    - ▪ U.7 Graph solutions to two-step inequalities
  - ○ Tenmarks centers
    - ▪ 7.EE.4b Solving Inequalities
  - ○ Hands-On/Creative Centers
    - ▪ Two-step inequality scavenger hunt*
  - ○ Online games
    - ▪ Equations and inqualities game https://www.quia.com/rr/325253.html
  - ○ Xtramath: review flashcards
  - ○ PARCC practice*

- Teacher Directed Stations
  - Bellringers: Week 31—page 243-244
  - Bellringers: Week 31—page 241-242
  - Teacher created two-step inequality problems on white boards

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for

students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may

hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.