



Unit Planner: Equations and Inequalities (Unit 2) Algebra 21



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Region 12 Middle School Curriculum > 2015-2016 > High School > Mathematics > Algebra 21 (Core) > Week 5 - Week 10

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Unit Overview

Sequence of topics/learning tasks

The material in this unit, Equations and Inequalities, is the heart of algebraic thinking. Students write, simplify, evaluate, and model situations with linear expressions. Students then examine the concept of equality and use linear equations and linear inequalities to model and solve real-world problems.

The properties of real numbers play a prominent role in this unit. The commutative, associative, and distributive properties are used when students simplify and evaluate expressions and solve multi-step equations. Opposites, reciprocals, and order of operations are used when students evaluate expressions and solve equations. Students revisit rational numbers when they solve equations and inequalities with rational number coefficients and rational number solutions. The activities in Unit 2 are designed to strengthen student understanding of prerequisite mathematical concepts.

The first investigation, Investigation 1, begins with number puzzles to encourage an understanding of algebraic expressions and the idea of working backwards to find a solution. Activities in this investigation ask students to use flowcharts and verbal descriptions to represent algebraic expressions. These techniques build students' understanding of how the order of operations is used in evaluating an expression and solving an equation.

In Investigation 2, students will apply their knowledge of solving one- and two-step equations and will write equations that model and solve real world problems such as bank fees, weight loss, and taxi cab charges. There is an emphasis on distinguishing between evaluating an expression and solving an equation. Activities involving algebra tiles and flow charts are available to support students with different learning styles.

Investigation 3 focuses on modeling real world scenarios with equations that contain variables on both sides. Students are asked to justify their steps in the equation solving process, recognize the role of the commutative and associative properties, and check the reasonableness of their answers. You may continue to use algebra tiles to support student learning. Students are also introduced to identities and contradiction and learn how a table and graph can be used to solve an equation. At the end of Investigation 3, a mid-unit test is provided to assess student mastery of solving two-step equations.

In Investigation 4, students solve multi-step equations that require the distributive property and combining like terms. Throughout this investigation, students model situations in different ways, from hands-on to symbolic. Activities involving algebra tiles and pan balances are included to support different learning styles. There are many opportunities for students to write and solve

equations to solve problems in contexts. Applications include walk-a-thons, pizza parties, geometry problems, and sports problems.

Investigation 5 expands students' equation solving skills to include the transformation of literal equations. Students learn to change the subject of a formula (literal equation) by algebraically solving for a variable. Flowcharts are reintroduced as a method of attack. Students solve for variables in common geometry formulas which show up on the CAPT test.

The final investigation, Investigation 6, introduces the concept of linear inequalities. Students write and solve inequalities to solve a variety of contextual problems and are asked to represent solutions of inequalities on number lines. Activities focus student attention on the difference between inequalities and equations and on the justification for reversing an inequality symbol when a negative number is multiplied to both sides or divided by both sides.

The Unit 2 Performance Task involves making consumer decisions about the purchase of iPods and downloads. In this task, and throughout this unit, students are encouraged to work cooperatively and share and compare their problem solving strategies.

Standards

CCSS: Mathematics

CCSS: Grade 8

Expressions & Equations

8.EE.C. Analyze and solve linear equations and pairs of simultaneous linear equations.

8.EE.C.7. Solve linear equations in one variable.

8.EE.C.7a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

8.EE.C.7b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.

CCSS: HS: Num/Quantity

Quantities

HSN-Q.A. Reason quantitatively and use units to solve problems.

HSN-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.

HSN-Q.A.2. Define appropriate quantities for the purpose of descriptive modeling.

HSN-Q.A.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CCSS: HS: Algebra

Seeing Structure in Expressions

HSA-SSE.A. Interpret the structure of expressions.

HSA-SSE.A.1. Interpret expressions that represent a quantity in terms of its context.

HSA-SSE.A.1a. Interpret parts of an expression, such as terms, factors, and coefficients.

HSA-SSE.A.1b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

∨ [Show details](#)

HSA-SSE.A.1b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

HSA-SSE.B. Write expressions in equivalent forms to solve problems.

HSA-SSE.B.3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.

Creating Equations

HSA-CED.A. Create equations that describe numbers or relationships.

HSA-CED.A.1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.

HSA-CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

∨ [Show details](#)

HSA-CED.A.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.

Reasoning with Equations & Inequalities

HSA-REI.A. Understand solving equations as a process of reasoning and explain the reasoning.

HSA-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.

HSA-REI.B. Solve equations and inequalities in one variable.

HSA-REI.B.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.

Mathematical Practices / Universal Practices

- MP.1. Make sense of problems and persevere in solving them. Focus on #1, 3, and 7.
- MP.2. Reason abstractly and quantitatively.
- MP.3. Construct viable arguments and critique the reasoning of others.
- MP.4. Model with mathematics.

Science and Engineering Practice

- MP.5. Use appropriate tools strategically.
- MP.6. Attend to precision.
- MP.7. Look for and make use of structure.
- MP.8. Look for and express regularity in repeated reasoning.

Essential Questions

1. What is an algebraic expression?
2. What is an algebraic equation?
3. What does equality mean (in mathematics and relative to real world scenarios)?
4. What is an inequality (in mathematics and relative to real world scenarios)?
5. How can we use linear equations and linear inequalities to solve real world problems?
6. What is a solution set for a linear equation or linear inequality? How do these solution sets differ?
7. How can models and technology aid in the solving of linear equations and linear inequalities?

Enduring Understandings

Overriding Enduring Understanding: To obtain a solution to an equation, no matter how complex, always involves the process of undoing the operations.

Specifically (as related to each essential question):

1. An algebraic expression is a mathematical representation consisting of constants, variables and algebraic operations (addition, subtraction, multiplication and/or division) and exponentiation by an exponent that is a rational number.

2. An algebraic equation is a mathematical representation which includes variables, constants, and operations. It sets two algebraic expressions equal to one another.

3. Equality (in mathematics) is a relationship between two quantities or, more generally two mathematical expressions, asserting that these quantities have the same value or that the expressions represent the same mathematical object.

4. An inequality (in mathematics) is a statement that of two quantities, one is

specifically less than, greater than, less than or equal to, or greater than or equal to the other.

5. We can use linear equations and linear inequalities to model real world scenarios.

6. The solution set for a linear equation typically has a finite number of answers (in the case of Algebra I, usually limited to one or two). The solution set for a linear inequality has more than one answer and typically has an infinite number of solutions which satisfy the criteria set in the inequality. An inequality sets boundaries on the solution and indicates what values are possible along with what values do not satisfy the inequality.

7. Models and technology can aid in solving linear equations and inequalities by enabling us to isolate the variables and define the solution. They can also represent the solution(s) graphically.

Concepts

what students need to know

- Order of operations
- Undoing operations
- Opposites
- Reciprocals
- Rational numbers - what they are and how to order them on a number line
- Like terms - how to identify and combine them
- How to simplify algebraic expressions, equations, and inequalities
- How to write and solve one step linear equations and inequalities

Skills

what students need to do.
Include (DOK).

- WRITE and REARRANGE (transform) algebraic formulas and literal equations, solving in terms of a given variable. (DOK 3)
- DEVELOP and APPLY linear equations and inequalities that

- How to write and solve two step linear equations and inequalities
- Writing and solving equations and inequalities with variables on both sides of the equals sign.
- The difference between equalities and inequalities.
- The difference between algebraic expressions and equations
- How to evaluate an expression
- The difference between evaluating an expression and solving an equation
- Commutative Property of Addition and Multiplication
- Associative Property of Addition and Multiplication
- Distributive Property of Multiplication over Addition and Subtraction
- How to write and transform formulas and literal equations
- How to interpret solutions of algebraic equations and inequalities, in context of a real world scenario.
- How to write a persuasive recommendation letter
- How to convert units of measure

- MODEL real-world situations. (DOK 2/3)
- COMBINE like terms to SIMPLIFY and SOLVE linear equations and inequalities. (DOK 2)
- SIMPLIFY and SOLVE two step linear equations and inequalities that represent a real world situation. (DOK 2)
- EXPLAIN what the solution to an algebraic equation or inequality means in context of the real world problem. (DOK 3/4)
- DISTINGUISH between evaluating an algebraic expression and solving an algebraic equation. (DOK 3)
- EXPLAIN the difference between the solution of an equation vs. an inequality. (DOK 3)
- CONSTRUCT and SIMPLIFY algebraic expressions APPLYING the mathematical order of operations. (DOK 2)
- CONSTRUCT a table of values for a given algebraic equation. (DOK 1/2)
- GRAPH algebraic equations and inequalities (both by hand and with the use of technology) (DOK 1/2)
- COMPARE, LOCATE, LABEL and ORDER integers, rational numbers and real numbers on number

lines, scales and graphs. (DOK 1/2)

- USE and APPLY algebraic properties, including associative, commutative and distributive, inverse and order of operations to SIMPLIFY computations with real numbers and SIMPLIFY expressions. (DOK 2/3)
- DETERMINE when and why to reverse an inequality symbol when solving the inequality. (DOK 2/3)
- USE technological tools such as spreadsheets, probes, algebra systems and graphing utilities to ORGANIZE, ANALYZE, INTERPRET and EVALUATE large amounts of numerical information. (DOK 2/3)
- CHOOSE from among a variety of strategies to ESTIMATE and CALCULATE values of formulas, functions and roots. (DOK 1/2)
- JUDGE the reasonableness of estimations, computations, and predictions.
- SELECT and USE appropriate units, scales, degree of precision to measure length, angle, area, and volume of geometric models. (DOK 3/4)
- ANALYZE and CHOOSE the best

	<p>solution for a real world scenario. (DOK 3/4)</p> <ul style="list-style-type: none"> • WRITE a letter of recommendation based on given criterion. (DOK 4) • CONVERT units of measure (specifically, gigabytes to megabytes and vice versa) (DOK 1)
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<p>21st Century Skills</p> <p>21st Century Skills</p> <ul style="list-style-type: none"> • 1. Use real-world digital and other research tools to access, evaluate, and effectively apply information appropriate for authentic tasks. • 2. Work independently and collaboratively to solve problems and accomplish goals. • 3. Communicate information clearly and effectively using a variety of tools/media in varied contexts for a variety of purposes. • 4. Demonstrate innovation, flexibility, and adaptability in thinking patterns, work habits, and working/learning conditions. • 5. Effectively apply the analysis, synthesis, and evaluative processes that enable productive problem solving. •
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<p>Learner Outcomes</p> <p>This unit supports Solving Problems and Defending Conclusions and Judgments</p>

<p>Interdisciplinary/Career Connections</p> <p>In a sales career, students would need to make recommendations based on customer requirements, as well as collaborate with team members. In the Performance Task, students need to evaluate a given teacher's technological needs (such as storage space requirements and functions the teacher wants to utilize the iPod for), research the options available, recommend additional features the teacher might want, and write a letter outlining said recommendations, justifying their choice.</p>

<p>Assessments</p> <p>include: interim & summative assessments, and performance tasks</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Exit Ticket (2.1) - The Story of "x" Formative DOK 2 Basic Application: Written (Test): Written Response</p> </div>

<p>Research\Expansion Opportunities</p> <p>include collaboration with peers</p> <p>Students will research iPod offerings (models and features) to best match the</p>

Exit Ticket on depicting the order of operations in evaluating algebraic expressions by flowcharting the story of "x." Writing algebraic expressions given the story of "x."

 [Exit Slip 2.1.doc](#)

Exit Slip (2.2) - Real-World Application of Two-Step Equations
Formative DOK 2 Basic Application: Written (Test): Written Response

Exit Ticket on writing and solving a two-step equation which models a given real-world scenario.


 [Exit Slip 2.2.doc](#)

Interim Assessment - One- and Two-Step Algebraic Equations
Interim DOK 3 Strategic Thinking: Written (Test): Written Response

Students will be assessed on their ability to read and interpret real-world problems, and write, solve, and check one- and two-step equations which model the given scenarios.

Exit Ticket (2.3.1) - Combining Like Terms
Formative DOK 2 Basic Application: Written (Test): Written Response

Exit ticket (2.3.1) on solving multi-step algebraic equations by combining like terms.

 [Exit Slip 2.3.1.doc](#)

Exit Ticket (2.3.2) - Process of Solving Equations with Variables on Both Sides
Formative DOK 2 Basic Application: Written (Test): Written Response

Exit ticket (2.3.2) on the steps to follow when solving multi-step algebraic equations with variables on both sides of the equation.

 [Exit Slip 2.3.2.doc](#)

given teacher's requirements to their recommendations.

Students will collaborate with peers during the unit and specifically on the Performance Task, as they will make a recommendation and write a letter to the given teacher justifying their choice as a team.

Interim Assessment - Multi-Step Equations with Variables on Both Sides of the Equation
Interim DOK 3 Strategic Thinking: Written (Test): Written Response

Students will be assessed on their ability to write, solve, and check multi-step algebraic equations, both in and out of context of given real-world scenarios, with variables on both sides of the equation.

Unit 2 - Mid-Unit Summative Assessment
Summative DOK 3 Strategic Thinking: Written (Test): Written Response

Mid-unit summative assessment (2.1 - 2.3).

 [2.3.9 Midunit Test.doc](#)

Exit Ticket (2.4.1) - Distributive Property, Variables on One Side of the Equation
Formative DOK 2 Basic Application: Written (Test): Written Response

Exit ticket on solving multi-step equations applying the distributive property, with variables on one side of the equation.

 [Exit Slip 2.4.1.doc](#)

Exit Ticket (2.4.2) - Distributive Property with Variables on Both Sides
Formative DOK 2 Basic Application: Written (Test): Written Response

Exit ticket (2.4.2) on applying the distributive property to solve multi-step algebraic problems with variables on both sides of the equation.

 [Exit Slip 2.4.2.doc](#)

Exit Ticket (2.4.3) - Distributive Property in Real-World Problems

Formative DOK 2 Basic Application: Written (Test): Written Response

Exit ticket (2.4.3) on applying the distributive property to model and solve a real-world problem

 [Exit Slip 2.4.3.doc](#)

Interim Assessment - Solving Multi-Step Equations, Applying the Distributive Property

Interim DOK 3 Strategic Thinking: Written (Test): Written Response

Students will be assessed on their ability to write, solve, and check solutions to multi-step equations, applying the distributive property of multiplication over addition/subtraction, in and out of context of real-world scenarios.

Exit Ticket (2.5) Literal Equations

Diagnostic DOK 2 Basic Application: Written (Test): Written Response

Exit Ticket on writing literal equations (solving equations in terms of one variable).

Exit Ticket (2.6) - Linear Inequalities in One Variable

Formative DOK 2 Basic Application: Written (Test): Written Response


Exit Ticket (2.6) on writing, solving, graphing, and checking linear inequalities in one variable.

Interim Assessment - Literal Equations and Inequalities

Interim DOK 3 Strategic Thinking: Written (Test): Written Response

Students will be assessed on their ability to write, solve, and check literal equations in context of real-world problems. They will also be asked to write and solve linear inequalities, interpreting their solutions based on the context of real-world

scenarios, and checking and graphing these solutions in one variable.

 [Quiz 2.5 and 2.6.docx](#)

Unit 2 Performance Task (iPods)

Summative DOK 4 Extended Thinking: Performance: Authentic Task/ Skill Demonstration

Students will work on a two-day task that has them investigating file storage size and cost for various models of iPods™. Students will share their findings with the class. Attached is the state's version of the task.

 [Unit 2 Performance Task iPods \(State Version\).doc](#)

 [Unit 2 Performance Task Rubric.doc](#)

Unit 2 - End of Unit Summative Assessment

Summative DOK 3 Strategic Thinking: Written (Test): Written Response

End of unit summative assessment.

 [Unit 2 End-of-Unit Test.docx](#)

Rubrics & Artifacts

Essential Vocabulary

algebraic expression

associative property

coefficient

constant

commutative property

distributive property

evaluate

integers

Technology/Tools/Resources

- Chromebooks and websites (research iPod offerings)
- Moodle - online blackboard
- Graphing calculators and/or graphing calculator software

<p>inverse operations</p> <p>linear inequalities</p> <p>literal equations</p> <p>order of operations</p> <p>properties of equality</p> <p>real numbers</p> <p>simplify</p> <p>variable</p>	
<p>Learning Plan with formative assessments</p> <p><i>Investigation 1: Order of Operations and Undoing Operations (3 days)</i></p> <ul style="list-style-type: none"> In this investigation, students will construct algebraic expressions and simplify expressions according to the orders of operations. Students will also use the order of operations in order to determine how to “undo” operations in solving an equation for an unknown. <p>2.1.0 Get Ready - Order of Operations</p> <p>2.1.1 Wisweb Instructions</p> <p>2.1.1 Order of Operations with Wisweb</p> <p>2.1.2 Solving Equations by Undoing</p> <p>2.1.3 Get Ready – Zero Pairs and One Pairs</p> <p>2.1.3 Resource - Multi-Step Equations PowerPoint</p> <p>2.1.3 Solving Equations Practice</p> <p><i>Exit Slip 2.1 - Solving Equations by Undoing</i></p> <p><i>Investigation 2: One- and Two-Step Linear Equations in Context (4 days)</i></p> <ul style="list-style-type: none"> In Investigation 2, students will write linear equations that model real world scenarios, solve two-step linear equations, and justify their steps. 	<p>Instructional Strategies</p> <ul style="list-style-type: none"> Whole group lesson teaching, followed by lesson related activities which apply the knowledge and concepts learned. Students work both independently and collaboratively to persevere and solve problems. Flexible grouping - combination of teacher directed and independent choice, based on exit ticket and interim assessment results to develop capacity to reason abstractly and quantitatively. Problem solving connection through real-world scenarios, whereby students have to interpret, analyze, compare and identify the appropriate solution based on the assigned teacher's needs and criterion.

2.2.0 Get Ready –Algebraic Expressions Millionaire Game

2.2.1 One-Step Applications

2.2.2 Two-Step Applications

2.2.3 New Haven Cab Fares

2.2.4 Six Flags and Speeding Tickets

Exit Ticket 2.2 - One- and Two-Step Algebraic Equations

Interim Assessment on writing and solving one- and two-step algebraic equations to model real-world scenarios.

Investigation 3: Solving Equations with Variables on Both Sides (3 days)

- In Investigation 3, students solve multi-step equations in a variety of real-life contexts. To solve the equations, students must combine like terms on one side of an equation, while collecting variable terms on one side and collecting constants on the other side. Students also solve equations that have no solution or an infinite number of solutions.

2.3.0 Opening Activity – Find your Like Terms

2.3.0 Get Ready – Combining Like Terms and Algebra Tiles

2.3.1 Algebra Balance – Variables on Both Sides

Exit Ticket 2.3.1

2.3.2 Equality in Tables and Graphs

Exit Ticket 2.3.2 - Solving Algebraic Equations with Variables on Both Sides of the Equation

2.3.3 Glastonbury Cab Fares

Interim Assessment on writing, solving, and checking multi-step algebraic equations that model real-world scenarios.

Mid-Unit Test - 2.1 - 2.3 (1 day)

Investigation 4: Solving Equations using the Distributive Property (3 days)

- In this investigation, students will write and solve multi-step equations in a number of different contexts. The

- Discussion of the characteristics of different options, justifying the solution the student team deems most appropriate.
- Students will write a recommendation letter collaboratively with their teammates, including information which justifies their recommendation.
- Differentiation throughout (with supports and enrichment).

investigation begins with a short introduction/review to topics such as the distributive property and combining like terms—concepts that are vital to solving multi-step problems. The rest of the investigation offers the choice of several activities for students to practice and extend the use of multi-step equations and formulas.

2.4.0 Get Ready – Distributive Property

2.4.1 Kindergarten Supplies

Exit Ticket 2.4.1 - Distributive Property

2.4.2 Distributive Property Applications

Exit Ticket 2.4.2 - Distributive Property Applications

2.4.3 Number Puzzle Project

Exit Ticket 2.4.3 - Distributive Property, mixed problems

Interim Assessment on writing, solving, and checking solutions to multi-step algebraic equations, applying the distributive property.

Investigation 5: Transforming Formulas and Literal Equations (2 days)

- Students will apply the principles of solving equations to literal equations in which one variable is solved in terms of other variables and to changing the subject of a formula.

2.5.0 Get Ready – Transformers, Math Geeks in Disguise

2.5.1 Canadian Vacation

2.5.2 Transforming CAPT Formulas

Exit Ticket 2.5 - Literal Equations

Investigation 6: Inequalities (4 days)

- In investigation 5, students will write a linear inequality that models a real world scenario, solve two-step linear inequalities and justify their steps.

2.6.0 Get Ready – Inequality True or False?

2.6.1 Lake Compounce

2.6.2 & 2.6.3 Solving and Graphing Inequalities

Exit Ticket 2.6 - Solving and Graphing Inequalities

Interim Assessment on Literal Equations and Linear Inequalities in One Variable

2.7.1 iPod Recommendations

Performance Task: iPods (2 days)

- Students will work on a two-day task that has them investigating file storage size and cost for various models of iPods™. Students will share their findings with the class.

End-of- Unit Test (2 days including review)

Differentiation (with supports)

Investigation 1:

- The flowcharts (Activity 2.1.2) and algebra arrows (Activity 2.1.3) provide students a visual representation of algebraic expressions.
- To complement Activity 2.1.2 and/or Activity 2.1.3, provide students additional practice using order of operations to simplify expressions. Worksheets containing order of operations problems are included in Unit 1, Investigation 2.

Investigation 2:

- The flowchart method (Activity 2.2.1) is recommended for students who have difficulty identifying the appropriate steps for solving one-step and two-step linear equations. Students who understood the flowchart method tend to gradually transition into solely using the undoing method. This activity can be done immediately after Activity 2.1.2 from Unit 2, Investigation 1.
- Algebra tiles (Activity 2.2.2) provide students a tactile experience. The activity can be performed with or without algebra tiles.
- Show students the *Algebra Balance Scales* found at the National Library of Virtual Manipulatives (NLVM) website. This activity helps students visualize linear equations and understand what happens to an equation when an operation is performed on both sides (of the equals sign).

Investigation 3:



Differentiation (enrichment)

Investigation 3:

- Some students may want to consider problem situations which lead to equations whose solutions are valid mathematically, but do not make sense in the context of the problem. For example, in Activity 2.3.7, suppose the fuel surcharge for Fast Cabs is \$6.00 (and all other charges are the same). For how many miles will the cost of a ride with Fast Cabs be equal to the cost of a ride with Speedy Cabs? The equation would be $.7x + 5.5 = .95x + 6$. The solution is $x = -2$, which does not make sense. For all non-negative values of x , Speedy Cabs is the less

- Algebra tiles (Activity 2.3.1) provide students a hands-on activity for modeling and simplifying algebraic expressions.
- Algebra Balance Scales (Activity 2.3.5) introduces students to a visual manipulative for solving multi-step equations. The applets are located on the National Library of Virtual Manipulatives (NLVM) website. One applet only models equations with positive coefficients, and the other models equations with negative coefficients.

Investigation 4:

- Algebra tiles (activity 2.4.2) provide students a visual understanding of the distributive property.
- Activity 2.4.3 provides students an opportunity to practice using the distributive property.
- Activity 2.4.5a, Solving Equations Skill Practice, may be particularly helpful to students who need sequential step-by-step instructions.
- Encourage students who are struggling solving multi-step linear equations to visit the following websites to see examples and videos:
 -  <http://www.yourteacher.com/algebra1/multistepequations.php>
 -  <http://www.onlinemathlearning.com/solving-multi-step-equations.html>

Investigation 5:

- Flowcharts (Activity 2.5.3) provide visual cues and are recommended for students who have difficulty identifying the appropriate steps.

Investigation 6:

- Some students have difficulty recognizing that an inequality like $8 > x$ is equivalent to $x < 8$. Questions 15 and 16 in Activity 2.6.2 specifically address this issue. If confusion on this score persists, you may teach students to always get the variable on the left side. This will help in graphing the solution set once the inequality is solved. A mnemonic that helps is to use the direction of the inequality symbol to show which side of the endpoint to shade. For $x > 8$, we shade to the right of 8 (the direction the symbol is pointing). For $x < 8$, we shade to the left. If you teach this strategy, emphasize that the variable must be on the left for this to work. Activity 2.6.4 provides opportunities for students to rewrite expressions.

expensive option. Challenge students to modify some of the other problems encountered in this investigation to produce similarly inappropriate "solutions."

Investigation 4:

- The distributive property with which we are familiar related multiplication and division. Students may want to explore whether there are other pairs of operations for which there is a distributive property. For example, does multiplication distribute over subtraction? Does division distribute over addition? Does addition distribute over multiplication?
- Activity 2.4.6b, Pizza Party, does not contain scaffolding. This version could be used with students who are more comfortable constructing equations.
- Activity 2.4.9, Geometry and Sports, is an activity for students needing more of a challenge. The problems provide strong independent learners with an opportunity to use their problem solving skills. Use some of this material with all

students if time permits.

- Activity 2.4.10, Arithmetic Sequences Revisited, can be used for students ready for a bigger challenge. This activity revisits arithmetic sequences, this time using the formula for finding the n th term.

Investigation 5:

- The green problems (Activity 2.5.4) require students to research energy costs and information about home appliance energy efficiency ratings and insulation energy efficiency ratings.

Investigation 6:

- Have each student construct a contextual problem that can be solved with a linear inequality. Ask them to solve it and write the answer on a separate piece of paper. Collect all of the problems (without answers) and shuffle them. Then, have students select a problem from the deck and attempt to solve it. Answers can be distributed at the end of the activity, and the problems can be discussed.

Sample Student Work/ Exemplars

(Identifiable personal information should not be displayed)

