

Part B: Lesson Plans for Learning Segment

Lesson 1: Combining Like Terms

1. Lesson Background

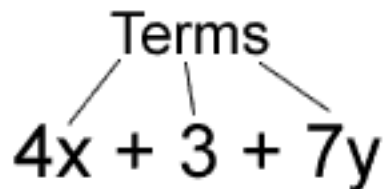
- Class: Extended Algebra I
- Period: 5ac
- Date: 9/12/14

2. Standards / Objectives

- Topic or Essential Question: How can combining like terms be used to simplify an expression?
- Standard(s) Addressed:
CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.
CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
CCSS.Math.Content.HSA-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.
- Instructional Content Objectives (measurable):
Successfully identify the like terms in an expression
Successfully simplify expressions by combining like terms
Successfully simplify multi-term expressions by performing the correct operations of addition and subtraction on terms with negative and positive coefficients

3. Language

- Academic Language Functions and Forms (including key lesson vocabulary)
 - Variable: represents a number (ex. x)
 - Expression: A collection of numbers and variables with math operations (has no equal sign)
 - Term: a part of a mathematical expression



- Simplify: to reduce to a smaller form by regrouping terms of the same variable
- Like terms: parts of an expression whose variable patterns are the same (ex. $4x^2$ and $-2x^2$)

Combine like terms.

A. $2x + 5x - 4y + 3$

$$\textcircled{2x} + \textcircled{5x} - \boxed{4y} + \boxed{3}$$

$$7x - 4y + 3$$

- Coefficient: the number in front of the variable
- Constant: the number that stands by itself, without the variable. Constants are like terms as well because they do not contain any variables.

$$4x^3 + 2x^2 - 3x + 1$$

coefficients **constant**

- Language Objectives
 - Be able to select and underline the like terms in an expression
 - Be able to simplify an expression by performing mathematical operations and combining like terms
 - Be able to determine a situation in which combining like terms would be appropriate (ex. finding the perimeter of a shape)

4. Instructional Strategies/Learning Tasks

Lesson Sequence Including opening hook and closure - include estimated time allotted next to each phase of the lesson)

A. Opening: (5 min.)

The teacher will discuss that now since we have completed Unit 1 Part 1 and taken the tests in this unit, we will be starting a new unit today, Unit 1 Part 2. Students will receive their grades from the last test and discuss how it factors into their grades. Students each receive a weekly syllabus that outlines all of the lessons and homework for each day in Unit 1 Part 2. Today, will we start our first day of combining like terms. Students should have prior knowledge of this topic from eighth grade. First we will define the meaning of the important vocabulary in this section, 1.4A, and then explain the process of how to combine like terms.

B: Lecture/Discussion (40 min.)

Part 1: The lesson begins with each student being provided a copy of the Unit 1 Part 2 syllabus. The teacher discusses where they are headed with this unit. Next, the teacher passes out the Smart Board slide notes, 1.4A Combining Like Terms. They must take notes on the problems that the teacher works out on the board. The teacher defines the vocabulary on the first few slides as the students write down the definitions. The teacher asks for student feedback on what they think each vocabulary word means before defining it. The teacher asks "What is

the difference between a constant and a coefficient?” and “How do we recognize if two terms are like?” and waits for student feedback. The teacher goes over the correct meaning of each term once there has been a small classroom discussion.

Part 2: Following the introduction of vocabulary, the teacher discusses the steps to combining like terms. For example, $6x - 1 + 4x + 2 = 10x + 1$. The teacher demonstrates multiple examples on the Smart Board so that the method is modeled for the students. The teacher uses the method of drawing lines between the like terms in different colors in order to distinguish between them. The students must fill in each example on their note sheet as the lesson goes along. After working through several together as a class, the students try a few of the examples on their own. After working individually on their papers, the class has a discussion of how they arrived at their answers. Students are asked to come up to the Smart Board and demonstrate the steps they took. They must first identify the like terms by underlining or drawing lines between them, and then perform operations on the terms to simplify the expression.

Part 3: Once students have grasped the concept of the practice problems that involve combining like terms, their homework assignment is passed out, WS 1.4A. Since their class period is split with lunch in between, this will happen during the second half of class towards the end of the period. During this time, students must begin working in this worksheet. The teacher circulates around the room in order to answer students' questions as they are working on this assignment, and make observations on which students are struggling.

C. Wrap Up (the last few minutes)

The teacher informs the students that this worksheet must be completed for homework. They must attempt each problem and show all work for credit. The teacher reviews that the homework aligns with the topic learned today, identifying and combining like terms. The teacher states that this homework will be checked for completion tomorrow, the answers will be given, and we will continue with combining like terms again tomorrow. The teacher also takes this time to answer any last minute questions of the students.

Differentiation (including accommodations and modifications of content, materials, delivery, activity, assignment, assessment, etc.)

Content Differentiation: Since simplifying expressions in which both combining like terms and distributing are needed eventually, the content in this learning segment is broken down into two parts. These students receive two days to learn the method of combining like terms. They will be taught as separate tasks in order to ease the students into the multi-step processes. During the in-class practice, students who finish on one example quicker than others are asked to move onto the next problem while the teacher walks around the room checking progress. Students who cannot finish all of the homework are given extended time to complete the problems.

Process Differentiation: Although combining like terms are properly written in a specific order, of variables with the highest degree first, students are told that they can write their answer in different ways. The focus of the lesson is to have students learn the process of simplifying an expression, so they may choose to combine the constants first rather than the terms with the variables first. Both final answers will be considered correct no matter which process they use. Finally, for the struggling students, visualization techniques are provided with different colors used on the Smart Board to identify the like terms, and verbal cues are used to prompt students to stay on task.

Materials: The materials needed for this lesson include the Unit 2 Syllabus, Smart Board, the Smart Board slides printed on a note sheet, the worksheet assigned for homework (1.4A), a scientific calculator, and a writing utensil for each student.

Accommodations: For the seven students in this class on IEPs, they are given extended time to complete their in-class work and homework assignments (1.5 times). The one student on a 504 in this class receives extended time as well (1.5 times). For these students, they are given prompting to stay on task, individual repetition of directions, and daily reminders. Two students can receive breaks outside of the classroom if needed. Additionally, two students receive preferential seating close to the teacher or away from distractions.

Assessments:

Assessment of content objectives (formal and informal):

- Students will be assessed formally through a worksheet, WS 1.4A, given for homework that involves combining like terms in order to simplify an expression. Students must complete all problems and show all necessary steps taken. The worksheet will be checked for completion the next day. Students will receive 10/10 points for the entire worksheet, 9/10 if one problem is left blank, 8/10 if a couple problems are left blank, etc. Solutions to the problems will be provided during the next class period.
- Students' progress on identifying and performing operations to combine like terms will be assessed informally throughout the lesson by the use of questioning, observation, and in-class work time.

Assessment of language objectives (formal and informal):

- Students will be assessed formally through a worksheet, WS 1.4A, given for homework and started at the end of class. Students must be able to use key vocabulary terms in order to simplify expressions and write their own expressions. Students must know the meaning of like terms, simplify, coefficient, variable, and a constant. Furthermore, students must recognize that when given a triangle and asked to find the perimeter, they can use the method of combining like terms to simplify. Students must complete all problems and show all necessary steps taken.
- Students knowledge of vocabulary will be assessed informally throughout the lesson by the use of questioning, observation, and in-class work time. Students will be asked "What does that vocabulary word mean?" when completing with their in class assignment. Students are encouraged to discuss their work with a neighbor and use the language verbally.

Reflection:

During this lesson, students did seem familiar with the concept of combining like terms slightly, but it definitely had to be retaught. One student asked "Is that all we do? We are not solving for anything?" However, many students struggle with understanding that combining like terms is just adding and subtracting the coefficients with the variable. The biggest area of error was in adding and subtracting with a negative number. Students were able to identify if a term was positive or negative during the lesson, but struggled when two like terms were far apart and one of them was negative. Often, their addition or subtraction was incorrect. During the practice problems on the Smart Board, circling the negative and the coefficient together when discussing each individual term emphasized this process. Through repetition during the following lessons, the students will get more practice with performing these operations.

Lesson 2: Combining Like Terms (*Continued*)

1. Lesson Background

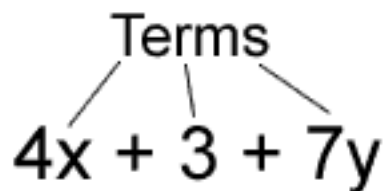
- Class: Extended Algebra I
- Period: 5ac
- Date: 9/15/14

2. Standards / Objectives

- Topic or Essential Question: How can combining like terms be used to simplify an expression?
- Standard(s) Addressed:
CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.
CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
CCSS.Math.Content.HSA-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.
- Instructional Content Objectives (measurable):
Successfully identify the like terms in an expression
Successfully simplify expressions by combining like terms
Successfully simplify multi-term expressions by performing the correct operations of addition and subtraction on terms with negative and positive coefficients

3. Language

- Academic Language Functions and Forms (including key lesson vocabulary)
 - Variable: represents a number (ex. x)
 - Expression: A collection of numbers and variables with math operations (has no equal sign)
 - Term: a part of a mathematical expression



- Simplify: to reduce to a smaller form by regrouping terms of the same variable
- Like terms: parts of an expression whose variable patterns are the same (ex. $4x^2$ and $-2x^2$)

Combine like terms.

A. $2x + 5x - 4y + 3$

$$\boxed{2x} + \boxed{5x} - \boxed{4y} + \boxed{3}$$

$$7x - 4y + 3$$

- **Coefficient:** the number in front of the variable
- **Constant:** the number that stands by itself, without the variable. Constants are like terms as well because they don't contain any variables.

$$4x^3 + 2x^2 - 3x + 1$$

coefficients **constant**

- Language Objectives
 - Be able to select, underline, and identify the like terms in an expression
 - Discuss the vocabulary definitions of coefficient, variable, and constant with peers
 - Be able to simplify an expression by performing mathematical operations and combining like terms, and explain this process in pairs

4. Instructional Strategies/Learning Tasks

Lesson Sequence Including opening hook and closure - include estimated time allotted next to each phase of the lesson)

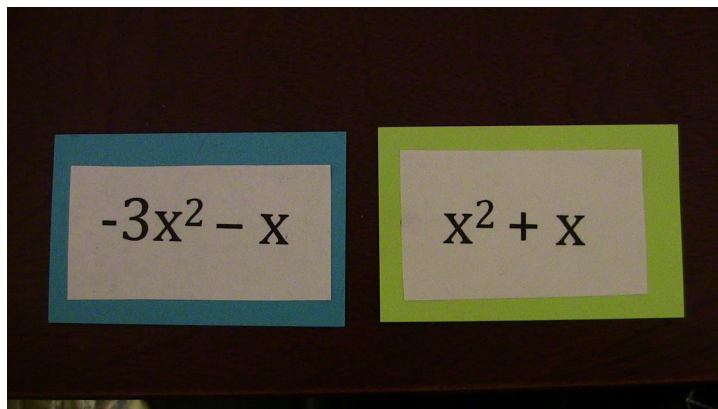
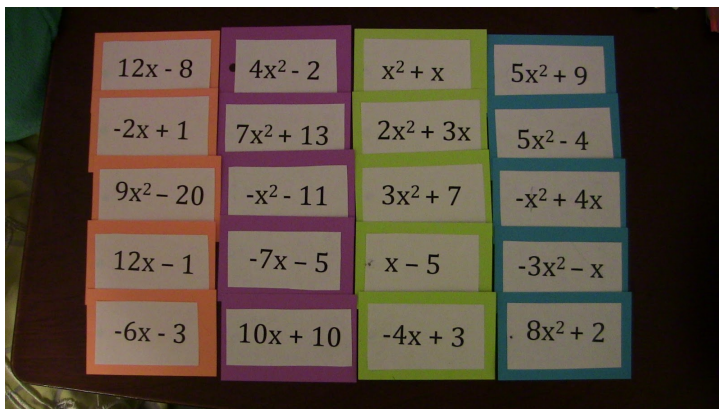
A. Opening: (5 min.)

The teacher begins by stating that we are continuing our exploration of what we learned yesterday, combining like terms. The teacher walks around the room to check each student's homework, WS 1.4A, for completion. The students are given 10 points in the teacher's grade book if they attempt all problems and show all work.

B: Activity/Discussion (40 min.)

Part 1: The teacher goes over the answers to the homework by writing them on the board and also reading them verbally. The commonly missed questions are gone over and worked out on the board. The teacher then asks the students which problems they had questions on, and then works out these on the board as well.

Part 2: Next, the students will continue learning how to combine like terms by starting with an activity. Each student is given a small card with two terms on it and a blank numbered worksheet to fill in their answers. Students are given the instructions for the activity. They must pair their card with another student's card by walking around the room, and then simplify the expression by combining like terms. The teacher writes one example on the board to demonstrate how students will combine two cards by adding or subtracting the like terms. Students must record their answers on their paper and repeat until all spaces are filled in, as well as show their work. During this time, the teacher circulates the room, checks student progress, and corrects their mistakes. After the students complete the activity, the teacher checks that each student has filled in the entire worksheet.



Part 3: For the second part of class, most likely after lunch, the students will continue practice on combining like terms. The teacher asks if the students have any questions on their pairing activity when they combined two sets of like terms. Next, the students are given their note sheet, 1.4A Combining Like Terms Continued. The teacher goes through the Smart Board slides to review the process of combining like terms, and the definitions of simplify, expression, coefficient, and constant. The teacher models the first few examples, and then moves to student led examples by promoting student involvement. The teacher asks the students “What is one set of like terms?” and “Which did you combine first?” For the last few examples, students are asked to work out the practice problem on their own while the teacher checks progress. Then, the answers are gone over on the Smart Board.

C. Wrap Up (the last few minutes)

The teacher summarizes the process of combining like terms and restates the key vocabulary terms. The teacher states that the homework for tonight is another worksheet on this topic. The homework will be checked for completion tomorrow. The teacher reminds the student to identify their like terms first by drawing lines between them, and then perform the operations of addition or subtraction on them. If there is extra time at the end of the period, students can begin working on this and questions will be answered.

Differentiation (including accommodations and modifications of content, materials, delivery, activity, assignment, assessment, etc.)

Content Differentiation: Struggling students who need extra support are given a second day to work on this topic. Thus, individual attention can be provided for the students who are confused since there are three teachers present in the room. Students on IEPs are given extra time to turn in their homework from last night if it is not complete, with no penalty. Students who grasp the content more quickly are able to help their partner during the activity and work ahead on the in-class practice problems. Finally, students who complete their combining of like terms with a partner can move on to finding another partner whenever they are ready and their answer is correct.

Process Differentiation: For visual learners, the students are encouraged to draw lines between the sets of like terms in order to keep their information organized. This is demonstrated on the Smart Board with different colors for each set. Furthermore, students are allowed to perform their operations in any order, and write their final answer in any order, as long as each expression is correct and simplified as much as possible.

Materials: The materials needed for this lesson include the numbered activity worksheet, a card with two terms on it for each student, the Smart Board, the note sheet, the worksheet assigned for homework, a scientific calculator, and a writing utensil.

Accommodations: For the seven students in this class on IEPs, they are given extended time to complete their in-class work and homework assignments (1.5 times). The one student on a 504 in this class receives extended time as well (1.5 times). For these students, they are given prompting to stay on task, individual repetition of directions, and daily reminders for the tasks. Two students receive breaks outside of the classroom if needed. Additionally, two students receive preferential seating close to the teacher or away from distractions.

Assessments:

Assessment of content objectives (formal and informal):

- Students will be assessed on their knowledge of how to combine like terms informally through the in-class practice during the activity. During this time, the students can be assessed through observation by the teacher as they work at their seats and move around the room.
- Students will be assessed formally through a homework assignment on this topic over combining like terms.

Assessment of language objectives (formal and informal):

- Students will be assessed informally through class participation. Since this is the second day on the topic, students will be asked “What is the difference between a coefficient and a constant?” Student must know the meaning of constant, coefficient, variable, a set of like terms, a set of unlike terms, simplified, and expression during this lesson.
- Students must also understand these main vocabulary words in order to perform operations on combining like terms on their in class activity, follow the directions on their homework, and complete all problems.

Reflection:

In this lesson, students worked for the second day on how to combine like terms. The first half of class was spent on a pairing activity, and students really enjoyed this. There is a new student present in class, and many people asked him his name, said “nice to meet you,” and were able to socialize with him. The students in this class were willing to learn and eager to get the right answer. Students were cooperative by walking around the room and communicating with as many partners as possible before the bell rang for lunch. Additionally, students were willing to ask questions of the teacher throughout the activity, as well as their peers when they were confused. The students enjoyed an alternative to direct instruction. After coming back from lunch, the students even asked if they could continue the activity. Providing an example on the board of what to do with their card and their partner’s card together was a beneficial model for this type of class. These worksheets were collected at the end of the activity in order to assess their progress informally. There were ten blank spaces provided on the worksheet. Although most students did not get to the end before lunch, it was better to have too many spaces than too few.

Lesson 3: The Distributive Property

1. Lesson Background

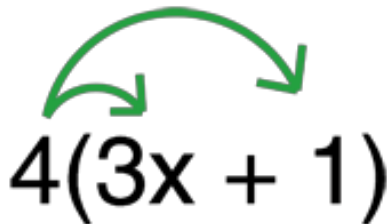
- Class: Extended Algebra I
- Period: 5ac
- Date: 9/16/14

2. Standards / Objectives

- Topic or Essential Question: How can the distributive property be used to simplify an expression?
- Standard(s) Addressed:
CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.
CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
CCSS.Math.Content.HSA-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.
- Instructional Content Objectives (measurable):
Successfully simplify expressions by using the distributive property
Successfully simplify multi-term expressions by performing the correct operations of addition, subtraction, multiplication, and division on terms with negative and positive coefficients.

3. Language

- Academic Language Functions and Forms (including key lesson vocabulary)
 - Distribution: Multiplying the term outside of the parentheses by each term inside of the parentheses


$$4(3x + 1)$$

- Variable: represents a number, ex. x
- Expression: A collection of numbers and variables with math operations (has no equal sign)
- Term: a part of a mathematical expression
- Simplify: to reduce to a smaller form by regrouping terms of the same variable
- Coefficient: the number in front of the variable
- Constant: the number that stands by itself, without the variable. Constants are like terms as well because they don't contain any variables.

$$4x^3 + 2x^2 - 3x + 1$$

coefficients **constant**

- Language Objectives
 - Be able to identify which term to distribute in an expression, based on the placement of parentheses
 - Use knowledge of the vocabulary of distribution, constant, coefficient, and terms in order to simplify an expression
 - Discuss the use of the distributive property in order to perform operations on expressions

4. Instructional Strategies/Learning Tasks

Lesson Sequence (Including opening hook and closure - include estimated time allotted next to each phase of the lesson)

A. Opening: (5 min.)

The teacher begins by checking the homework from last night for completion out of 10 points and then going over the answers. The teacher writes the answers on the board and also repeats them verbally. At this time, any problems that the students had questions on are addressed. The teacher explains that today we will learn a new method of simplifying expressions, distributing a constant outside of parentheses by multiplying every term inside of the parentheses by it.

B: Lecture/Discussion (40 min.)

Part 1: Students are introduced to the topic of distributing on the first few Smart Board slides. Each student takes notes on their note sheet. The teacher works through several examples of distributing a constant to each term inside of the parentheses. The teacher draws arrows to indicate that every term must be multiplied by this number and to help students remember this step.

Part 2: Once the teacher models several examples, the students try some practice problems on their own. As each is posted on the Smart Board, the students try it on their own note sheet. As they are working, the teacher walks around to check their progress and correct mistakes. It is important to state that when multiplying by a negative number, each term inside the parentheses will be affected by this negative. After the students are given a few minutes for each problem, the teacher goes over the correct process on the board while asking for student feedback.

Part 3: After lunch, the class will finish up the last few example problems and then the teacher will go over them. Next, the students will receive worksheet 1.4B and have the remaining class time to work on this, about ten minutes. During this time, students will work individually on simplifying these expressions while the teacher circulates the room to provide individual help.

C. Wrap Up (the last few minutes)

The students are reminded of the new property they learned today, distributing, and that all questions on the assignment involve this method. Students are told that whatever they did not complete on the worksheet is to be finished for homework. Students are encouraged to ask questions at this time or see the teacher before or after class for extra help.

Differentiation (including accommodations and modifications of content, materials, delivery, activity, assignment, assessment, etc.)

Content Differentiation: While working on the in class practice problems, student who finish early are encouraged to go on to the next problem. The teacher can correct their work on provide feedback throughout the room in this small group setting. On the other hand, students on IEPs who need extra time to complete the homework assignment are given an extension and extra support.

Process Differentiation: While utilizing the distributive property, students can multiply in any order. Each term must be correct, but the final simplified expression can be set up differently for each student. Furthermore, some students may show more steps than others in order to make sure the operations they perform are correct. Finally, students who need support performing operations on terms with negative and positive numbers can utilize their scientific calculators.

Materials: The materials needed for this lesson include the Smart Board, the Smart Board slides printed on a note sheet, the worksheet assigned for homework, a scientific calculator, and a writing utensil for each student.

Accommodations: For the seven students in this class on IEPs, they are given extended time to complete their in-class work and homework assignments (1.5 times). The one student on a 504 in this class receives extended time as well (1.5 times). For these students, they are given prompting to stay on task, individual repetition of directions, and daily reminders for the tasks. Two students receive breaks outside of the classroom if needed. Additionally, two students receive preferential seating close to the teacher or away from distractions.

Assessments:

Assessment of content objectives (formal and informal):

- Students will be assessed formally through a worksheet, WS 1.4B, given for homework that involves distributing a term outside of parentheses in order to simplify an expression. Students must complete all problems and show all necessary steps taken. Solutions to the problems will be provided during the next class period. The worksheet will be checked for completion the next day. Students will receive 10/10 points for the entire worksheet, 9/10 if one problem is left blank, 8/10 if a couple problems are left blank, etc.
- Students will be assessed informally throughout the lesson by the use of questioning, observation, and in-class work time.

Assessment of language objectives (formal and informal):

- Students will be assessed informally through their in class participation. The teacher will use questioning and answer techniques in order to get students to use correct mathematics vocabulary, such as multiplying, distribution, constant, and parentheses.
- Students will be assessed formally through their homework, WS 1.4B. Students must apply their knowledge of vocabulary in order to follow the directions and properly complete the questions.

Reflection:

During this lesson, students were asked at the beginning “What does it mean when a number is next to the parentheses?” Some students said that it “means multiplying.” Thus, students had some prior knowledge of today’s lesson on the distributive property. As is to be expected, they had the most trouble with multiplying negative numbers. At the end of this lesson, students were also introduced to writing one fraction as a sum or difference of two fractions. I used a visualization method of drawing a “heart,” two circles each around the denominator, in order to split the fraction into two. There is no work with these types of problems, just rewriting, but the students seemed to make it harder than it actually was. Through practice when given two problems during class, they were able to realize that the method was simpler than they were making it. The next time I teach this lesson, I will reiterate the fact that they are not computing anything, just splitting a fraction into two.

Lesson 4: Combining Like Terms and Distributing

1. Lesson Background


- Class: Extended Algebra I
- Period: 5ac
- Date: 9/17/14

2. Standards / Objectives

- Topic or Essential Question: How can both methods of distributing and combining like terms be used to simplify an expression as much as possible?
- Standard(s) Addressed:
CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.
CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
CCSS.Math.Content.HSA-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.
- Instructional Content Objectives (measurable):
Successfully simplify expressions that require both combining like terms and distributing
Recognize that each step is necessary and use the distributive property before combining like terms
Successfully simplify multi-term expressions by performing the correct operations of addition, subtraction, multiplication, and division on terms with negative and positive coefficients
Successfully write a two-term expression with one variable, a coefficient, and a constant

3. Language

- Academic Language Functions and Forms (including key lesson vocabulary)
 - Distribution: Multiplying the term outside of the parentheses by each term inside of the parentheses


$$4(3x + 1)$$

- Variable: represents a number, ex. x
- Expression: A collection of numbers and variables with math operations (has no equal sign)
- Term: a part of a mathematical expression
- Like terms: parts of an expression whose variable patterns are the same (ex. $4x^2$ and $-2x^2$)

Combine like terms.

A. $2x + 5x - 4y + 3$

$$\textcircled{2x} + \textcircled{5x} - \boxed{4y} + \boxed{3}$$

$$7x - 4y + 3$$

- Simplify: to reduce to a smaller form by regrouping terms of the same variable
- Coefficient: the number in front of the variable
- Constant: the number that stands by itself, without the variable. Constants are like terms as well because they don't contain any variables.

$$4x^3 + 2x^2 - 3x + 1$$

coefficients constant

- Language Objectives
 - Correctly identify the like terms and parentheses of an expression
 - Correctly describe the different parts of the expression in a written explanation
 - Write and discuss the difference between a coefficient and a constant
 - Successfully write an two term expression with one variable, a coefficient, and a constant

Write a 2-term expression with 1 variable, a coefficient of -4 and a constant of 7

You write... $-4x + 7$

coefficient constant

4. Instructional Strategies/Learning Tasks

Lesson Sequence (Including opening hook and closure - include estimated time allotted next to each phase of the lesson)

A. Opening: (5 min.) The teacher checks the homework from yesterday on distributing for completion. The teacher goes over the answers to the homework as well as writes them on the board. The teacher answers any questions at this time. Next, the teacher discusses that today we will combine our knowledge of what we have learned the past few days in order to simplify more expressions. Specifically, we will be distributing a constant first, and then combining any like terms in an expression.

B: Lecture/Discussion (40 min.)

Part 1: The teacher discusses how both methods will be used to simplify an expression. The teacher points out that simplifying an expression does not change the problem, we are just rewriting it in a different way. The distribution property must be used first whenever there are parentheses present in the expression. Then one the parentheses are gone, the next step is to combine all like terms. The teacher models several examples of the board. The teacher

emphasizes the importance of distributing the negative sign if there is one with the constant outside of the parentheses.

Part 2: After the teacher models several problems on the Smart Board, the students attempt the problems on their own first. The teacher will post one problem on the Smart Board slide that they have in their written notes, and ask them to do it at their seats. As this is happening, the teacher circulates the room, checks student progress, and corrects any mistakes. After a few minutes is given to work on the problem, the teacher writes out the work on the Smart Board by asking students questions like “What is your first step?” “Why did you do it in that order?” The teacher uses questioning techniques to get students to explain their work verbally after they have written it out.

Example practice problem:
Simplify the following expression:

$$6(7 - 3y) + 6(y + 1)$$

Part 3: Once the class has gone through all of the example problems on the note sheet, the teacher passes out the homework assignment for tonight. If there is extra time in the period after lunch, students will begin to work on this during class time. The teacher explains that students must show all work on their process of combining like terms and distributing so that the point of mistakes can be found. The teacher circulates around the room as students are working on this assignment.

C. Wrap Up

The teacher summarizes what the class has done today, extended our knowledge of what we learned in previous lessons in order to simplify longer and more complicated expressions. The teacher states that tomorrow we will spend working on these types of problems by reviewing on the individual dry erase boards after going over the homework.

Differentiation (including accommodations and modifications of content, materials, delivery, activity, assignment, assessment, etc.)

Content Differentiation: Students who finish the in class practice problem more quickly are asked to move on to the next problem in their notes while other students are working. This way, each student has something to work on while still working at his or her own pace as the teacher checks student progress. Students on IEPs who need extra time to complete the homework assignment are given an extension.

Process Differentiation: Students must distribute before combining like terms. However, they can combine like terms in any order and write their final answer in any order. Students are given flexibility in how they arrive at their simplified expression. Furthermore, students who are struggling with this process are asked to draw arches between their constant and each term they are distributing to in order to make sure that each term is taken care of.

Materials: The materials needed for this lesson include the Smart Board, the Smart Board slides printed on a note sheet, the worksheet assigned for homework, a scientific calculator, and a writing utensil for each student.

Accommodations: For the seven students in this class on IEPs, they are given extended time to complete their in-class work and homework assignments (1.5 times). The one student on a 504 in this class receives extended time as well (1.5 times). For these students, they are given prompting to stay on task, individual repetition of directions, and daily reminders for the tasks. Two students receive breaks outside of the classroom if needed. Additionally, two students receive preferential seating close to the teacher or away from distractions.

Assessments:

Assessment of content objectives (formal and informal):

- Students will be assessed formally through a worksheet on combining like terms and distributing, WS 1.4C. Students must apply their knowledge from the lessons one and two days prior in order to simplify expressions that require both combining like terms and distributing. Students must complete all problems and show all necessary steps taken in this multiple step process. The worksheet will be checked for completion the next day. Students will receive 10/10 points for the entire worksheet, 9/10 if one problem is left blank, 8/10 if a couple problems are left blank, etc.
- Students will be assessed informally throughout the lesson by their amount of active participation in answering questions, reviewing the topics, and observation on their in-class work as the teacher walks around the room.

Assessment of language objectives (formal and informal):

- Students' knowledge of the terms that correspond with distributing and combining like terms will be assessed formally through worksheet 1.4C. They must successfully write a two term expression with a variable, a coefficient, and a constant. Furthermore, students must use their knowledge of the phrases the distributive property, like terms, simplify, parentheses, and expression in order to properly rewrite an expression.
- Students' knowledge of vocabulary terms will be assessed informally during class time by their participation on the examples. Students will volunteer their answers and must explain their problem solving process using the mathematical language learned in class, such as distribute, multiply, variable, term, addition, and subtraction.

Reflection:

In this lesson, the students had a good grasp on the idea that now we are combining both the distributive property and combining like terms to simplify an expression. Many students answered questions during class when asked, "Someone give me an example of two terms I can combine" and "What is my first step?" Several students also volunteered to come up to the board and show their work. Students understood that we must first get rid of the parentheses. However, while working in class on the worksheet after lunch, several students only distributed and forgot to combine like terms after that. Through circulating around the room and checking progress, I was able to prompt students by asking "What must you do next?"

At the end of the lesson, students were writing their own expression given information that must be present in it. Students had a hard time memorizing the difference between a coefficient and a constant at first, even though it was in their notes the day of Lesson 1. Thus, the definitions were written down again on the Smart Board in order for students to give themselves a reminder on their paper. When students volunteered writing their own expression on the board, I explained to the class the steps that student was taking in order to emphasize how to write our own expression.

Lesson 5: Combining Like Terms and Distributing (Continued)

1. Lesson Background


- Class: Extended Algebra I
- Period: 5ac
- Date: 9/18/14

2. Standards / Objectives

- Topic or Essential Question: How can both methods of distributing and combining like terms be used to simplify an expression as much as possible?
- Standard(s) Addressed:
CCSS.MATH.CONTENT.HSA.SSE.A.1.A Interpret parts of an expression, such as terms, factors, and coefficients.
CCSS.MATH.CONTENT.HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
CCSS.Math.Content.HSA-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.
- Instructional Content Objectives (measurable):
Successfully simplify expressions that involve both the distributive property and combining like terms
Recognize when both steps are necessary and distribute before combining like terms
Successfully simplify multi-term expressions by performing the correct operations of addition, subtraction, multiplication, and division on terms with negative and positive coefficients

3. Language

- Academic Language Functions and Forms (including key lesson vocabulary)
 - Distribution: Multiplying the term outside of the parentheses by each term inside of the parentheses


$$4(3x + 1)$$

- Variable: represents a number, ex. x
- Expression: A collection of numbers and variables with math operations (has no equal sign)
- Term: a part of a mathematical expression
- Like terms: parts of an expression whose variable patterns are the same (ex. $4x^2$ and $-2x^2$)

Combine like terms.

A. $2x + 5x - 4y + 3$

$$\textcircled{2x} + \textcircled{5x} - \boxed{4y} + \boxed{3}$$

$$7x - 4y + 3$$

- Simplify: to reduce to a smaller form by regrouping terms of the same variable
- Coefficient: the number in front of the variable
- Constant: the number that stands by itself, without the variable. Constants are like terms as well because they don't contain any variables.

$$4x^3 + 2x^2 - 3x + 1$$



- Language Objectives
 - Write an expression that has a coefficient, a variable to a certain degree, and a constant
 - Discuss what it means to use the distributive property, identify like terms, and combine like terms
 - Use knowledge of key vocabulary terms by following the directions to simplify an expression
 - Identify and write about parts of an expression using key vocabulary

4. Instructional Strategies/Learning Tasks

Lesson Sequence (Including opening hook and closure - include estimated time allotted next to each phase of the lesson)

A. Opening: (5 min.) The teacher begins by checking worksheet 1.4C, last night's homework. The teacher then goes over the answers and also writes them on the board. At this time, students may ask questions about any parts of the homework that they did not understand. Today, we will spend a second class period simplifying expressions. We will do a review on dry erase boards for each student while the questions are posed on the Smart Board.

B: Activity/Discussion (40 min.)

Part 1: The first student in each row is asked to pass out a dry erase board, marker, and paper towel for each student in their row. A practice problem is posted on the Smart Board and the students are given time to work on the problem at their seat. The teacher circulates around the room in order



to check student understanding of yesterday's lesson, distributing and combining like terms in order to simplify an expression. The teacher provides feedback to the students as they are working on a problem.

Part 2: After students try a problem on their own, the teacher goes over the work and answer on the board. Students are also asked to volunteer to come up to show their work on the Smart Board while the teacher talks through it. The teacher asks for student input with questions such as "What step did you take first?" and "How do we combine these two terms together?" At this time, the teacher corrects any misconceptions and reinforces the concepts learned yesterday. The students then erase their answers on the dry erase board, and this same procedure is used for each practice questions posted on the Smart Board.

Part 3: After lunch, the students finish up the last few problems on their dry erase board. After this, the teacher discusses the common mistakes and restates the procedure for simplifying an expression. One must distribute to the terms inside of the parentheses first, and then combine like terms. At this time, if there is extra time remaining in the period, students will begin working on worksheet 1.4D. The teacher will check their work as they begin these problems by walking around as they are at their seat.

C. Wrap Up

The teacher states that WS 1.4D must be completed for homework and will be gone over tomorrow. At this time, the teacher addresses any last minute questions. The teacher also states that since this is our second day spent on the topic, we will be moving on to Patterns, Equations, and Graphs tomorrow. Combining like terms and distributing are important topics to understand in order for us to move on.

Differentiation (including accommodations and modifications of content, materials, delivery, activity, assignment, assessment, etc.)

Content Differentiation: Students who finish the in class practice problem more quickly are asked to move on to the next problem in their notes while other students are working. This way, each student has something to work on while still working at their own pace as the teacher checks student progress. Students on IEPs who need extra time to complete the homework assignment are given an extension.

Process Differentiation: Students must distribute before combining like terms. However, they can combine like terms in any order and write their final answer in any order. Students are given flexibility in how they arrive at their simplified expression. Furthermore, students who are struggling with this process are asked to draw arches between their constant and each term they are distributing to in order to make sure that each term is taken care of.

Materials: The materials needed for this lesson include the Smart Board, the worksheet assigned for homework, a scientific calculator, a dry erase board, a marker, and a paper towel for each student.

Accommodations: For the seven students in this class on IEPs, they are given extended time to complete their in-class work and homework assignments (1.5 times). The one student on a 504 in this class receives extended time as well (1.5 times). For these students, they are given prompting to stay on task, individual repetition of directions, and daily reminders for the tasks. Two students receive breaks outside of the classroom if needed. Additionally, two students receive preferential seating close to the teacher or away from distractions.

Assessments:Assessment of content objectives (formal and informal):

- Through an in-class activity, students will be assessed informally on their ability to apply their knowledge of the content learned yesterday, both combining like terms and distributing. Students will work on simplifying these expressions in class on white boards in order to reinforce the procedure. Students are asked to volunteer their answers and come up to the Smart Board, showing their work and explaining their reasoning to the class. Thus, they will be assessed through informal observation.
- Students will be assessed formally through their homework tonight, WS 1.4D. Students in Extended Algebra spend two days on a lesson such as this. Students must complete all problems and show all necessary steps taken.

Assessment of language objectives (formal and informal):

- Students are informally assessed through observation on their dry erase boards. They are observed on their ability to write a two-term expression that contains a coefficient, a variable, and a constant. Furthermore, they are assessed on the explanation of how to distribute and combine like terms when coming up to the Smart Board.
- Lastly, students must use their knowledge of the lesson's key vocabulary terms in order to follow directions and complete the homework assignment, for example a simplified expression versus an unsimplified expression. They must identify the parts of an expression -- the constants, coefficients, variables, a set of like terms, and a set of unlike terms -- and write about them with explanations by answering the homework questions. Students will be translating from mathematical symbols to writing words and definitions of these terms.

Reflection:

This final lesson was a wrap up of the topics that we have spent the last four days on, simplifying expressions. This activity was beneficial because students were able to engage with their learning by each having an individual white board. Furthermore, it was interactive because each student must be participating and they can hold up their answer when they were done. These practice problems took longer than expected because these students still continued to struggle with first distributing then combining like terms. After getting the hang of it, their addition or subtraction with negative numbers still needed some reinforcement and error correction. Due to the lesson taking longer than expected because students did not quickly arrive at the answer, there was not any time left at the end of class for students to start the homework. The homework was passed out with five minutes left and discussed part by part, but students will have to complete the entire worksheet at home or in study hall. For these struggling students, they usually need time in class to get started.