1. LESSON CONTEXT AND RATIONALE

| Culture and Context | The target population of this lesson is a single class, consisting of twenty-eight students, of seventh grade mathematics students at B. Middle School. The classroom is homogeneous in the sense that this is a general education classroom and not an inclusion class with a large number of students requiring special educational accommodations. Nevertheless, there are certainly different levels of ability within the classroom. There are many high achieving students who consistently make good grades and demonstrate high levels of understanding. At the same time, there are those students who are low achieving or lack motivation. Additionally, there is one student with a 504 plan for attention deficit disorder who is to be allowed time and a half on in class assessments. With these factors in mind, I have designed my lesson to be appropriate for all students by utilizing techniques of differentiation and by maintaining a caring and respectful classroom community. The students’ understanding of the material covered in this lesson is vital not only to the rest of their mathematical careers, but also to their every day lives. The content of this lesson relates to planning and organization, skills that can be applied almost anywhere. I intentionally use real-world applications in my examples because I want students to understand the relevance of mathematics. I have incorporated a few different pedagogical approaches in this lesson, but they center on providing differentiated instruction and assessment and student choice. To differentiate, I focus my teaching on key concepts and critical thinking to create pathways for student learning (Tomlinson, 2001). I do this by starting with an open-ended task which will lead into guided instruction based on student discovery. I also cater to different learning styles by utilizing multiple means of representation and engagement. (In this lesson, I use manipulatives and real-world examples.) Another thing I do is to provide a level of autonomy to my students, in this case when it comes to assessment. I use both open questions and parallel tasks in my worksheet and ticket out the door. This is another way to differentiate, as described by Small & Lin (2010). Furthermore, providing students with autonomy, as well as allowing them room to express themselves, helps build a caring and respectful classroom community (Weinstein & Novodvorsky, 2011). |
| Identity and Intellectual Development | N/A |
| Lesson Rationale | I believe that the content of this lesson is extremely important to my students. First, the numerical elements of this lesson will reinforce what the students should have learned in the previous unit on operations with rational numbers. Secondly, this lesson will allow students to move onto further subjects in algebra such as solving variable equations, a cornerstone of secondary mathematics. The seventh grade math curriculum touches upon the foundations of many areas including algebra, geometry, and probability and statistics. The ability to simplify rational expressions, like the rest of the skills presented in this class, will help produce more mathematically competent young adults in the future. Indeed, there are clear connections that can be made between this |
lesson and some career skills and every-day activities. That is why I have incorporated as many practical examples as possible into my lesson. The purpose of this exercise is to build a foundational skill of mathematics and connect this skill to areas outside of the classroom.

Management
There are multiple management techniques in place in the classroom of which I can make use. One of these is the behavior card that each student is issued weekly. I like this procedure because it is a way to enforce behavior without being too disruptive. If I feel that the students are at any time getting out of hand, I will ask them to all have their behavior cards out on their desks. Another technique already in place is for me to raise my hand and wait silently for students to follow suit. This is a good way to get students quiet between tasks without raising my voice. I will greet students at the entrance of the classroom as they come in, and I will collect a ticket out the door from each student as he or she leaves.

2. STANDARDS & REQUIREMENTS

2. CCGSP or GPS Standard(s)
MCC7.EE.1 – Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients
MCC7.EE.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.

IEP Goal(s) and Benchmarks
There is one student in this class, A.J., who has a 504 plan. It states on his plan that he requires extra time on in-class assessments. There are no students with physical challenges in this classroom.

Modification(s)/Accommodation(s)
The only assessment I am administering in this lesson is a ticket out the door. Since this assessment is not for a formal grade but rather is intended as a check for understanding, I will provide everyone in class the same amount of time for this assignment. If Austin does not finish the ticket out the door, he may choose to hand it in as it is (without fear of consequence), or I will allow him up to five minutes after the end of class and write him a late pass.

Differentiation
There are multiple students in this class who are high achievers. Many students are performing at if not above grade level. There is one particularly intelligent student, K. E., who tends to be disruptive in class. For this reason, he is placed away from other students in the class seating chart. For these gifted students, I have provided choice in parallel tasks and open-ended questions. These tasks aim to extend the thinking of students who are prepared to challenge themselves. At the same time, open-ended and parallel tasks can extend the opportunity to be successful to students who are under-performing. Some of the low achieving students in this class genuinely try and fail to grasp the material, but the larger problem, I would say, is lack of motivation. Therefore, I have strived to make the material engaging to many different kinds of learners.

3. RESOURCES

Academic Language
This lesson will require students to understand and respond to both written and spoken instructions. Any set of instructions that students receive in writing will also be communicated verbally for students who have difficulty with reading comprehension. All students will be asked to produce a productive written language task on their exit tickets, and volunteers will be asked to speak in front of the class. The main required language skill,
though, will be in recognizing and producing mathematical notation and symbols including rational numbers, variables, and mathematical operations. The most challenging aspect of this will probably be working with variables. This is not a new concept to students, but they have not seen it explicitly yet this year. Otherwise, the representational language demands should not be too challenging for students. Much of the academic vocabulary in this lesson has been used throughout the previous unit, and any more recent relevant vocabulary, such as “distributive” and “commutative,” will be reinforced.

### Language Functions
The key language function in this lesson is to compare and contrast. One of the key focus points of this lesson is learning how to recognize like terms. This means students will need to understand how one variable is the same or different from another and why terms like $x$ and $x^2$ are different and cannot be combined.

### Language Vocabulary
This lesson will include content-specific vocabulary. Such terms include variable, like terms, coefficient, constant, expression, and equation.

### Materials
This lesson will begin with an activity involving algebra cubes to get students active and interested. Then, for my guided instruction, I will give students handouts with a few exercises on them. I will also ask students to have three or four different colored pencils, pens, markers, etc. They may use their own, or I will provide them for the class. I will also have a SmartBoard presentation with the same problems on students’ worksheets so that we can formulate solutions on the SmartBoard. Finally, students will be given a ticket out the door activity which they will complete before the end of class.

### Technology
The technology feature of this lesson will be the use of the SmartBoard. Both instructor and students will use this resource. The SmartBoard technology is useful in this lesson because of its capabilities such as moving around objects and allowing for different shapes and colors to be easily utilized.

### 4. LESSON PROCEDURE

#### Enduring Understanding
The broad idea surrounding this lesson is learning how to make a mathematical expression more useful by rewriting it in a different form using operations with rational numbers and the properties of algebraic expressions. In my exercises posed to students, I have highlighted several of the applications of this skill that exist outside of my lesson and this classroom such as leaving a tip at a restaurant, shopping for ingredients, and tiling a floor. In that last task, I let students essentially create and solve their own problem, as “students are often motivated to solve open-ended tasks that they generate themselves” (Bush & Greer, 1999, p. 17).

#### Essential Question(s)
In this lesson, students will apply their knowledge of the properties of operations to expand, rewrite, and simplify algebraic expressions with rational coefficients. *(How do I simplify mathematical expressions?)* They will also discuss and understand why this is important. *(How is simplifying mathematical expressions useful?)*

#### Lesson Objective(s)
By the end of this lesson, students will be able to simplify mathematical expressions with rational coefficients (i.e. including negative numbers, fractions, and decimals) by combining like terms. They will also understand how this is useful in the context of a problem.

#### Assessment Link
I will measure students’ understanding by using the questions on my ticket
out the door assignment. I will also explicitly ask students to describe one way in which this can be useful in real-life situations.

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<tr>
<th>Introduction to Lesson</th>
<th>The hook for this lesson will be a brief but fun and creative activity in which I ask students to create their own sculptures using algebra blocks, count how many of each type of tile they used, and use this to write a simplified algebraic expression. This is an easy way for the students to see how algebraic expressions translate to the physical world and what it means for an expression to be simplified. Allowing students to be creative and having an activity that ties into real physical objects promotes higher-level thinking. The warm-up should take 10 to 15 minutes.</th>
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| Body of Lesson | ● Body of lesson will consist of guided practice involving questions of increasing difficulty  
● Student response and participation will be a large part of the lesson  
● Students will learn how to simplify expressions by representing like terms as different colors and/or shapes  
● Word problems will be used to connect learning to real life  
● Plan for 30 minutes of instruction  
● Questions to promote thinking:  
  ➢ What is the difference between an expression and an equation?  
  ➢ What is the coefficient of “x” by itself?  
  ➢ How is x different from $x^2$? Why can’t these terms be combined?  
  ➢ What can negative coefficients represent in the real world? |
| Closure | The closure of my lesson will be in the form of a “ticket out the door” assessment. The assignment will consist of one open ended task, three closed tasks, and one writing prompt asking students about how the lesson is applicable. The tasks will require that the students understand the lesson's objectives as well as material from the prior lesson on the distributive property and the previous unit on operations with rational numbers. The closure should take 10 minutes to complete. |

5. ASSESSMENT

| Evaluation (Assessment Plan for IEP Goals and/or 504 Plans) | The formative assessment of this lesson will take place informally throughout the class period. I will ask students to share their thoughts and conclusions with the class voluntarily, and I will pick on as many students as possible for this. Here, I will provide verbal feedback as needed either in the form of praise or correction. I will use the vocabulary and academic language of this lesson throughout the period, and I will encourage my students to do so as well. They should also be able to comprehend the vocabulary of this lesson when completing their exit tickets, my summative assessment for this lesson. This is the assignment that will tell me whether or not the students have mastered the material of this lesson. I will know that they have succeeded in understanding the main focus of this lesson when they are able to simplify expressions with rational (i.e. negative, fractional, and decimal) coefficients and describe how this skill is useful in terms of a real-life situation. Students will receive written feedback on this assignment in the next class period. |

6. REFLECTION

| Analyzing Teaching Effectiveness | N/A |
References


