

Lesson Plan Template

Grade: 9 th Grade		Subject: Algebra	
Materials: Color Tokens, Notebook, Pencil		Technology Needed: None	
Instructional Strategies: <input type="checkbox"/> Direct instruction <input type="checkbox"/> Peer teaching/collaboration/ cooperative learning <input type="checkbox"/> Guided practice <input type="checkbox"/> Visuals/Graphic organizers <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> PBL <input type="checkbox"/> Learning Centers <input type="checkbox"/> Discussion/Debate <input type="checkbox"/> Lecture <input type="checkbox"/> Technology integration <input type="checkbox"/> Modeling <input type="checkbox"/> Other (list) – Manipulatives		Guided Practices and Concrete Application: <input type="checkbox"/> Large group activity <input type="checkbox"/> Hands-on <input type="checkbox"/> Independent activity <input type="checkbox"/> Technology integration <input type="checkbox"/> Pairing/collaboration <input type="checkbox"/> Imitation/Repeat/Mimic <input type="checkbox"/> Simulations/Scenarios <input type="checkbox"/> Other (list) Explain: We will begin with a large group discussion, and I will teach students how to use the tokens as a group. Then, I will have them work with a partner to solve some problems using the tokens.	
Standard(s) HS.A-APR.1: Add, subtract, and multiply polynomials.		Differentiation <p>Below Proficiency: These students will struggle the most with this lesson. My hope is that most of them can at least grasp the idea of grouping like terms together. Then, I am also hoping that giving them a visual description with the tokens will help them to at least perform the addition operations. I expect these students to struggle with subtraction and negative numbers. This is where I am hoping their partners, who have a high understanding of the material, will be able to help them.</p> <p>Above Proficiency: Students who are above proficiency will be very comfortable grouping like terms and adding or subtracting them. They also should have a stronger grasp of how to use the tokens to understand negative numbers well. These students will be paired with students who are struggling, and they will act like tutors, guiding these students to a greater understanding of the material.</p> <p>Approaching/Emerging Proficiency: Students who are approaching proficiency should be comfortable grouping their like terms together. They should also be comfortable with the idea that adding and subtracting polynomials is about adding and subtracting coefficients. The main struggle that I expect from this group of students is that they may have difficulty working with negative numbers. My hope is that using the tokens will help them to understand this.</p> <p>Modalities/Learning Preferences: Visual learners, math manipulatives, partner work, direct instruction</p>	
Objective(s) Students will learn how to add and subtract polynomials during this lesson. "I can add and subtract polynomials of any degree." Bloom's Taxonomy Cognitive Level: Applying, Analyzing			
Classroom Management- (grouping(s), movement/transitions, etc.) <ul style="list-style-type: none"> Students should leave the tokens aside until asked to use them. Students should listen attentively as the first example is presented. Students should follow along, using their tokens to perform the addition and subtraction in each example. Students are expected to move quickly and quietly to sit next to their partner. Students are expected to cooperate with their partner. 		Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules, and expectations, etc.) <ul style="list-style-type: none"> Students are expected to respect the teacher and listen attentively. Students are expected to not be distracted by the manipulatives. Students are expected to respect each other as they work in pairs. 	
Minutes	Procedures		
3-4 min	Set-up/Prep: I would begin class by handing out the tokens to each student so that everyone has at least 15 tokens. Then, I would ask students to take out their notebooks.		

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3-4 min	<p>Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.) I would begin by asking students what they remember from our discussion about polynomials the previous day. They should recall the idea of like terms and how it is significant in classifying polynomials. I will use this to begin our discussion about addition and subtraction of polynomials. “When we add and subtract polynomials, we add and subtract the like terms.”</p>		
15-20 min	<p>Explain: (concepts, procedures, vocabulary, etc.) Next, we will look at a simple example where we are adding and subtracting monomials, such as $x + 3x$ and $5x^2 - 2x^2$. To do this, I will have students place their tokens in front of them. The lighter side of the tokens will represent positive numbers, while the darker side of the token will represent negative numbers. It is important to understand that combining one lighter token with one darker token will result in the two tokens “cancelling out.” We will use these tokens to represent the coefficients of each x term. In the addition problem, this will look like adding 3 lighter counters to 1 lighter counter to yield 4 counters which is equivalent to $4x$. In the subtraction problem, we will start with 5 lighter counters, and we must remove 2 of these counters, leaving us with 3 counters or $3x^2$.</p> <p>Next, we will cover the situation where the number that we are subtracting is greater than the number that we are subtracting from, for example $3x^2 - 7x^2$. In this case, we would begin with 3 lighter tokens. Then, to give us enough tokens to subtract 7, we must add more 4 more lighter tokens. Then, to ensure that we have not changed the problem, we must add 4 more dark tokens as well (the equivalent of adding 0). Finally, when we remove 7 tokens, we are left with 4 “negative” tokens or $-4x^2$.</p> <p>Finally, we will cover the case where we are subtracting a negative number, such as $7x - (-2x)$. To do this, we will perform a similar operation as the one above. We will begin with 7 lighter tokens. Then, we want to take away two darker tokens, but we do not have any dark tokens to take away. Therefore, we must add 2 dark tokens so that we can remove them. When we do this, we must also add two lighter tokens so that we are not changing the problem. Finally, when we remove the darker tokens, we are left with 9 lighter tokens or $9x$.</p> <p>Then, I will write down some problems on the board for students to work on in pairs.</p>		
10-15 min	<p>Explore: (independent, concrete practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions) The problems that students are asked to work on will be a mixture of addition and subtraction problems. Some of them will include monomials, while some of them will contain larger polynomials. If students struggle to understand what to do here, I will remind them that they can only add and subtract like terms. This should help them understand how to group the different terms together and perform the necessary operation.</p> <p>I will choose partners for the students, and then I will write the problems down on the board. Each student will be expected to submit their work, and I will simply grade based on completion. Students may not finish all the problems, but if the turn something in, they will receive full credit. Students will also be expected to use tokens to help them solve the problems.</p> <p>Problems that students will have to work on include:</p> <ol style="list-style-type: none"> 1) $x + 7x$ 2) $4x - 10x$ 3) $5x^2 - 7x^2$ 4) $7x^4 + 9x^4$ 5) $x^2 - 2x - x^3 + 7x$ 6) $x^5 + x^3 - 7x^5 + 5x^3$ 7) $x^3 - 2x^2 + x - (2x^3 - 3x - 3)$ 		
3-5 min	<p>Review (wrap up and transition to next activity): We will conclude class by talking about any questions that the students struggled with. I will also ask for student feedback on whether they found the tokens to be helpful in performing the necessary operations. If students have no further questions, I will allow them to continue working until the bell rings.</p>		
<table border="1" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Formative Assessment: (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc. I will assess students based on how engaged they are as they are working with their partner. If students are not participating as much, I</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Summative Assessment (linked back to objectives) End of lesson: Students will receive full credit for the submission of their work, but I will still assess how students were responding to each question to see which students are struggling and which ones are doing well.</p> </td> </tr> </table>		<p>Formative Assessment: (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc. I will assess students based on how engaged they are as they are working with their partner. If students are not participating as much, I</p>	<p>Summative Assessment (linked back to objectives) End of lesson: Students will receive full credit for the submission of their work, but I will still assess how students were responding to each question to see which students are struggling and which ones are doing well.</p>
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will walk over to check on them. I will also be walking around the classroom as students are working.

Consideration for Back-up Plan:

If students are struggling to understand how to use the tokens, I will tell them to color code each of their like terms. Then, I will ask them to write down the coefficients for each term and use their calculator if necessary.

If applicable- overall unit, chapter, concept, etc.:

Students will be expected to know how to add and subtract polynomials on a test.

Reflection (What went well? What did the students learn? How do you know? What changes would you make?):

Solutions to problems done in class:

- 1) $8x$
- 2) $-6x$
- 3) $-2x^2$
- 4) $16x^4$
- 5) $-x^3 + x^2 + 5x$
- 6) $-6x^5 + 6x^3$
- 7) $-x^3 - 2x^2 + 4x + 3$