Madelyn Hunter Lesson Cycle - Lesson Plan Template

Teacher: Mr. Rodriguez	**Date:** April 8, 2025
Subject Area: Mathematics (Algebra I)	**Grade Level:** 8th Grade

Objective/Purpose:
(The student expectations must be clearly defined and in line with the district/state standards. For the student's benefit, explain what students will be able to do by the end of the lesson and why these objectives are important to accomplish.)

By the end of this lesson, students will be able to:
• Solve systems of linear equations using the substitution method
• Identify when a system has one solution, no solution, or infinitely many solutions
• Check their solutions by substituting back into both original equations
• Apply systems of equations to solve real-world problems

This skill aligns with Common Core Standard 8.EE.C.8 and is essential for success in high school algebra and beyond. Systems of equations appear frequently in real-world applications such as business, engineering, and science. Mastering the substitution method provides students with a reliable algebraic tool for solving complex problems and prepares them for more advanced mathematical concepts like matrices and linear programming.

Materials/Resources/Equipment Needed:
• Individual whiteboards and dry erase markers
• Graphing paper and rulers
• Scientific calculators
• Interactive whiteboard/projector
• Systems of equations practice worksheet
• Real-world problem scenario cards
• Algebra tiles (optional for visual learners)
• Exit ticket slips
• Substitution method reference sheet

Anticipatory Set:
(Before you dig into the meat of your lesson's instruction, set the stage for your students by tapping into their prior knowledge and giving the objectives a context. What activities will you use to focus students on the lesson for the day?)

Present this real-world scenario: "The school is selling tickets for the spring play. Adult tickets cost $8 and student tickets cost $5. If they sold 120 tickets total and made $750, how many of each type of ticket did they sell?" Give students 3 minutes to work with a partner to set up equations. Most will struggle to solve it, creating the need for today's lesson. Have pairs share their equation setup: A + S = 120 and 8A + 5S = 750. Acknowledge their great work setting up the system and explain that today we'll learn a systematic method called substitution to solve these types of problems. Connect to prior knowledge by asking students to solve simple equations like x + 3 = 7 to remind them of inverse operations.

Instructional Delivery:
(What information is essential for the student to know before beginning and how will this skill be communicated to students? This is the section where you explicitly delineate how you will present the lesson. Direct instruction? Small group? Centers? The instruction could include a variety of instructional delivery methods.)

Direct Instruction (20 minutes):
• Introduce the substitution method using a simple system: y = 2x and x + y = 9
• Demonstrate the four-step process: 1) Solve for one variable, 2) Substitute, 3) Solve, 4) Find the other variable
• Show how to check the solution by substituting into both original equations
• Work through a second example with the class: 2x + y = 7 and x - y = 2

Interactive Practice (15 minutes):
• Students work example problems on individual whiteboards
• Use "Show Me" technique where all students hold up their boards simultaneously
• Address common misconceptions immediately

Differentiated Instruction:
• Visual learners: Use color-coding for each step
• Kinesthetic learners: Provide algebra tiles for concrete manipulation
• Advanced learners: Introduce systems with fractions or decimals

Model:
(If you will be demonstrating the skill or competence, how will this be done?)

I will model the complete substitution process using the system: 3x + 2y = 16 and y = x - 2

Step-by-step demonstration:
1. **Identify the variable already solved:** "I notice y is already isolated in the second equation"
2. **Substitute:** "I'll replace y in the first equation with (x - 2): 3x + 2(x - 2) = 16"
3. **Solve for x:** "3x + 2x - 4 = 16, so 5x = 20, therefore x = 4"
4. **Find y:** "Substitute x = 4 into y = x - 2, so y = 4 - 2 = 2"
5. **Check:** "Verify in both equations: 3(4) + 2(2) = 16 ✓ and 2 = 4 - 2 ✓"

I'll think aloud throughout, emphasizing decision-making: "Why did I choose this equation to substitute from?" and "How do I know my answer is correct?"

Check for Understanding:
(Identify strategies to be used to determine if students have learned the objective.)

• **Whiteboard checks:** Students solve problems and hold up boards for immediate feedback
• **Think-Pair-Share:** "What's the first step in solving this system?"
• **Fist-to-Five:** Students rate their confidence level (1-5) after each example
• **Random questioning:** Cold call students to explain their reasoning
• **Error analysis:** Present incorrect solutions and ask students to identify mistakes
• **One-minute write:** "Explain the substitution method in your own words"
• **Observation:** Circulate during practice to identify students needing additional support
• **Thumbs up/down:** Quick comprehension checks throughout instruction

Guided Practice:
(Under your supervision, students are given the chance to practice and apply the skills you taught them through the instructional delivery.)

Structured Partner Practice (20 minutes):
Students work in pairs to solve systems using provided worksheet. Problems progress in difficulty:
• Level 1: One equation already solved (y = 3x + 1 and 2x + y = 11)
• Level 2: Need to solve for one variable first (x + 2y = 8 and 3x - y = 5)
• Level 3: Real-world application problems

Teacher's Role:
• Circulate and provide targeted feedback
• Ask probing questions: "Why did you choose to solve for that variable?"
• Encourage peer teaching: "Can you explain your method to your partner?"
• Identify and address common errors immediately
• Provide additional scaffolding for struggling students

Student Accountability:
• Partners must show all work and check solutions
• Each student solves alternate problems to ensure individual understanding
• Pairs present one solution method to another pair

Closure:
(What method of review and evaluation will be used to complete the lesson? How will you wrap up the lesson by giving the lesson concepts further meaning for your students?)

Wrap-up and Reflection (8 minutes):
• Return to the opening problem about play tickets and solve it together using substitution
• Answer: 70 adult tickets and 50 student tickets
• Ask students to reflect: "When might substitution be easier than graphing?"
• Quick review of the four-step process using student volunteers
• Address any remaining questions or misconceptions

Connection to Future Learning:
• Preview tomorrow's lesson on elimination method
• Explain that substitution is one of three methods they'll master
• Connect to real careers: "Engineers use systems of equations to design bridges and buildings"

Student Self-Assessment:
• "Rate your confidence solving systems using substitution on a scale of 1-10"
• "What's one thing you want to practice more before tomorrow?"

Independent Practice:
(List the assignment(s) that will be given to the students to ensure they have mastered the skill without teacher guidance.)

Homework Assignment:
Complete problems 1-15 on the "Systems by Substitution" worksheet:
• Problems 1-8: Basic substitution practice with varying difficulty
• Problems 9-12: Word problems requiring students to set up and solve systems
• Problems 13-15: Challenge problems including systems with no solution or infinite solutions

Success Criteria:
• Show all four steps of the substitution process
• Check solutions in both original equations
• Write final answers as ordered pairs (x, y)
• For word problems, define variables and write a sentence answer

Support Options:
• Reference sheet with step-by-step process provided
• Online tutorial video links for students needing extra help
• Office hours available before school for additional support

Assessment: Homework will be checked for completion and accuracy. Common errors will be addressed in tomorrow's warm-up activity.