Lesson Plan Template

Grade: 9th Grade

Subject: Algebra

Materials: GCF handout, Notebook, Pencil

Technology Needed: Calculator

Instructional Strategies:

- ☐ Direct instruction
- ☐ Guided practice
- ☐ Socratic Seminar
- ☐ Learning Centers
- ☐ Lecture
- ☐ Technology integration
- ☐ Other (list)
- ☐ Peer teaching/collaboration/ cooperative learning
- ☐ Visuals/Graphic organizers
- ☐ PBL
- ☐ Discussion/Debate
- ☐ Modeling

Guided Practices and Concrete Application:

- ☐ Large group activity
- ☐ Independent activity
- ☐ Pairing/collaboration
- ☐ Simulations/Scenarios
- ☐ Other (list)
- ☐ Hands-on
- ☐ Technology integration
- ☐ Imitation/Repeat/Mimic

Explain:

Standard(s)

HS.A.SSE.2: Use the structure of an equation to identify ways to rewrite it.

Objective(s)

In this lesson, students will learn how to identify the greatest common factor of monomials. Then, they will use this to factor binomials.
"I can find the GCF of two monomials and use this to factor expressions."

Bloom's Taxonomy Cognitive Level: Applying, Analyzing

Differentiation

Below Proficiency: These students will likely struggle once a variable is included in the expression. My goal for these students is to get them to a point where they are comfortable finding the GCF of the coefficients. Then, I will pair them with a student who is above proficiency who will be able to work with them to explain how to find the GCF of the variables. These students may also ask questions about other topics they find confusing.

Above Proficiency: Students who are above proficiency may contribute more than other students at the beginning of class because it may be easier for them to recognize the connection between examples in the previous lesson. These students will likely be very comfortable finding the GCF of both the coefficient and the variable. The challenge for them will be to start factoring any expressions that they are able to.

Approaching/Emerging Proficiency: Students who are approaching proficiency will be more comfortable with the idea of finding the GCF of integers and coefficients. They may still become confused when they try to factor expressions, especially variables. My hope is that they will benefit from working together and seeing examples on the board. I believe that by working in pairs, they will be able to catch each other's mistakes.

Modalities/Learning Preferences: building on lesson from previous class, using handouts to factor, breaking down into a two-step procedure, working with a partner, peer tutoring

Classroom Management- (grouping(s), movement/transitions, etc.)

- Students are expected to take out their handout and calculators when they get to class
- Students are expected to participate in the opening activity
- Students are expected to respect the privilege of using their calculators by not becoming distracted
- Students must listen respectfully when the teacher or other students are talking
- Students are expected to cooperate with their partner respectfully

Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules, and expectations, etc.)

- Students are expected to listen respectfully to the teacher and other students
- Students are expected to cooperate with their partner during group work
- Students are expected to use the calculators productively

Minutes	Procedures
2 min	**Set-up/Prep:** The only set up for this lesson will be that students need to take out their handout and calculators.
10-12 min	**Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.)** To engage students, I will have them recall the party example. However, this time, I will tell them that we have 4x entrees, $12x^2$ appetizers, and $20x^3$ cookies. Again, we need to find the greatest number of guests that we can invite where each one will receive the same number of entrees, appetizers, and cookies as the others do. I will have students write down their work on a piece of paper. I will not expect them to find a solution, this is more an exercise in trying to see how well they understand what the significance of the GCF is. If they can write something down, they will receive credit.

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	Once students have handed their papers in, we will discuss how we might solve this problem. Students should remember that in the previous lesson, the solution was the GCF of the three numbers. We will try to solve the problem the same way here. To find the GCF of monomials, we must compare their two components, the variable, and the coefficient. First, we will see how many 'x' variables we see in each term. We have one term with three, one with two, and one term with only one. Therefore, the greatest number of variables in common is a single 'x'. Then, we will compare the coefficients in the same way we did yesterday. We will draw a Venn diagram and use the handouts to find the greatest factor that each number has in common. We should find that the GCF of the coefficients is 4. This leaves us with a total GCF of 4x.
10-15 min	**Explain: (concepts, procedures, vocabulary, etc.)** I have already explained to students that finding the GCF of a variable term includes two steps, find the GCF of the variable and the coefficient. Now, we will run through a couple more examples. First, we will begin with the example of two monomials. We will try to find the GCF of $5x^2$ and $12x^3$. We will note that the GCF of the coefficients is 1 because they have no other factors in common. Then, we will note that both terms have an x^2 in common. Therefore, the GCF is $1x^2$. Now we will try another similar example with three terms. This time we will try to find the GCF of $15x$, $25x^2$, and $75x^3$. We will note that the GCF of the coefficients is 5. Then, we will observe that each term shares an 'x' in common. Therefore, the GCF here will be $5x$. Now, I will attempt to give students a brief intro to factoring once they understand how to find the GCF. We will begin with the example of $3x + x$. In this example, students should recognize that the only factor that is shared by both terms is x. Therefore, this is what we will "factor out" of the expression because it is the GCF. To do this, we will divide each term by 'x' and multiply 'x' by the each of the quotients. That is, we will have $3x + x = x(3 + 1) = x(4)$. In the next, example, we will have a slightly more complicated GCF. We will attempt to factor $4x^2 + 2x$. Students should be able to see that the GCF here is $2x$. Then, we will divide each term by $2x$ which will leave us with $2x + 1$. Finally, we must multiply this expression by $2x$ to give us $4x^2 + 2x = 2x(2x + 1)$. We will not do any more examples after this because we will return to factoring again in a few more lessons. Students are not expected to fully understand factoring yet.
15-20 min	**Explore: (independent, concreate practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions)** Once we have covered a few examples, I will break the students up into pairs where they will work on a few problems that I write on the board. Students will be expected to find the GCF of each set of numbers/terms. Then, any students who finish this will be expected to try to factor each expression into simplest form as a challenge. Problems that the students will be expected to work on include: $14x + 7$ $15x^2 + 5x$ $x^2 - 7x$ $5x^2 - 13x$ $x^2 + 4x - x - 4$ (this is a challenge problem) Solutions: $7(2x + 1)$ GCF: 7 $5x(3x + 1)$ GCF: $5x$ $x(x - 7)$ GCF: x $x(5x - 13)$ GCF: x $(x + 4)(x - 1)$ GCF: $x + 4$
3-5 min	**Review (wrap up and transition to next activity):** To wrap up, I will ask if students have any more questions. If so, we will review another example from the problems that they were working on. If not, I will have students continue to work with their partner until the end of class.

Formative Assessment: (linked to objectives) **Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.** First, I will observe the contributions of different students at the beginning of class. I will also observe the responses that they have written down to the opening question. Then, I will walk around as students are working to see if they have any questions. **Consideration for Back-up Plan:**	**Summative Assessment (linked back to objectives)** **End of lesson:** At the end of the lesson, I will collect student work and assess how well they are understanding the material. All students will receive credit if they hand something in. **If applicable- overall unit, chapter, concept, etc.:** Students must be able to factor integers and polynomials on the unit test.

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If students are continuing to struggle with factoring, I may use this lesson to continue focusing on factoring integers. Then, I may devote part of the next class period to factoring binomials.	

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