

Lesson Plan Template

Grade: 9 th Grade	Subject: Algebra
Materials: Worksheet, Pencil, Paper, White board	Technology Needed: None
Instructional Strategies: <input type="checkbox"/> Direct instruction <input type="checkbox"/> Peer teaching/collaboration/ <input type="checkbox"/> Guided practice cooperative learning <input type="checkbox"/> Socratic Seminar <input type="checkbox"/> Visuals/Graphic organizers <input type="checkbox"/> Learning Centers <input type="checkbox"/> PBL <input type="checkbox"/> Lecture <input type="checkbox"/> Discussion/Debate <input type="checkbox"/> Technology integration <input type="checkbox"/> Modeling <input type="checkbox"/> Other (list)	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 spend most of class trying to discover ways of classifying polynomials through big group discussion. Then, students will have the opportunity to work on the worksheet in groups.
Standard(s) HS.A.SSE.1 : Interpret expressions that represent a quantity in terms of context. (a) Interpret parts of an expression such as terms, factors, and coefficients. (b) Interpret complicated expressions by examining one or more of their parts as a single entity.	Differentiation <p>Below Proficiency: These students may struggle to understand how to classify polynomials. They may be able to identify similarities between polynomials, but they may struggle to understand which of these are significant. Then, they will struggle to understand how to choose ways of classifying polynomials. If these students are quieter in the big group discussion, my hope is for them to share ways that they are struggling in small group discussion so that other students may help them. I will not expect these students to complete the challenge problems.</p> <p>Above Proficiency: Students who are above proficiency will be very comfortable classifying polynomials in several different ways. They will also be responsible for leading discussion when they are working on the worksheets in groups. Most of these students will understand how to add polynomials quickly, and their challenge will be to work on the more difficult problems on the worksheet.</p> <p>Approaching/Emerging Proficiency: Students approaching proficiency should contribute regularly to class discussion, and they should also thrive in group situations as they work to discover ways of solving problems together. The extra help that they need will likely come from solving problems with their peers. These students should have a good understanding of classifying polynomials based on exponents. They may also do well learning how to add them.</p> <p>Modalities/Learning Preferences: Large-group discussion working to discover new ideas, small group work, working through examples to create a pattern that can be replicated</p>
Objective(s) Students will understand how to interpret and classify polynomials by degree and number of terms. "I can classify polynomials by degree and number of terms." Bloom's Taxonomy Cognitive Level: Understanding, Applying	(This cell is merged with the Differentiation cell above and contains no additional text.)
Classroom Management- (grouping(s), movement/transitions, etc.) <ul style="list-style-type: none"> • Students should remain quiet for the first part of the opening activity. • Students are expected to transition quickly into groups. • Students are expected to sit with their assigned group. • Students are expected to respect the other members of their group. 	Behavior Expectations- (systems, strategies, procedures specific to the lesson, rules, and expectations, etc.) <ul style="list-style-type: none"> • Students are expected to listen quietly when the teacher is talking. • Students are expected to respect the contributions of others. • All students are expected to actively participate in group work. • Students should actively participate in large group discussion. • Students are expected to take notes during the lesson.
Minutes	Procedures

Lesson Plan Template

1 min	Set-up/Prep: There will be minimal set up for this class period. It is simply important that students have a pencil out and a piece of paper to write on and turn in.		
10 min	Engage: (opening activity/ anticipatory Set – access prior learning / stimulate interest /generate questions, etc.) I will begin class by asking students to write down three things that they know about polynomials. Then, I will collect their papers, and we will discuss some of the things that they wrote down. We may also talk about some simple applications of polynomials (such as “we can use polynomials to model functions”). Then, I will ask students how we might classify polynomials. I will encourage at least 2-3 responses before introducing ways that I would like them to classify them. Students may suggest classifying based on variable, coefficient or whether the terms are positive or negative.		
25 min	Explain: (concepts, procedures, vocabulary, etc.) To explain how I would like students to classify polynomials, I will return to an idea they should have learned when they were studying exponents. They should know the difference between the base and the exponent, so I will use this to describe how I would like them to classify polynomials. We will begin by classifying individual terms. To show the students how to do this, I will begin with the example of the terms 2^4 , 5^7 , 3^4 , 11^2 , and 13^7 . I will ask students to observe the similarities between these terms. They should notice that some terms have the same exponent. Then, I will change each of the numbers in the base to an ‘x’ so that they will look like x^4 , x^7 , x^4 , x^2 , and x^7 . Now, students should recognize that some of the terms are identical. This will show them how we can classify individual terms by their exponent. “Terms that share the same variable and exponent are called ‘like terms.’ We are able to add and subtract these terms from each other.” Next, I will show them how we can also classify polynomials. We will begin with the example of a few binomials $x^3 + x + 7$, $x^2 + 2x$, and $x^2 + 4$. Again, I will ask students to make comparisons between each polynomial. I want them to recognize that some of them have terms of the same power. This is what will allow us to classify the polynomials. First, we will note the terms that each polynomial has in common. Then, we will note the term with the highest power in each polynomial. Finally, we will note the number of terms in each polynomial. Then, I will tell students that each of these second two are valid ways of classifying polynomials, but I will tell them that we most often will classify polynomials based on the term with the highest degree. Finally, we will briefly look at adding polynomials. We will use the example above to do this. We will use the three polynomials above and pair each one with the other two so that we have the pairings $(x^3 + x + 7) + (x^2 + 2x)$, $(x^2 + 2x) + (x^2 + 4)$, and $(x^3 + x + 7) + (x^2 + 4)$. I will show students how to do the first one by explaining that we add the like terms together by adding their coefficients. This will yield $x^3 + x^2 + 3x + 7$. Then, I will ask students to try the other two on their own.		
10-15 min	Explore: (independent, concrete practice/application with relevant learning task -connections from content to real-life experiences, reflective questions- probing or clarifying questions) I will hand out a worksheet to students containing problems like those we tried as a group. I will place students in groups of 3-4 people to work on the problems, then whatever they do not complete will be homework. I will also include a few challenge problems for them to try.		
3-5 min	Review (wrap up and transition to next activity): I will conclude class by asking if anyone has any questions. If so, we will review the material that is causing confusion. If not, I will allow students to continue		
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Formative Assessment: (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.</p> <p>My first assessment will be their responses to our opening discussions along with the set of answers they hand in. I will check in with students by observing how engaged they are. I will monitor their participation in class discussions and in group work at the end of class.</p> <p>Consideration for Back-up Plan: N/A</p> </td> <td style="width: 50%; vertical-align: top;"> <p>Summative Assessment (linked back to objectives) End of lesson: Students will be assessed based on the worksheet that I hand out. I plan to grade it on completion, but I will still observe how they are doing at solving each problem.</p> <p>If applicable- overall unit, chapter, concept, etc.: I will include questions in the unit test which will require students to know how to classify polynomials.</p> </td> </tr> </table>		<p>Formative Assessment: (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.</p> <p>My first assessment will be their responses to our opening discussions along with the set of answers they hand in. I will check in with students by observing how engaged they are. I will monitor their participation in class discussions and in group work at the end of class.</p> <p>Consideration for Back-up Plan: N/A</p>	<p>Summative Assessment (linked back to objectives) End of lesson: Students will be assessed based on the worksheet that I hand out. I plan to grade it on completion, but I will still observe how they are doing at solving each problem.</p> <p>If applicable- overall unit, chapter, concept, etc.: I will include questions in the unit test which will require students to know how to classify polynomials.</p>
<p>Formative Assessment: (linked to objectives) Progress monitoring throughout lesson- clarifying questions, check-in strategies, etc.</p> <p>My first assessment will be their responses to our opening discussions along with the set of answers they hand in. I will check in with students by observing how engaged they are. I will monitor their participation in class discussions and in group work at the end of class.</p> <p>Consideration for Back-up Plan: N/A</p>	<p>Summative Assessment (linked back to objectives) End of lesson: Students will be assessed based on the worksheet that I hand out. I plan to grade it on completion, but I will still observe how they are doing at solving each problem.</p> <p>If applicable- overall unit, chapter, concept, etc.: I will include questions in the unit test which will require students to know how to classify polynomials.</p>		
Reflection (What went well? What did the students learn? How do you know? What changes would you make?):			

Lesson Plan Template

Example problems from worksheet:

Classify the following polynomials by degree and number of terms

1) $x^2, 5x^2, 7x^4, 4x^3, 3x^5$

2) $x^2 + 4, x^2 + 4x + 7, x^3 + 3x + 4, x^3 + 2$

There will be a few more problems like each of these. For the first problem, students should recognize that x^2 and $5x^2$ have degree 2, then each of the next terms have degree 4, 3, and 5, respectively. All the expressions in the first problem only contain a single term.

In the second problem, $x^2 + 4$ and $x^2 + 4x + 7$ both have degree 2, even though they have a different number of terms. Then, $x^3 + 3x + 4$ and $x^3 + 2$ both have degree 3.