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Grade: 9 (Algebra: Factoring) EDU 521.02

 Content Area: Mathematics

Topic: Factoring polynomials using the method of the greatest common factor

**INSTRUCTIONAL OBJECTIVE**

After reviewing the greatest common factor, students will learn how to factor through taking out the greatest common factor within the polynomial. Students will make PowerPoint Presentations and work independently to complete problems.

**STANDARDS AND INDICATORS**

NYS LearningStandards for Mathematics, Science, and Technology- **Standard 1:  Analysis, Inquiry, and Design**

Students will use mathematical analysis, scientific inquiry, and engineering designs, as appropriate, to pose questions, seek answers, and develop solutions.

Indicators:

* This will be evident when students analyze the columns that will be on the board while assessing students. Students will have to analyze each column to math up which answer goes with what question.
* This will be evident when students work to create their PowerPoint presentations.

NYS Learning Standards for Mathematics, Science, and Technology- Standard 3: Mathematics

Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry.

Indicators:

* This will be evident when students will learn about what the greatest common factor is when factoring polynomials.
* This will be evident when students will match the column that has the answer to the column that has the polynomial before it is factored.
* This will be evident when students work on the math worksheet to answer all of the questions in class and for homework.
* This will be evident when students will go over a couple of examples of factoring our the greatest common factor.

NYS LearningStandards for Mathematics, Science, and Technology**- Standard 7:  Interdisciplinary Problem Solving**

Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions.

Indicators:

* This will be evident when students will create their own word problem during the motivational activity.

New York State English Language Arts Standard # 4: Language for Social Interaction

Students will use oral and written language for effective social communication with a wide variety of people. As readers and listeners, they will use the social communications of others to enrich their understanding of people and their views.

Indicators:

* This will be evident when students work together to create their PowerPoint presentations on factoring using the greatest common factor.
* This will be evident when students can work with partners on a worksheet that deals with factoring out the greatest common factor of a polynomial.

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**MOTIVATION**

The Greatest Common Factor is a concept that is used in many different units in mathematics. In order to introduce factoring using the greatest common factor, students will be given a word problem in which they will just be asked to find the GCF out of the numbers given to them in the word problem. This will be a refresher for students to remember how to find common factors between numbers. The word problem is from the website Math Playground. Once students finish this problem, they will create their own word problem and have another student solve their problem. The word problem, taken from the website, Math Playground, is listed below.



**MATERIALS**

The materials that will be used in this lesson will be a computer that has access to PowerPoint software, SMART board or overhead projector to display PowerPoint presentations, worksheets, pencils or pens, and a notebook.

**STRATEGIES**

Strategies used during this lesson include motivation, direct instruction, use of PowerPoint to create PowerPoint presentations, cooperative learning, and assessment.

**ADAPTATIONS**

* The student that is a selective mute will be placed in a group that he or she feels comfortable being in. This student will take a role within the group but will not be forced to speak when the group is presenting.
* The student with visual impairment will have worksheets made up with much larger writing. Also any writing that is done on the board will be typed into a worksheet for the student in large font so he or she does not have trouble seeing what is written on the board.
* The student with visual impairment also has ADHD and will only have to do half of the assigned homework problems. Too many problems will cause him to lose his attention span extremely easy.
* There is a student that has difficulty reading due to visual impairment. Therefore, within the group that student was assigned to, he or she will help create the PowerPoint and not read information about the topic.

**DIFFERENTIATION OF INSTRUCTION**

* Visual and spatial learners will benefit from viewing the PowerPoint presentations. They will also benefit from the activity which involves matching the answer to the correct polynomial.
* Students who learn best by writing will benefit from writing the word problem during the motivational activity. It allows them to be creative with their writing and come up with a word problem that relates to something about them.
* Students who learn best by speaking will benefit from presenting their group presentations using PowerPoint. They can also benefit by taking a leadership role within the group. Students who learn best by interacting with others will learn best by participating in the group work and helping to find the necessary information.
* Auditory learners will benefit from listening to each group present their PowerPoint presentation. They will also benefit when the teacher talks about what a greatest common factor is and goes over an example of factoring using the GCF and show the steps that go along with it.

**DEVELOPMENTAL PROCEDURES**

1. Students will review how to take the greatest common factors of numbers. Students will do the motivational activity and then make up their own word problem and have another student answer their word problem.
2. Students will then be split up into groups of six. Within these groups, students will take about ten minutes to find information on factoring using the greatest common factor. Within these groups, there should be 3 students looking up information and 3 students putting together that information into the PowerPoint. Students will then create a PowerPoint with about three or four slides the most about the information they found. The information they find should include what factoring the greatest common factor is, what the steps are to finding the greatest common factor, and any other important information that they find. Students will be able to use textbooks and the Internet to find information. After all groups present, students should have a better idea of factoring using the greatest common factor.
3. Students will be presented with the following information from the website:. Students will learn what the greatest common factor is and as a class we will go over the example below:



1. Students will then be given a worksheet on factoring using the GCF. Students can either work alone or with a partner to answer the first 10 questions on the sheet.
2. The homework will be handed out. The last 20 questions will be assigned for homework from the worksheet.

**ASSESSMENT**

* Following the lesson, answers will be placed on one side of the board and the polynomial before it is factored using the GCF will be placed on the other side in random order. Students will be randomly picked on and asked to match the answer to the polynomial. Students will get credit if they get the right answer. This will help to see who understands the lesson and who still needs work with this topic.
* Students will be given a class participation grade for presenting their PowerPoint presentations to the class.

**INDEPENDENT PRACTICE**

* Using the same worksheet that was given out in class students will answer the last 20 questions on a separate sheet of paper. Students will hand in the paper with their answers on it tomorrow to be graded as a homework grade and to see how the students are doing with this topic. The worksheet was taken from the website: <http://edhelper.com/polynomials11.htm>.

**FOLLOW-UP- ACADEMIC INTERVENTION & ACADEMIC ENRICHMENT**

Academic Intervention: Students will listen to a CD-ROM that has information and worked out problems on it. Students will listen carefully and take notes on the information being presented on the CD.

Academic Enrichment: Students will be given a challenging problem at the start of lesson number two which will lead into the lesson on factoring by grouping. Students will also be asked to go on the Regents Prep website to review information about factoring using the greatest common factor in order to help them to prepare for the following lesson and other lessons from the unit.

**TEACHER REFERENCES**

*Algebra-class.com*. (2009). Retrieved August 7, 2010 from

 <http://www.algebra-class.com/factoring-polynomials.html>

*edHelper.com* (n.d.). Retrieved August 7, 2010 from

 <http://edhelper.com/polynomials11.htm>

*Mathplayground.com*. (2010). Retrieved August 7, 2010 from

 <http://www.mathplayground.com/howto_WPGFC.html>

New York State Education Department. (n.d.). *New York State learning standards*. Retrieved

 August 7, 2010, from <http://www.emsc.nysed.gov/nysatl/standards.html>