**Algebra Lesson Plan Example Two: Order of Operation**

(Two 50 minute class periods)

**Objective:** Students will use the order of operations to evaluate expressions.

**Concept/Skills**: Includes order of operation; mnemonics; mathematical expression;

 and exponents

**Materials:** whiteboard w/markers

 PEMDAS Rap song lyrics

 6 student volunteers to model the acronyms

 1 student volunteer to “rap” the PEMDAS lyrics

 PEMDAS Rap video [(click here)](http://www.teachertube.com/viewVideo.php?video_id=79967&title=PEMDAS_Rap)

Math notebooks

4-5 mathematical expressions

**Procedures:**

*Introductory Activity*

 Write the following problem on the whiteboard.

 2 + 3 x 4 + 4

 Ask students to compute the problem. Many will right away be confused as to what to

 do first. Their confusion may have led to their understanding the problem as

 2 + 12 + 4 = 18 **OR** 5 x 8 = 40

Explain that the confusing example above is why it is important to have an **order of** **operation**. Otherwise, there would be a great amount of confusion when trying to evaluate mathematical expressions.

*Developmental Activity*

Ask for seven volunteers, preferably a mixture of gender, and assign each student an

 acronym with the title of *Mr.* or *Ms*. preceding each word of the acronym (ex. Mr.

 Parentheses, Ms. Exponent, etc.). Each student will wear an identification tag to denote

 their position in the order of operation. Next, introduce the procedure with the **PEMDAS**

 lyrics accompanied by a background beat or music. This could be performed as a

 singular function or accompanied by an example on the board.

**[(1 + 2) – 3] – (4-5) = [3-3] – (-1) = 1**

The six students modeling the operation are asked to point to their particular function as

 the lyrics are being said by the “rapper.” Students in the audience could also be

 interchanged with the models to grasp a better understanding of the procedure. Explain

 that ***mnemonics*** is a tool/strategy to use in order to internalize and remember concepts

**(Please Excuse My Dear Aunt Sally).** Show the PEMDAS rap video as an example.

**\*Remind students to record in their Math Journals the proper method of applying this system of operation**.

**Order of operations** is calculated left to right in the following order:

1. **Parenthesis**
2. **Exponents 1**
3. **Multiplication or Division**
4. **Addition or Subtraction**

The standard order of operations, or precedence, is expressed in the following chart.

1. **Terms inside brackets**
2. **Exponents and Roots**
3. **Multiplication and Division**
4. **Addition and Subtraction**

**Explain:** This means that if a number or other symbol, or an expression grouped by

one or more symbols of grouping, is preceded by one operation and followed by another.

The operation higher on the list should be applied first. Symbols of grouping can be

used to override the usual order of operations. Grouped symbols can be treated as a

single expression. Symbols of grouping can be removed using the associative and

distributive laws.

Students practice using order of operation with the mathematical expressions written

on the whiteboard. They should write the examples in their Math notebooks to support

the method they recorded.

*Concluding Activity*

 Begin with a Question and Answer session to clarify any ambiguous words or steps

 in the operation. Next, invite students to exchange roles and continue with the procedure

 with the assistance from the role models.

*Evaluation*

For homework, students should think of sequential events in their environment that follows the PEMDAS procedural method. The student should follow the order of operation to describe their events or activities. Explain that students will be creating their own PEMDA lyrics in the next class session. They should bring in a background beat or music if they have particular style in mind. Otherwise, they may use the music provided in class.

**DAY TWO**

**Materials:** background beats and/or music

 PEMDA Song Lyrics Directions

**Procedures:**

*Introductory Activity*

 Remind students (from the notes the day before) of the order of operations. Ask

 students, “Why do we need an order of operation?”

*Developmental Activity*

 Distribute PEMDA Song Lyrics Directions. Go over directions with the class and

 answer questions for clarification.

 Students will need the rest of the class period to create song lyrics.

*Concluding Activity*

 On an exit slip (a small piece of paper given to teacher a student exits the classroom),

 have students solve the problem from the whiteboard.

*Evaluation*

For homework, students should practice performing their song lyrics. Each group will perform song for the rest of the class at the beginning of the next class period.

Lesson Plan Website

<http://lessonopoly.org>

**Example PEMDA Song Lyrics**

**Chorus:**

If you see a long mathematical expression man

simplify it by combining what you can

makes it much easier, don’t make me stutter

PEMDAS makes math smooth like butter

first is the P, means Parentheses

go inside those curved lines, believe me

do all the math you find in them

rewrite the expression now my friend

E for Exponents in the second phase

those little numbers you see that are raised

for example if you have 3 to the second power

make it a 9 real fast, don’t take an hour

third is M for Multiplication

in an expression or an equation

simplify by timesin’ what you see

and if no operation next to parentheses

**Chorus:**

D is for Divide, order number four

divide could be a slash or maybe something more

a line in a fraction that can be simplified

or two dots above and below a straight line

Addition is the operation second to last

almost done with PEMDAS so that test you can pass

add the numbers with addition signs between ‘em son

should have no other operations left but one

number six is Subtraction, that’s the S

look for tiny horizontal line, don’t guess

difference between two numbers, just about done

take away amount on right from the left one

**Chorus:**

If you forget PEMDAS don’t sweat it

remember this phrase that’ll help you get it

Please Excuse My Dear Aunt Sally

it’s in every classroom from NYC to Cali

**Please Excuse My Dear Aunt Sally!**

**PEMDAS Song Lyric Directions**

1. As a group, you will create a song, rap, or chant that goes through the steps of the order of operations.
2. You will write said song/rap/chant in your Math notebook.
3. You will also write the song/rap/chant on a separate sheet of paper (one copy per group) for the teacher. \*Due time of performance
4. You may use a pre-existing song and change the words. (Be sure to reference the song if you choose to do this!)
5. Practice! Practice! Practice! Be Prepared for Your Performance!!
6. You will perform your song/rap/chant twice. Once in its entirety, and then again while walking through a problem.