**Concept Development Lesson Plan**

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**Date Created:** 3/10/2014

**Subject(s):** Math 1

**Topic or Unit of Study (Title):**  Order of Operations and Evaluating Expressions

**Grade Level:** 9th and 10th

***Materials:*** Calculator, pencil, paper, three pairs of dice, group activity worksheet, computers

**Summary (*and Rationale*):** Order of Operations is an important concept in all of Math. To be successful in Math, students must have a strong foundation, starting with the understanding of the Order of Operations.

**I. Focus and Review (Establish Prior Knowledge):** [5 min]

What is a mathematical quantity? What is a variable? What are algebraic expressions? What are numerical expressions? What are examples of both? Go over a few homework problems with the class.

**II. Statement of Instructional Objective(s) *and Assessments*:**

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| **Objectives** | **Assessments** |
| *When given the group worksheet the students will be able to apply the order of operations to solve the expression without assistance and with 80% accuracy.*  | Students will be able to solve the problems using the order of operations with 80% accuracy during the game and they will be able to show understanding of the concepts of order of operations in their math journals.  |

State the objective: [1 minute]

Assessment: [no additional time is required]

**III. Teacher Input (Present tasks, information and guidance):**  [20 minutes]

The teacher will ask the students to write down the steps they take to get ready for school in the mornings (ex. Wake up, Take shower, Get Dress, Brush Hair, Eat Breakfast, Brush Teeth). Then the teacher will ask a few students to share their steps. The teacher will then discuss with the class the importance of the order of the steps when getting ready in the morning. From there, the teacher will introduce and explain that the order that we follow in mathematics is just as important.

Key Terms: Power, Exponent, Base, Simplify, Evaluate

The teacher will go over PleaseExcuseMyDearAuntSally, which the students would have learned in middle school. This explains the order in which you use to solve an expression.

1. **P**arentheses

2. **E**xponents

3. **M**ultiplication

4. **D**ivision

5. **A**ddition

6. **S**ubtraction

Teacher will work through an example explaining each step.

 $20 ÷\left(4+ 6\right)×25=20 ÷10 ×25$

 $ =2 × 25$

 $=50$

Students will work three problems with the teachers help. The teacher will use the three problems to explain how students should follow the order of operations.

1. $4 × \left(15-9\right)÷3=4 ×6 ÷3$

 $=24 ÷3$

 $=8$

1. $\left(12 ×10\right)- \left(3+4\right)=120-7$

 $= 113$

1. $\left(22 ÷2\right)×\left(4+8\right)= 11 ×12$

 $=132$

Then the student will be divided into groups of four. Each group will then be given the Order, Order Please worksheet. The teacher will the roll the dice and call out the numbers. The students will the use the numbers to fill in the blanks however they want with the numbers that were called. The groups will then work together to solve the problems using the order of operations. They will have three minutes per round, and there will be a total of six rounds. The group with the highest number will win the round.

**IV. Guided Practice (Elicit performance):** [20 minutes]

Students will be divided into groups of four. Each group will then be given the Order, Order Please worksheet. The teacher will the roll the dice and call out the numbers. The students will the use the numbers to fill in the blanks however they want with the numbers that were called. The groups will then work together to solve the problems using the order of operations. They will have three minute per round, and there will be a total of six rounds. The group with the highest number will win the round.

***V.* Closure (Plan for maintenance):** [5 minutes]

Have the students answer these two questions in their Math Journals.

1. What is the correct order for performing mathematical operations?
2. How does changing the order of operations affect the outcome when simplifying an expression?

***VI.* Independent Practice:** Divide the students into pairs. The students will then create a poster that demonstrates their knowledge of order or operations. They can use Microsoft Publisher or poster board. Their finished work will be displayed in the halls. This project will be graded with using the rubric posted below.

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| Making a Poster: Order of Operations PosterTeacher Name: **Ms. Davis** Student Name:     \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  |

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| CATEGORY  | 4  | 3  | 2  | 1  |
| Graphics -Clarity  | Graphics are all in focus and the content easily viewed and identified from 6 ft. away.  | Most graphics are in focus and the content easily viewed and identified from 6 ft. away.  | Most graphics are in focus and the content is easily viewed and identified from 4 ft. away.  | Many graphics are not clear or are too small.  |
| Grammar  | There are no grammatical mistakes on the poster.  | There is 1 grammatical mistake on the poster.  | There are 2 grammatical mistakes on the poster.  | There are more than 2 grammatical mistakes on the poster.  |
| Knowledge Gained  | Student can accurately answer all questions related to facts in the poster and processes used to create the poster.  | Student can accurately answer most questions related to facts in the poster and processes used to create the poster.  | Student can accurately answer about 75% of questions related to facts in the poster and processes used to create the poster.  | Student appears to have insufficient knowledge about the facts or processes used in the poster.  |
| Content - Accuracy  | At least 7 accurate facts are displayed on the poster.  | 5-6 accurate facts are displayed on the poster.  | 3-4 accurate facts are displayed on the poster.  | Less than 3 accurate facts are displayed on the poster.  |
| Explanation  | A complete response with a detailed explanation.  | Good solid response with clear explanation.  | Explanation is unclear.  | Misses key points  |

**STANDARDS:**

* CCSS.Math.Content.HSA.SSE.A.1.a
Interpret parts of an expression, such as terms, factors, and coefficients.
* CCSS.Math.Content.HSA.SSE.A.1.b
Interpret complicated expressions by viewing one or more of their parts as a single entity.
* HS.TT.1.1   Use appropriate technology tools and other resources to access information
* HS.TT.1.2   Use appropriate technology tools and other resources to organize information
* HS.TT.1.3   Use appropriate technology tools and other resources to design products to share information with others

**Plans for Individual Differences:** For students having difficulty understanding the concepts, identify where they are struggling and give further explanations to assist them. Students who are having difficulty may be paired with students who understand it so they may receive peer assistance too in both the project and the game.