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MATHEMATICS

Grade 6

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Lesson 8: Culminating Performance Task – Why Are So Many Wrong?

Focus Standard: 6.EE.1, 6.EE.2, 6.EE.2a, 6.EE.2b

Additional Standards: 6.SP.4

Standards for Mathematical Practice: SMP.2, SMP.3, SMP.4, SMP.6

Estimated Time: 60 – 120 minutes

Resources and Materials:

- Handout 8.1: Multiplication Tree
- Handout 8.2: Performance Task - Why Are So Many Wrong?
- Handout 8.3: Performance Task Rubric
- Professor Pete’s Website: <http://www.classroomprofessor.com/teaching-math/why-did-74pc-of-facebook-users-get-this-wrong/>

Learning Target(s):

- Students will write algebraic expressions to represent real-world and mathematical situations.
- Students will apply understanding of exponents, using the order of operations to solve expressions, analyze data to make predictions, draw conclusions from data, and create a graph to represent data in a performance task.

Guiding Questions:

- How can I translate verbal expressions into algebraic expressions?
- What difference does it make if we use an order of operations or not?

Vocabulary

Academic Vocabulary:

- Algebraic expression
- Coefficient
- Constant
- Numeric expression
- Term

Instructional Strategies for Academic Vocabulary:

- Model how to use the words in discussion.
- Read and discuss the meaning of word in a mathematical context
- Students write/discuss using the words

Instructional Plan

Understanding Lesson Purpose and Student Outcomes: Students complete the performance task to demonstrate understanding of the skills taught during this unit.

Anticipatory Set/Introduction to the Lesson: “My Favorite No”

Distribute large index cards or half sheets of paper. Display the following for students:

Two boys were playing in the park one day when they saw two girls each walking with three dogs. The park ranger had a box of doggie treats with 80 treats in the box. She gave each dog 3 treats. Write an expression to solve for how many treats the park ranger had left. **Ans. $80 - (2^2 \cdot 3)2$ or a similar expression**

- ✓ Assign students to groups and give them 10 minutes to complete their work. Allow more time if necessary. Remind students to use exponents whenever possible. Each group will submit one expression. At the end of the time collect the students’ work and go through the cards identifying those that have the work done correctly as “Yes” and those that have errors as “No.” Look for misconceptions and copy the incorrect work for the first problem on the board without changing it. Facilitate an open discussion about why the work is not correct. If a student says the work or answer you displayed is incorrect have them offer a reason why it is incorrect and tell how they would correct it (SMP.3).

Note: Refer to Lesson 3 for details on how to use “My Favorite No” for instruction.

For students who are EL, have disabilities, or perform well below the grade-level:

- Give students **Handout 8.1 Multiplication Tree** to use to organize their data.

Extensions for students with high interest or working above grade level:

- Give students an expression and tell them to write a story to describe the expression.

Activity 1: Performance Task – Why Are So Many Wrong?

Distribute **Handout 8.2: Performance Task – Why Are So Many Wrong?** and **Handout 8.3: Performance Task Rubric**. Read the directions aloud.

- ✓ Explain that after they access and read [Professor Pete’s blog](#), they will complete a performance task based on the information on the blog. Explain the performance task as follows:
1. Answer questions about the information Professor Pete has posted (SMP.2).
 2. Reply to one of the comments posted on the blog (SMP.3).
 3. Post a new comment about why so many people were incorrect (SMP.2).
 4. Create an expression based on criteria listed in the handout (SMP.6).
 5. Make predictions about the responses you would get if this expression were posted on social media (SMP.2, SMP.4).

Review **Handout 8.3: Performance Task Rubric** with the students answering questions and clarifying any misconceptions about what is expected of them.

For students who are EL, have disabilities, or perform well below the grade-level:

- Students can work in a small group with the teacher.

Extensions for students with high interest or working above grade level:

- Design a class blog for submitting expressions as Professor Pete did.

Note: Teacher will control the blog and students will not be using social media in the classroom.

Reflection and Closing:

Have students share the comments they submitted on Professor Pete’s website. Allow other students to reply to or critique the comments (SMP.3)

Homework

No homework.

Handout 8.1: Multiplication Tree

Name: _____

Date _____

2 Boys · 2 Girls



_____ girls · _____ dogs



_____ dogs · _____ treats



_____ treats

Handout 8.2: Performance Task – Why Are So Many Wrong?

Name: _____

Date _____

Directions:

Part 1 -

1. Go to: <http://www.classroomprofessor.com/teaching-math/why-did-74pc-of-facebook-users-get-this-wrong/>
2. Read the information about the question Professor Pete posted on Facebook and the solutions he received. The data are displayed in the graph on page 4 of the blog.
3. Answer the questions on page 2 of this handout about the data and Professor Pete's conclusions as they pertain to using the order of operations.
4. Reply to one of the comments that were posted on this blog. Your comment should contain algebra and math vocabulary, be mathematically accurate and reference the order of operations. Record who you are replying to and your reply on page 2 of the handout.
5. Post a new comment of your own about why so many people were incorrect. **Do not use your real name in your post.** Your comment should contain algebra and math vocabulary, be mathematically accurate and reference the order of operations. Record the name you use and your new comment on page 2 of the handout.

Part 2 –

1. Create an expression that includes 7 criteria: brackets, parentheses, exponents and the four operations. Show your expression on page 3 of this document.
2. Make predictions about the types of answers you would get if you were to post your expression on a social media site and 350 people responded. Record your predictions on page 3 and 4.
3. Create a histogram to show your predictions. Histogram must include: title, axis labels, axis scales; accurate representation of data; and color.

For both sections, refer to the rubric, **Handout 8.3: Performance Task Rubric**, page 5, that will be used to grade your work.

Handout 8.2: Performance Task – Why Are So Many Wrong? Part 1

Name: _____

Date _____

Answer the following questions in the spaces provided. If you need more space, use a separate piece of paper and label it correctly.

1. In what ways do Professor Pete’s order of operations compare to the order of operations we used in our unit? (Be specific). _____

2. Why do you think so many people responded to Professor Pete’s post? _____

3. Why do acronyms such as BODMAS and PEMDAS lead to confusion when solving algebraic expressions? _____

4. Rewrite Professor Pete’s expression, adding parentheses and/or brackets, so the 43% of people who answered 1 would get the correct answer of 8 if they used PEMDAS or BODMAS to solve. _____

5. Why do you think it’s important for all people to use the same order of operations when solving algebraic expressions? _____

Reply to comment: Person replying to _____

My reply: _____

My new comment: Name (**NOT YOUR REAL NAME**) _____

My new comment: _____

Handout 8.2: Performance Task – Why Are So Many Wrong? Part 2

Name: _____

Date _____

Directions:

1. Create an expression that includes brackets, parentheses, and each of the four operations.

2. Show the correct solution in the box below.

Correct Solution:

3. List 3 incorrect answers people might get and show how they would calculate to get the incorrect answer.

Incorrect answer #1:

Incorrect answer #2:

Incorrect answer #3:

4. If you posted this expression to a social media website, and 350 people responded to your post, make predictions about the number of people who would get each answer, both incorrect and correct.

Number of Responses:

Correct Answer _____

Incorrect Answer #1: _____

Incorrect Answer #2: _____

Incorrect Answer #3: _____

5. Create a graph (circle, bar, line, pictograph, dot plot) to show your predictions. Show your graph below:

Handout 8.2: Performance Task Rubric

Rating	4	3	2	1
Evaluative Criteria	Distinguished	Proficient	Moderate	Partial
Answer questions to evaluate reasoning using the Order of Operations.	Accurately answer 5 questions to evaluate reasoning.	Accurately answer 4 questions to evaluate reasoning.	Accurately answer 2 - 3 questions to evaluate reasoning.	Accurately answer 1 question to evaluate reasoning.
Use algebraic vocabulary and order of operations to reply to others' comments and create their own comment.	Both comments: 1. Use vocabulary correctly. 2. Are mathematically accurate. 3. Reference the Order of Operations.	Both comments contain 2 criteria.	Both comments contain 1 of the criteria.	Only one comment contains 1 criterion and the other has none of the criteria.
Use the order of operations to create an expression containing 7 parts.	Expression is written with all 6 components.	Expression is written with 4-5 components.	Expression is written with 2-3 components.	Expression is written with fewer than 2 components.
Predict responses and create a graph to illustrate the predicted responses.	Graph provides 4 reasonable responses for the problem provided and is easy to read.	Graph provides 3 reasonable responses for the problem provided and is easy to read.	Graph provides 2 reasonable responses for the problem provided.	Graph provides 1 reasonable response for the problem provided.

For training or questions regarding this unit,
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