Simplify Expressions Using the Order of Operations

Summary

Students will simplify numerical expressions using the correct order of operations.

Main Core Tie

Mathematics Grade 5

Strand: OPERATIONS AND ALGEBRAIC THINKING (5.OA) Standard 5.OA.1

Additional Core Ties

Mathematics Grade 5

Strand: OPERATIONS AND ALGEBRAIC THINKING (5.OA) Standard 5.OA.2

Materials

Ti-73 calculators

- Student Response Cards

Student Worksheets: Order of Operations Journal Page, Order of Operations Telephone Trick Worksheet, Order of Operations-Checking With A Calculator, Krypto

Background for Teachers

Enduring Understanding (Big Ideas):
There is a correct order when performing multiple operations.
Essential Questions:

How does the order in which operations are performed affect the outcome of a problem?
How will the result of several operations change if the order of those operations is changed?

Skill Focus:
Know and apply the correct order of operations
Vocabulary Focus:
Operation, Order of Operations, grouping symbols.
Ways to Gain/Maintain Attention (Primacy): technology, music, journaling, forming and checking hypotheses, discussion, graphic organizer, cooperative learning, novelty(telephone number trick), game.

Instructional Procedures

Starter:

Write 2,000,000 in scientific notation
Find the value for 4
Write the prime factorization for 60

Lesson Segment 1 (Launch): How does the order in which operations are performed affect the outcome of a problem? How will the result of several operations change if the order of those operations is changed?
Give each student a response card (attached). The second page of the cards is the back of the first page, so that, when copied as a two-sided document, each card will have the same words front and back. Have them do mental math for the following problems as you show them one at a time. Then, suggest an answer and have them hold their response card about chest high pinching the correct response between finger and thumb so that the student can see what they will be indicating from their side and you can see the other side of the card.. After each problem tell them whether the suggested answer was true of false. Type the problem into TI-73 to show the correct answer. Discuss how they

got their answers. Tell them that the graphing calc and you know a secret about the operations that will always give them the correct answer.

3 + 6 x 5 (45) (false, should be 33)
(6 + 4) (7 2) (5) (true)
8 + 6 ÷ 2 x 3 (21) (false, should be 17)
(7) (true)

Lesson Segment 2 (Explore): How does the order in which operations are performed affect the outcome of a problem? How will the result of several operations change if the order of those operations is changed?

Journal: Give each student a copy of the attached Order Of Operations journal page. Sing the" Winning The Order Of Operations War" song with them. Have them go through the words of the song using numbers to indicate what operations should be done first, second, etc. Look at the thinking map below the song, helping the students see this is a good way to organize information that must be done in a sequence. Have them write the order in the boxes of the sequence map. Box 1: perform operations inside parentheses, Box 2: find the value for exponential expressions, Box 3: multiply or divide in order from left to right, Box 4: add or subtract in order from left to right.

Next, have students identify every operation in each expression below the sequence map. Work together to show how to perform the operations using the correct order of operations in a step by step method. These are the same problems as used for the mental math earlier in the lesson.

Have students work through the attached Order of Operations Telephone Trick. Tell them they will be choosing which operation to perform first, second, or even third for each step. If they don't recognize the result as their own telephone number, they haven't performed the operations in the correct order.

Lesson Segment 3 (Summarize/Apply): How does the order in which operations are performed affect the outcome of a problem? How will the result of several operations change if the order of those operations is changed?

Have students complete the Order of Operations calculator worksheet, then play Krypto as described on the Krypto worksheet.

Practice: Students should choose one of the three operations on the bottom of the telephone trick page.

Assessment Plan

Performance task, observation, student response cards.

Bibliography

This lesson plan was created by Linda Bolin.

Authors

Utah LessonPlans