**FIRST GRADING PERIOD**

**Lesson 10:** Simplifying a Series of Operations on Whole Numbers Involving more than Two Operations using the PMDAS or GMDAS rule.

**Week 4**

Objective: Simplifies a series of operations on whole numbers involving more than two operations using the PMDAS or GMDAS rule.

**Value Focus:** Show Cooperation

**Prerequisite Concepts and Skills**

* Concept of Four Basic Operations
* Order of Operations in Solving Problems

**Materials:** Charts of word problems and exercises, flash cards, activity cards

**References:** K to 12 Grade 5 Curriculum (M5NS-Id-62.2); Number Smart Teacher’s Resource Material 5 pages 26 – 28; Soaring 21st Century Mathematics 5 pages 59 to 64; <http://www.mathgoodies.com/Lessons/vol7/order_operations.html>

**Instructional Procedure:**

1. **Preliminary Activities**
2. **Drill**
* Group the class according to readiness based on results of the pre-assessment. The pupils should not know the results of the pre-test so they will not be labelled. Just name the pupils who should be in one of these groups:

Group Archimedes – pupils got 17 -20 points correct

Group Einstein – pupils who got 13-16 points correct

Group Gauss – pupils who got 12 points and below

* Write this on the board: 2, 7, 1, 4, and 8 .Then, each group gets an envelope with the following pieces:+, - , x, (and).
* Ask each group to insert the symbols in such a way that the result will equal to 115. The first to get the correct expression earns 3 points .The second team earns 2 points and the third team earns 1 point.
1. **Review**

Recall the previous lesson (GMDAS rule)

1. **Motivation**

 Ask the learners “Have you experienced being absent from school for a week because you were sick and upon returning, you had to take a quiz or summative test on that day? What did you feel?

1. **Developmental Activities**
2. **Presentation**

 Princess was absent for a week because she was sick. When she went back to school, she had to take a test. Items for the test given are shown below.

1. 20 x 60 ÷ 6
2. 81- 9 + 15
3. 54 – 24 ÷ 4
4. 15 x 12 – 16 ÷ 8
5. 36 – 24 ÷ 6 + 14
6. **Performing the Activities**

**Ask:** Can you help Princess solve her problem? Let us try to answer the items. Ask each pair of pupils to answer the items in their notebooks.

Call some pupils to show their solutions on the board.

1. 20 x 60 ÷ 6 2) 81 – 9 + 15 3) 54 - 24 ÷ 4

= 1 200 ÷ 6 = 72 + 15 = 54 – 6

= 200 = 87 = 48

 4) 15 x 12 – 16 ÷8 5) 36 – 24 ÷ 6 + 14

 = 180 – 16 ÷8 =36 – 4 + 14

 = 180 – 2 = 32 + 14

 = 178 = 46

**Ask :**Did you get the correct answer to each item? Why don’t we have the same answer to some items? Why is your answer different from the correct answer? What facts are given? What are the operations come first? Which operation will you do first?

1. **Processing the Activities**
2. Provide the concept : Order of Operations
3. Give the rules, and have them explain why they were able to apply these rules and form the concept : Order of Operations
4. Have them also perform the activity to show Order of Operations (GMDAS or PMDAS rule).This should be followed to get the correct answer.

**Say:** “In a series of operation, certain rules must be followed to arrive at one specific answer. Here, the MDAS rule must be followed correctly to get the right answer. The MDAS stands (G for Grouping, M for Multiplication, D for Division, A for Addition and S for Subtraction) and PMDAS stands for parenthesis and the four basic operations.

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| Example 1:    | Evaluate each expression using the rules for order of operations.  |
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| Solution:    |

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| **Order of Operations** |
| **Expression** | **Evaluation** | **Operation** |
| 6 + 7 x 8 | = 6 + **7 x 8** | Multiplication |
| = 6 + 56 | Addition |
| = 62 |   |
| 16 **÷** 8 - 2 | = **16 ÷ 8** - 2 | Division |
| = 2 - 2 | Subtraction |
| = 0 |   |
| (25 - 11) x 3 | = **(25 - 11)** x 3 | Parentheses |
| = 14 x 3 | Multiplication |
| = 42 |   |

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| In Example 1, each problem involved only 2 operations. Let's look at some examples that involve more than two operations. |

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| Example 2:   | Evaluate 3 + 6 x (5 + 4) **÷** 3 - 7 using the order of operations. |
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| Solution:   |

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| Step 1:   | 3 + 6 x **(5 + 4)÷** 3 - 7 |  =  | 3 + 6 x 9 **÷** 3 - 7 | Parentheses |
| Step 2:   | 3 + **6 x 9÷** 3 - 7 |  =  | 3 + 54 **÷** 3 - 7 | Multiplication |
| Step 3:   | 3 + **54 ÷ 3** - 7 |  =  | 3 + 18 - 7 | Division |
| Step 4:   | **3 + 18** - 7 |  =  | 21 - 7 | Addition |
| Step 5:   | 21 - 7 |  =  | 14 | Subtraction |

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| Example 3:   | Evaluate 9 - 5 **÷** (8 - 3) x 2 + 6 using the order of operations. |
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| Solution:   |

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| Step 1:     | 9 - 5 **÷(8 - 3)** x 2 + 6 |  =  | 9 - 5 **÷** 5 x 2 + 6 | Parentheses |
| Step 2:   | 9 - **5 ÷ 5** x 2 + 6 |  =  | 9 - 1 x 2 + 6 | Division |
| Step 3:   | 9 - **1 x 2** + 6 |  =  | 9 - 2 + 6 | Multiplication |
| Step 4:   | **9 - 2** + 6 |  =  | 7 + 6 | Subtraction |
| Step 5:   | 7 + 6 |  =  | 13 | Addition |

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| In Examples 2 and 3, you will notice that multiplication and division were evaluated from left to right according to Rule 2. Similarly, addition and subtraction were evaluated from left to right, according to Rule 3. |

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| When two or more operations occur inside a set of parentheses, these operations should be evaluated according to Rules 2 and 3. This is done in Example 4 below. |

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| Example 4:   | Evaluate 150 **÷** (6 + 3 x 8) - 5 using the order of operations. |
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| Solution:   |

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| Step 1:   | 150 **÷** (6 + **3 x 8**) - 5 |  =  | 150 **÷** (6 + 24) - 5 | Multiplication inside Parentheses |
| Step 2:   | 150 **÷(6 + 24)** - 5 |  =  | 150 **÷** 30 - 5 | Addition inside Parentheses |
| Step 3:   | **150 ÷ 30** - 5 |  =  | 5 - 5 | Division |
| Step 4:   | 5 - 5 |  =  | 0 | Subtraction |

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1. **Reinforcing the Concept and Skill**
2. Solve these following.
3. 14 + 68 x 24 = \_\_\_\_\_\_
4. 84 **÷** 4 + 56 = \_\_\_\_\_\_
5. 180 **÷** 90 + 16 = \_\_\_\_\_\_
6. 32 x 56 + 28 = \_\_\_\_\_\_
7. 45 x 38 – 21 = \_\_\_\_\_\_
8. 25 – (21 ÷ 7 ) + 3= \_\_\_\_\_\_
9. 27 – (405 ÷ 45 ÷ 9) x 4 = \_\_\_\_\_\_
10. **Summarizing the Lesson**

Lead the pupils to generalize the following:

 To perform a series of operations, the MDAS or PMDAS rule must be followed. Do what is within the parenthesis first .Then do multiplication and division operations in order from left to right. Finally, do addition and subtraction in order from left to right.

1. **Applying to New and Other Situations**

Write the correct operation symbol to make the following mathematical sentence true.

1. 24 x 3 + 6 2 = 75
2. 21 ÷ 3 7 – 6 4 = 47
3. 36 ÷ 4 x 3 4 = 23
4. 54 + 7 3 – 20 ÷ 4 = 70
5. 16 8 – 9 9 x 2 = 0

**C. Assessment**

Find the value of each mathematical sentence.

1. (20 + 4 ) ÷ 2 = \_\_\_\_\_\_ 6. 99 x 99 ÷ 99 = \_\_\_\_\_\_
2. 721 – 68 ÷ 4 = \_\_\_\_\_\_ 7. 300 – [(345-264) x 3 ] ÷ 9 = \_\_\_\_\_\_
3. 4 x [(12 + 8) x 2 + 3] + 4 = \_\_\_\_\_\_ 8. 264 ÷ [(127 – 124) x 4 ] – 22 = \_\_\_\_
4. 27 – (405 ÷ 45 ÷ 9) x 4 = \_\_\_\_\_\_\_ 9. 15 ÷ (4 + 1) + 8 x 3 + 7 x (2+3) = \_\_\_\_\_
5. 184 – 16 x 3 = \_\_\_\_\_\_ 10. 25 – (21 ÷ 7 ) + 3 = \_\_\_\_\_\_\_

**D. Home Activity**

 **Remediation**

Find the value of each mathematical sentence.

1. (7 + 9) ÷ (3 + 1 = \_\_\_\_
2. (343 + 57 ) x 32 = \_\_\_\_
3. 5 961 x (981 – 624 ) ÷ 7 = \_\_\_\_
4. (23 x 90) ÷ (414 x 5) = \_\_\_\_\_
5. 45 ÷ (5+4) – 5 = \_\_\_\_\_

**Enrichment**

Use 2, 4, 6 or 8 to make each sentence correct.

1. X ÷ ( + ) = 8
2. x - ( + ) = 24
3. x ( + ) - ) = 28
4. ( + ) x ( + ) = 84

**FIRST GRADING PERIOD**

**Lesson 11:** Finding the Common Factors and the GCF of 2 to 4 Numbers Using Continuous Division

**Week 4**

**Objective:** Find the common factors and the GCF of 2 to 4 numbers using continuous division

 **Value Focus:** Helpfulness

**Prerequisite Concepts and Skills:**

* Mastery of the basic multiplication
* Identifying prime and composite numbers

**Materials:** Use of Venn Diagram and Number Cards

**References:** K to 12 Grade 5 Curriculum (M5NS-Id-68.2), Number Smart Teacher’s Resource Material 5 pages 20 to 23, Soaring 21st Century Mathematics 5 pages 159 to 164

**Instructional Procedure:**

1. **Preliminary Activities**
2. **Drill**

 Draw a blank Venn diagram with two circles on the board. Have the pupils work in pairs. Tell them that partners in each pair will perform a specific task. Partner A will record a list of interests on his/her whiteboard generated by pupils .Then Partner B draws a Venn diagram similar to the one drawn on board on his/her whiteboard . Together , they will sort their list of interests into the Venn diagram . Ask the pairs of pupils about the criteria they used to place their interest into the Venn diagram.

**Ask:** Why are some items placed in only one of the circles? Why are some items placed in the overlapping section of the Venn diagram?

1. **Review**

 Tell pupils they will be using Venn diagram to find the factors that various numbers share or have in common. Assess pupils’ prior knowledge by asking the following questions:

* What is a factor?
* What is a product?
* What are prime numbers?
* What are composite numbers?
1. **Motivation**

 Show a picture of a boy helping his father in the market. Ask the pupils to tell something about the picture. Elicit the value of helpfulness.

**Ask:** How do you show helpfulness at home? In school? Is it good to be helpful? Why?

1. **Developmental Activities**
2. **Presentation**

Present this problem to the class.

 Joshua helps his father in their fruit store. They sold 48 oranges and 60 apples. They plan to pack them separately in small boxes. What is the biggest number of oranges and apples that can be placed in boxes if these are of the same number?

 Have the pupils read the problem. Then ask: What did Joshua and his father sell? How many oranges were sold? How many apples were sold? What do Joshua and his father plan to do with the oranges and apples? How will you solve for the answer to the problem?

1. **Performing the Activities**
2. Allow the pupils to form groups .Give each group flash cards with factors and a product.
3. Let the leader guide them in comparing if the factors of the product are correct or not.
4. Let the group with the same product compare the common factors. Then ask them to identify the largest common factor.
5. After brainstorming and getting the correct method, the leader of the group will present their answer to the whole class for evaluation.
6. Assess how the pupils work as a group.
7. **Processing Activities**

Ask the pupils to do “Share with a Friend”. Let them discuss on how to find the Greatest Common Factor .

Expected Answers:

* We solved problems by first finding the common factors and then the Greatest Common Factor (GCF) by listing method.
* We also solved for the answer by writing each number as a product of its prime factors using factors tree or prime factorization, the multiply the common prime factors to get the GCF.
* We also solved the problem by continuous division.

Emphasize that prime factors are factors which are prime numbers.

1. **Reinforcing the Concept/ Lesson**

Find the GCF of the following:

1. 56 and 84 = \_\_\_\_\_
2. 300 and 375 = \_\_\_\_\_
3. 44 and 66 = \_\_\_\_\_\_
4. 30 , 75 , 90 and 135 = \_\_\_\_\_\_
5. 24 , 42 and 48 = \_\_\_\_\_
6. **Summarizing the Lesson**

Summarizing the lesson by asking :

?

What are common factors?

What is Greatest Common Factor or GCF?

How do we find the Greatest Common Factor (GCF) of two given numbers?

* Common Factors are factors common to two – four numbers
* We find the Greatest Common Factor (GCF) of 2 to 4 numbers by listing method, prime factorization and continuous division.

 Continuous Division is done following the steps below.

* Write the numbers horizontally and find a prime number that will divide the numbers, if possible.
* Divide by that prime number and write the quotients below the dividends. Copy any numbers not divided below them.
* Continue the process until no two numbers have a common prime divisor.
* Multiply all the prime divisors common to the give numbers to get the GCF.
1. **Applying to New and Other Situations**

Read and Solve.

Tricia has a rectangular piece of paper, 30 cm by 18 cm , she wants to cut it into square sheets of the same size .What is the largest size of square sheets she can get?

1. **Assessment**
2. Find all the common factors of:
3. 6 and 9 = \_\_\_\_\_\_\_\_\_\_\_\_ 4. 12 and 16 = \_\_\_\_\_\_\_\_\_\_\_\_
4. 15 and 18 = \_\_\_\_\_\_\_\_\_\_ 5. 27 and 36 = \_\_\_\_\_\_\_\_\_\_\_\_
5. 25 and 75 = \_\_\_\_\_\_\_\_\_\_ 6. 56 and 144 = \_\_\_\_\_\_\_\_\_\_\_
6. Find the GCF of the following:
7. 12 and 42 = \_\_\_\_\_\_\_\_\_\_\_ 4. 15 and 75 = \_\_\_\_\_\_\_\_\_\_
8. 20 and 45 = \_\_\_\_\_\_\_\_\_\_\_ 5. 21 and 56 = \_\_\_\_\_\_\_\_\_\_
9. 24 and 108 = \_\_\_\_\_\_\_\_\_\_ 6. 36 and 243 = \_\_\_\_\_\_\_\_\_

**D. Home Activity**

 **Remediation**

Find the GCF of the following:

1. 54 and 72 = \_\_\_\_\_\_\_\_\_
2. 180 and 216 = \_\_\_\_\_\_\_
3. 36, 168 , 144 and 252 = \_\_\_\_\_\_
4. 13, 65 and 117 = \_\_\_\_\_\_\_
5. 12, 21 , 30 = \_\_\_\_\_\_\_

**Enrichment**

1. When 75, 111, and 183 are divided by a certain number, they all leave the same remainder of 3. Find the largest possible value of this number.
2. Three ribbons with lengths of 96 cm, 160 cm and 192 cm are each cut into pieces of equal lengths .What is the greatest possible length to cut so as to leave no remainder?

**FIRST GRADING PERIOD**

**Lesson 12:** Finding the Common Multiples and LCM of 2 to 4 Numbers Using Continuous Division

**Week 4**

**Objective:** To identify the common multiples and LCM of 2 to 4 numbers using continuous division

 **Value Focus:** Respect to others

**Prerequisite Concepts and Skills**

* Skip Counting
* Writing a given number as a product of prime factors

**Materials:** Flash cards, manila paper

**References:** K to 12 Grade 5 Curriculum (M5NS-Id-69.2), Number Smart Teacher’s Resource Material 5 pages 23 to 26, Soaring 21st Century Mathematics 5 pages 165 to 170

**Instructional Procedure:**

1. **Preliminary Activities**
2. **Drill**

Let the pupils do skip counting numbers 2 to 10.

1. **Review**

Recall the previous lesson about GCF.

1. **Motivation**

Have a game on grouping the pupils according to \_\_\_\_\_\_\_\_\_\_. You may consider the grouping according to height , age , favourite colour, fruits, food and etc. At the command , “Group yourselves according to \_\_\_\_\_\_\_\_. The pupils will go to the respective groupings. Ask the pupils what they have realized after the game. Lead a discussion on individual differences and commonalities of children. Elicit the value of respect to others. Emphasize that everyone is a unique person, thus everyone deserves respect from others.

1. **Developmental Activities**
2. **Presentation**

Present this situation to the class.

 Mary, the architecture student, is working on her assignment. She first designs a rectangular pattern measuring 9 cm by 12 cm. She then makes copies of the rectangular pattern. Next she uses the rectangular patterns to form a square. How many rectangular patterns does she need to form the smallest square? What is the length of a side of this square?

 9cm

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 12

 36 cm

The diagram shows that Mary needs 12 rectangular patterns to form the smallest square of side 36 cm. The length , in cm of the side of a square that can be formed is a multiple of both 9 and 12. Consider the possible multiples of 9 and 12.

The multiples of 9 are 9 18 27 36 45 54 63 72 81 90 99 108

The multiples of 12 are 12 24 36 48 60 72 84 96 108

Discuss more about LCM.

1. **Performing the Activities**

 Have the pupils work by teams. Have them find the multiples of the following pairs of numbers and identify the common multiples for each pair of numbers. Have them give the least common multiple between the pair. Have them record their work as in the chart.

|  |  |  |  |
| --- | --- | --- | --- |
| Number Pair | Multiples | Common Multiples | Least Common Multiple (LCM) |
| 15 |  |  |  |
| 3 |  |  |  |
| 11 |  |  |  |
| 7 |  |  |  |
| 10 |  |  |  |
| 9 |  |  |  |

1. **Processing the Activities**

Let the groups present their outputs.

**Ask :**How did you solve for the correct answer? Let the pupils discuss their output to the class.

1. **Reinforcing the Concept and Skill**

Find the LCM of these numbers using the continuous division.

1. 16 and 48 = \_\_\_\_\_\_\_
2. 18 , 27 , and 45 = \_\_\_\_\_\_\_
3. 24 and 72 = \_\_\_\_\_\_\_
4. 24, 48 and 80 = \_\_\_\_\_\_
5. 8, 40 and 54 = \_\_\_\_\_\_\_
6. **Summarizing the Lesson**

To find the LCM of the given numbers we can use continuous division.

* Write the numbers horizontally and fin a prime number that will divide the numbers , if possible.
* Divide by that prime number and write the quotients below the dividends. Copy any numbers not divided below the dividend .
* Continue the process until the quotients are 1.
* Multiply all the prime divisors and the last set of quotients to get the LCM.
1. **Applying to New and Other Situations**

Read and Solve .

1. What is the least number of mangoes that can be divided equally among 9 , 8 , and 12 children.
2. You bring the drinks for your baseball team every sixth game. Every third game is a home game. When will you first bring the drinks to home game? If there are 20 games in an annual sportsfest , how many times will you bring the drinks to a home game like this?
3. **Assessment**
4. Find the LCM of the following using the continuous division method.
5. 48 and 54 = \_\_\_\_\_\_\_\_
6. 42 , 108 and 252 = \_\_\_\_\_\_\_
7. 24, 32 , 48 and 74 = \_\_\_\_\_\_
8. 135 , 450 = \_\_\_\_\_\_
9. 150 , 315 , 525 = \_\_\_\_\_\_
10. A lighthouse flashes its light every 12 minutes. Another lighthouse flashes every 18 minutes. If the two lighthouse flash together at 12:00 noon, at what time will they next flash together?
11. **Home Activity**

Find the LCM of these set of numbers.

1. 8 , 12 , 30
2. 12, 20, 45
3. 18, 27 , 35
4. 4, 10 , 8
5. 9, 12 , 18

**Enrichment**

Fill in the blanks.

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| --- | --- | --- |
| **Numbers** | GCF | LCM |
| 1. 6 , 10
 |  |  |
| 1. 10 , 21
 |  |  |
| 1. 9 , 12
 |  |  |
| 1. 12 , 16
 |  |  |
| 1. 8 , 40 , 54
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