5

DepED
DEPARTMENT OF EDUCATION

# Lesson Exemplar for Mathematics 5

Quarter 2
Lesson
8

**Lesson Exemplar for Mathematics Grade 5**
**Quarter 2: Lesson 8 (Week 8)**
**SY 2024-2025**



**Development Team**

**Writer:**
• Hazel G. Andrada, Ph. D. (Philippine Normal University Visayas)

**Validator:**
• Aurora Gonzales, Ph. D. (Philippine Normal University)

**Management Team**

Philippine Normal University
Research Institute for Teacher Quality
SiMMER National Research Centre

**MATHEMATICS/QUARTER 2/ GRADE 5**

| **I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES** | |
|---|---|
| ***A.*** **Content Standards** | Prime and Composite Numbers |
| **B. Performance Standards** | Distinguish prime numbers from composite numbers. (NA) |
| **C. Learning Competencies and Objectives** | ***Learning Competency***<br>***1.*** *Distinguish prime numbers from composite numbers using the Sieve of Eratosthenes.* |
| **D. Content** | **1.** Use models to illustrate concepts of prime and composite numbers.<br>**2.** Use Sieve of Eratosthenes to determine prime and composite numbers from 1 to 200. |
| **E. Integration** | 21st Century Skill: Critical Thinking and Collaboration |

**II. LEARNING RESOURCES**


Guadarrama, M. T. A. & Avendaño, G. A. (2021). *Number Smart 4 (Revised Ed.).* Rex Book Store, Inc. ISBN: 978-621-04-1688-6

Knowledge Channel (2023, February 22). *What are Prime and Composite Numbers* [Video File]. Youtube. https://www.youtube.com/watch?v=6pIIFzLhTB8

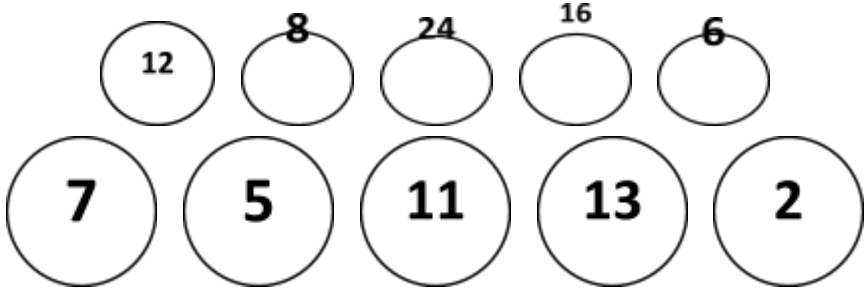
Laforteza, R. A. & Santiago, J. P. (2015). *Exploring Math Possibilities 5.* Don Bosco Press, Inc. ISBN: 978-971-9978-81-7

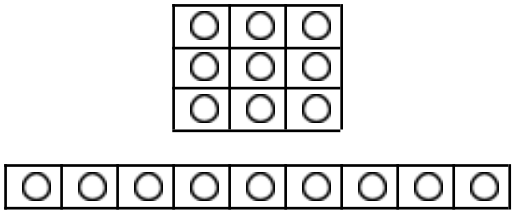
Sacao, J. R. (2022). *Math World 4* (2nd ed.). C & E Publishing, Inc. ISBN: 978-971-98-1716-1

*Admin. (2022, July 21). Sieve of Eratosthenes (Method to Find Prime Numbers with Examples). BYJUS. https://byjus.com/maths/sieve-of-eratosthenes/#:~:text=Sieve%20of%20Eratosthenes%20is%20a,in%20the%20third%20century%20B.C.*

Suarez, J. V. (2019). *Math Beyond Time 5.* JO-ES Publishing House, Inc. ISBN: 978-971-655-611-7

<table>
<tr><th colspan="2">III. TEACHING AND LEARNING PROCEDURE</th><th>NOTES TO TEACHERS</th></tr>
<tr><td>A. Activating Prior Knowledge</td><td>
DAY 1<br>
1. Short Review<br>
Put check (✓) in the appropriate space if the number is divisible by the number in the top row. Put (✕) if it is not.
<table>
<tr><th></th><th>Numbers</th><th>2</th><th>3</th><th>5</th><th>11</th></tr>
<tr><td>1</td><td>19</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2</td><td>25</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3</td><td>30</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4</td><td>41</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>55</td><td></td><td></td><td></td><td></td></tr>
</table>
2. Feedback (Optional)
</td><td>The teacher will provide a short review on applying divisibility rules. The teacher may conduct the review by calling out volunteers to mark a check or wrong on the board.</td></tr>
<tr><td>B. Establishing Lesson Purpose</td><td>
1. Lesson Purpose<br>
In our review, we applied the divisibility rules that we learned to determine whether the given numbers can be divided by the numbers on the top row.<br><br>
Upon observing the given numbers, we can notice that some numbers can be divided by some numbers on the top row, but some cannot.<br><br>
Let us take 19 and 41 for example, can you think of any other number that can divide these numbers without leaving any remainder? As a matter of fact, these numbers cannot be divided by any other number except for itself and one (1).<br><br>
Do you think there are other numbers that share the same characteristics as these two numbers?<br><br>
There are various mathematicians in history such as Eratosthenes, Euler, and Goldbach that studied these types of numbers and now is our time to study them too.<br>
2. Unlocking Content Vocabulary
</td><td>In this part of the lesson, the teacher will guide the students to determine the characteristics of the given number in the review part. The teacher may use the following questions:<br><br>1. Are all the given numbers divisible by the numbers on the top row?<br>2. What numbers can be divided by some of the numbers on the top row?<br>3. What numbers cannot be divided by the numbers on the top row?<br><br>In this part of the lesson, the teacher will introduce the</td></tr>
</table>

| | | |
|---|---|---|
| | Before we proceed to our next lesson, let us first revisit some of the terminologies that we learned from our previous lesson which will remain important in our new lesson. Let us redefine, on our own words, what these words mean:<br>  <br> | related terminologies that are commonly used in applying divisibility rules. The teacher may use the other examples on the review to clarify the concepts. |
| **C. Developing and Deepening Understanding** | **SUB-TOPIC 1: Use models to illustrate concepts of prime and composite numbers.**<br>**1. Explicitation**<br><br>We have here some random numbers from 1 to 30 written on each ball with varying sizes. What we will do is we will let these balls run through a sift and let us observe what numbers will pass through the sift and what will be filtered out.<br>  <br><br>Which numbers went through the sift? Which one did not?<br><br>Now, with a partner, select two numbers that passed through the sift and another two (2) numbers from those filtered out. Using circles, determine if you can arrange your chosen number in arrays with no leftover circles. An **array** is an arrangement of objects, pictures, or numbers organized in rows or columns. | In this part of the lesson, the students will engage the class by "sifting" the listed numbers. The instructional material will be prepared such that the composite numbers are smaller than the prime numbers. The sift may be made from baskets, nets, or any resources that can be locally found.<br><br>In this part of the lesson, the students will be doing an |

| | | |
|---|---|---|
| | For example, let us arrange 9 in an array:<br>  <br>An array can also tell us the factors of a given number by counting the number of rows and columns of each array. For instance, in our given arrays of 9, the first array has 3 columns and 3 rows, while the second one has 1 row and 9 columns. Therefore, the factors of 9 are 1, 3, and 9.<br><br>Now, from our activity, we noticed that those numbers that passed through the sift can be grouped with more than one array without leaving any leftover circles. However, those numbers that were filtered out can only be arranged with one array. These two groups of numbers can be classified into two:<br>a. **Prime Numbers**<br>Those numbers that were filtered out by the sift are called **prime numbers.** These numbers can only be modelled using one array. From the activity, we noticed that prime numbers have exactly two factors: one (1) and itself.<br>Examples: (Less than or equal to 10)<br>2, 3, 5, and 7<br><br>b. **Composite Numbers**<br>Those numbers that passed through the sift are called **composite numbers.** These numbers can be modelled using more than one array. From the activity, we can also tell that composite numbers have more than two factors.<br>Examples: (less than or equal to 10)<br>4, 6, 8, 9, and 10<br><br>**Connection of prime and composite number:** | activity in pairs. They will model the different given numbers using arrays of circles. After the activity, the teacher will call out volunteers to show their models on the board both for those numbers that passed through the sift and those numbers that were filtered out. The teacher may process the activity using the following questions:<br><br>1. Now, from all your work, what can you notice about those numbers that passed though the sift when modeled through arrays? How many factors do these numbers have?<br>2. How about those numbers that were filtered out. How many factors do these numbers have?<br><br>The teacher may ask the students to identify all the prime numbers below 10.<br><br>The teacher may ask the students to identify all the composite numbers that are less than or equal to 10. |

**Prime numbers** are considered the building blocks of natural numbers because all natural numbers can either be a prime number or a composite number that can be expressed as products of two or more primes.

In this part of the lesson, the teacher may let the students do the activity individually or by pair.

*Answer:*
1. COMPOSITE
2. PRIME
3. COMPOSITE
4. PRIME
5. COMPOSITE

**2. Worked Example**

Determine whether the following numbers are **PRIME** or **COMPOSITE** using arrays.

1. 14
2. 37
3. 27
4. 47
5. 49

**DAY 2**

**3. Lesson Activity (Refer to Worksheet 1)**

**Activity 1**

Determine whether the following numbers are **PRIME** and **COMPOSITE** using arrays**.** Write **P** if the number is prime and **C** if it is composite.

The activity will be conducted on the 2nd day for around 30 minutes. It will be answered after the students are done answering.

| | |
|---|---|
| ____1. 26<br>Factors: _____<br>Arrays: | ____2. 23<br>Factors: _____<br>Arrays: |
| ____3. 43<br>Factors: _____<br>Arrays: | ____4. 34<br>Factors: _____<br>Arrays: |
| ____5. 45<br>Factors: _____<br>Arrays: | ____6. 37<br>Factors: _____<br>Arrays: |

*Answers:*
1. C (Factors: 1,2,13,26)
2. P (Factors: 1, 23)
3. P (Factors: 1, 43)
4. C (Factors: 1, 2, 17, 34)
5. C (Factors: 1, 3, 5, 9, 15, 45)
6. P (Factors: 1, 37)

**Activity 2**

Determine the number that is being described. Write your answer on the space provided.

*Answers:*
1. 7
2. 18

_____1. The prime number between 6 and 10.
_____2. The composite number between 15 and 20 that is divisible by 9.
_____3. The product of the smallest prime number and the smallest composite number.
_____4. The sum of all prime numbers less than 10.
_____5. The difference between the prime number between 25 and 30 and the largest composite number less than 200.

3. 8
4. 17
5. 169

**DAY 3**

**SUB-TOPIC 2: Use Sieve of Eratosthenes to determine prime and composite numbers from 1 to 200.**

**1. Explicitation**

Everyone in the class will be given a card with numbers 1 to 50. All you have to do is to follow the instructions written on the board.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** |
| **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** | **49** | **50** |

**INSTRUCTIONS:**

1. Put an (x) on number 1.
2. Color the number 2 **blue.** Color all multiples of 2 **green.**
3. Color the number 3 **blue.** Color all multiples of 3 **green.**
4. Color the number 5 **blue.** Color all multiples of 5 **green.**
5. Color the number 7 **blue.** Color all multiples of 7 **green.**
6. Color all unmarked numbers with **blue.**

Now, pick two random blue colored numbers. Determine whether the number is prime or composite using array.

Then, pick two random green colored numbers. Determine whether the number is prime or composite using array.

In this part of the lesson, the teacher will guide the students in performing the Sieve of Eratosthenes for counting numbers between 1 to 50. The teacher should inform the students ahead to bring coloring materials. The teacher may change the rules for marking such as using checks and wrongs, other colors, etc. The activity will be processed by the teacher using the following guide questions:

1. What can you observe about the numbers that are colored blue?
2. What can you observe about the numbers that are colored green?
3. Why do you think 1 is crossed out?

As we can observe, all numbers that are colored blue are prime numbers while all numbers that are colored green are composite numbers.
This process of identifying of prime numbers in a given limit of counting numbers is called the **Sieve of Eratosthenes.** This method was introduced by a Greek mathematician, Eratosthenes, during the 3rd Century BC.
As you noticed earlier, one (1) is crossed out because this number is neither prime nor composite. One (1) cannot be considered as a prime number because by definition, a prime number must have exactly 2 factors. However, 1 has only 1 factor which is 1.
We can also notice that there are prime numbers that only differs by two such as 3 and 5, 5 and 7, 11 and 13, and 17 and 19. These pairs of prime numbers are called **twin primes.**

In this part of the lesson, the teacher may provide the students with a new sheet containing the digits from 1 to 100. This activity should be done by the students individually.

**2. Worked Example (Refer to Worksheet 2)**
Identify all the prime numbers between 1 to 100 using the Sieve of Eratosthenes.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
| **11** | **12** | **13** | **14** | **15** | **16** | **17** | **18** | **19** | **20** |
| **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** |
| **31** | **32** | **33** | **34** | **35** | **36** | **37** | **38** | **39** | **40** |
| **41** | **42** | **43** | **44** | **45** | **46** | **47** | **48** | **49** | **50** |
| **51** | **52** | **53** | **54** | **55** | **56** | **57** | **58** | **59** | **60** |
| **61** | **62** | **63** | **64** | **65** | **66** | **67** | **68** | **69** | **70** |
| **71** | **72** | **73** | **74** | **75** | **76** | **77** | **78** | **79** | **80** |
| **81** | **82** | **83** | **84** | **85** | **86** | **87** | **88** | **89** | **90** |
| **91** | **92** | **93** | **94** | **95** | **96** | **97** | **98** | **99** | **100** |

*Answer:*
There are 25 prime numbers between 1 to 100. These are:
2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97

**3. Lesson Activity (Refer to Worksheet 2)**

This lesson activity is suggested to be conducted on the 3rd day. It may be done by the students immediately or as an asynchronous task.

*Answer:*
1. 97
2. 93

| | | |
|---|---|---|
| | Refer to the Prime Numbers Chart that you just constructed. Determine the number that is being described on each item.<br><br>_____1. What is the largest prime number between 1 and 100?<br>_____2. What is the difference between the largest prime number and the smallest composite number?<br>_____3. What is the only even prime number?<br>_____4. What is the sum of all prime number between 70 and 80?<br>_____5. What numbers are the only twin primes between 50 and 100?<br>_____6. What is the sum of all prime numbers between 10 and 20?<br>_____7. What is the difference between the largest prime number and the least composite number between 20 and 50?<br>_____8. What is the sum of all twin primes that is in between 10 and 20?<br>_____9. How many prime numbers are in between 50 and 100?<br>_____10. What is the product of the least and largest prime numbers in between 1 and 100? | 3. 2<br>4. 223<br>5. 71 and 73<br>6. 60<br>7. 27<br>8. 60<br>9. 10<br>10. 194 |
| **B. Making Generalizations** | **DAY 4**<br>**1. Learners' Takeaways**<br>From the discussion for this week,<br>a. When can we say that a number is a prime number?<br>b. When can we say that a number is a composite number?<br>c. Is one a prime or a composite number? Why?<br>d. What are twin primes?<br><br>**2. Reflection on Learning**<br>a. In this lesson, we learned that prime numbers are the building blocks of natural numbers. As a person, we also have people around us that makes us who we are. Can you name a person that contributes to your growth? | In this part of the lesson, the teacher will guide the students in generalizing what they have learned by answering the given guide questions. The teacher can have it through oral recitation or a worksheet.<br><br>In this part of the lesson, the teacher will connect the lesson to real-life by instilling the value of being grateful. |
| **IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION** | | **NOTES TO TEACHERS** |
| **A. Evaluating Learning** | **1. Formative Assessment**<br>**(Refer to Worksheet 3)** | |

<table>
<tr><td></td><td colspan="3">2. Homework (Optional)</td><td></td></tr>
<tr><td rowspan="5">B. Teacher’s Remarks</td><td>Note observations on any of the following areas:</td><td>Effective Practices</td><td>Problems Encountered</td><td rowspan="5">Teachers are encouraged to record relevant observations or any critical teaching events that influence the attainment of the lesson objectives. Use or modify the provided template in recording the notable instructional areas or concerns.<br><br>In addition, notes here can also be on tasks that will be continued the next day or additional activities needed.</td></tr>
<tr><td>strategies explored</td><td></td><td></td></tr>
<tr><td>materials used</td><td></td><td></td></tr>
<tr><td>learner engagement/ interaction</td><td></td><td></td></tr>
<tr><td>others</td><td></td><td></td></tr>
<tr><td>C. Teacher’s Reflection</td><td colspan="3">Reflection guide or prompt can be on:<br>▪ <u>principles behind the teaching</u><br>What principles and beliefs informed my lesson?<br>Why did I teach the lesson the way I did?<br><br>▪ <u>students</u><br>What roles did my students play in my lesson?<br>What did my students learn? How did they learn?<br><br>▪ <u>ways forward</u><br>What could I have done differently?<br>What can I explore in the next lesson?</td><td>Entries on this section are the teacher's reflections about the implementation of the whole lesson, which will serve as inputs for the LAC sessions. Use or modify the provided guide questions in eliciting teacher’s insights.</td></tr>
</table>