Learning Experience:

Prime and Composite Numbers

When planning, include the following:
Models (Concrete—Semi-Concrete—Semi-Abstract—Abstract)
Problems/Situations
Questions

AKS:
7.OA.4 Determine whether a given whole number in the range 1-100 is prime or composite*
*reviewing 6.OA.4 – determine multiples and factors for whole numbers 1-100

Vertical Alignment:

5th Grade
9.NBT.5 multiply multi-digit whole numbers fluently using the standard algorithm

10.NBT.6 solve problems involving division of up to 4 digit whole number dividends by a one or two digit whole number divisor using strategies based on place value, properties and/or relationship between multiplication and division, including problems that generate a remainder

11.NBT.6 illustrate and explain division calculations by using equations, rectangular arrays, and/or area models

3rd Grade
6.OA.6 explain the relationship between multiplication and division to understand division as an unknown-factor problem

7.OA.7 multiply and divide fluently (using products and dividends 0 - 100) using strategies such as the relationship between multiplication and division or properties of operations

10.OA.9 identify, describe, and extend arithmetic patterns that may also occur in a table or graph (including patterns in the addition table and multiplication table)

Standards for Mathematical Practice:
1. Make sense of problems and persevere in solving them.
2. Model with mathematics.
3. Use appropriate tools strategically.
4. Look for and make use of structure.
5. Look for and express regularity in repeated reasoning.

Materials: (Links Included)
1. The King's Commissioners by Aileen Friedman (A Marilyn Burns Brainy Day Book)
2. Tiles or snap cubes (47 for each student or group)
3. Sieve of Eratosthenes skill sheet – 1 copy for each student
4. Colored pencils
5. Factor Friend worksheets (Sheet 1 and Sheet 2) (See additional file)
6. Divisibility Rules sheet
7. Prove or Disprove worksheet

Online Videos
1. Brain Pop video on prime numbers
2. Prime Number Video

Vocabulary:
Whole Number
Factor
Prime
Composite
Multiple
Divisibility

Essential Question:
How do we determine if a number is prime or composite?

Activating Strategy:
Factor Friend – reviewing factors
-Each child is given a number 1-30, (their student number can be used). In their math journal, they will list the factors for their number.

Using these factors, they will create their Factor Friend. Use Factor Friend sheet 1.
1. Each student will write their given number inside the mouth of Factor Friend.
2. Next, they will write the factors on the arms and the legs (one factor on each arm/leg). For example, if their number is 12, they will have six arms/legs (1, 2, 3, 4, 6, and 12).
3. Students will attach the arms and legs to a body (no pattern provided) made out of construction paper.
**Students can glue the Factor Friend in their math journals, or attach/ use with the number line.

Instructional Activity:

1. Watch the [Brain Pop video on prime numbers](#).
   *As a class, complete the quiz at the end of the Brain Pop video. This will give an opportunity to define the **Sieve of Eratosthenes**, which will be a part of this activity.
2. Have the students define prime and composite in their math journals, using the vocabulary cards on the MOCC.
3. Using sheet #2 of the Factor Friend activity, students will determine which hat (prime or composite) is needed for their Factor Friend. Reminder: if the student is #1, they will have the "I Am Special" crown.
4. Read The King's Commissioners.
5. During the reading of the story, the main character develops an array. While reading this page, define/ discuss an array (has to be a rectangle or square with nothing left over).
6. Continue with the story, identifying factors with numbers presented in the story.
7. After reading the story, each student (or can be done with partners) will attempt to build an array with 47 tiles/ snap cubes, with no tiles/ snap cubes left over.
8. The students will learn that there is only one that can be built: 1 X 47. Identify that this is a prime number.
9. As a whole group, build a composite number with the tiles as an example.
10. Have the students then use their tiles/ snap cubes to create an array of any composite number. Example: 5 X 8 = 40

   Questioning:
   1. Can you show me a prime number?
   2. Can you show me a composite number?
   3. Turn and talk: what is the difference between your Factor Friend number and your neighbor's Factor Friend number?
   4. Can you show me the closest prime number to your Factor Friend Number?
   5. How can you use your tiles/ snap cubes to create an array with a composite number of 24?
   6. How can you use your tiles/ snap cubes to create an array with a prime number of 23?
   7. Why are there some tiles left over with a prime number?
   8. Why were we able to evenly divide up the composite numbers?
   9. Why is it important to understand the difference between a prime and composite number?

Extension:

Factor Friend
Use the **"I'm Square"** box to determine if their number is square or not. If their number is a square number, they can glue the "I'm Square" to the bowtie of their Factor Friend.

Sieve of Eratosthenes

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1. Students will complete the **Sieve of Eratosthenes** using colored pencils.
2. At the end of the activity, the prime numbers will be left over (not marked out).
3. Divisibility rules can also be reviewed at this time. (see **Materials** for link)

One Time Only Game*
Directions:
1. Player #1 writes down a number greater than one and less than 100.
2. Player #2 writes down a factor of the first number underneath it.
3. Player #1 writes down a factor of this new number.
4. Each player, taking turns, writes down a factor of the preceding number.
5. If a player writes down a prime number, the next player adds 7 to it and writes down the resulting sum as his or her turn.
6. The player who can no longer contribute a new number loses the game.
7. Once a number has been written down, it cannot be used again and the number one cannot be used at all.
   *Source: ***Developing Number Sense*** by Rusty Bresser and Caren Holtzman

Prove or Disprove Worksheet
Prove or Disprove worksheet
* Whole group/ independent practice/ homework

Summarizing:

1. Students will watch the Prime Number Video and reflect that all of the prime numbers up to 100 are reviewed.
2. Students will create a "ticket out the door" by folding a piece of paper in quarters and labeling each section A, B, C, and D.
   A. What makes a number prime? List or draw an example.
   B. What makes a composite number? List or draw an example.
   C. Is _____ a prime number? How can you prove it?
   D. Is there anything that you don't understand about prime or composite numbers?

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PRIME

PRIME

Composite

PRIME

I'm Special

Composite

I'm Square

Composite