MTH 1W: Sets and Subsets

LESSON OVERVIEW:

Scope and Sequence – Main Lesson Topics	Prior Knowledge	Vocabulary
The Numbers We Use: Sets and Subsets • sets and subsets • set notation • review of the real number system	• Whole numbers • Rational numbers • Integers • Natural numbers	• R Number System • Set • Subset • Parent Set • Proper Subset

Learning Objectives	Curriculum Expectations
I can: • Describe subsets of number systems and how they are defined • Describe the similariteis and differences between subsets of numbers	• **B1.2** describe how various subsets of a number system are defined, and describe similarities and differences between these subsets

1 Lesson Introduction & Problem String *(see below)* — 40 minutes

Introduction:

- A set is a collection of "things" that all have a common property. Eg,. Items of clothes that you wear is a set. {hat, shoes, shirt, jacket, pants…} or Types of fingers – {index, middle, ring, pinky}
- Matematiciatns use a simple notation for sets using curly brackets (AKA set brackets or braces), commas, and the elements (things) of the set. See above for examples. The three dots (AKA ellipsis) means "continue on"
- The first example of clothing would be called an intinite set, the second example of fingers would be called a finite set.
- If there is a really long list, we can use the ",,," in the middle to be more efficitent. E.g.; {a,b,c,…x,y,z}
- We can define sets by their properties {x|x>0} is read as the set of all "x's", such that x is greater than 0

2 Consolidation — 10 minutes

- Understanding the Real Number System and how the subsets exist within (relationships between the subsets)
- How to create subsets using proper subset notation
- If students are still struggling with rational vs irrational (which is fair), we can play Adam's video

3 Meaningful Notes — 10 minutes

- **Subset** – a smaller set wtihin a set. E.g.I the set of whole numbers is a subset of the set of integers.
- **Number System** – a way to define number relationships. E.g., the base ten number system includes the digits 0 to 9,and the relationship of one place value to another is a multiple of 10.

4 Check Your Understanding — 15 minutes

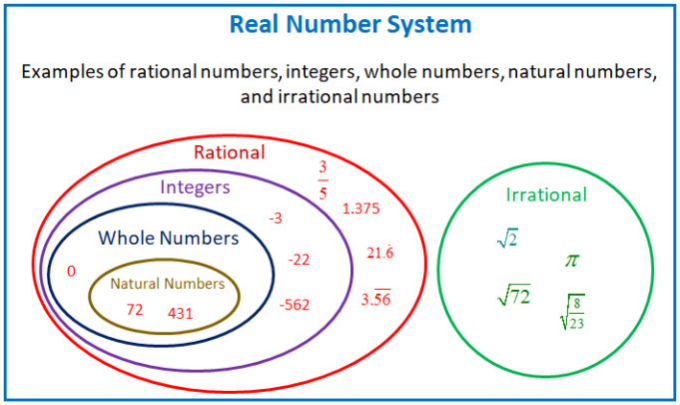
-

MTH 1W: Sets and Subsets

LESSON BACKGROUND:

- Showcase a set of numbers {1,2,3,4,5…} and identify the beginning and the end of the set.
- Define Subset and collectively identify number of possible subsets. Identify a *proper subset*
- Collectively identify a number of non-possible subsets
- Try another example of {2,4,5,6,8,9} and create subsets. Try using different order of numbers to show that order does not matter.
- Review the Real Number System with students through using the Teacher Resource on the Scope and Sequence. Identify the different letters used to represent different types of numbers and write each set on the board.
  - ie. the Natural Numbers are {1, 2, 3…}, the Whole Numbers are {0, 1, 2, 3…}, the Integers are {…-2, -1, 0, 1, 2…}, rational numbers are a/b such that b =/ 0 and repeating decimals, and irrational numbers include root 2 and pi (non-repeating decimals)
- Leave sets on board, and have students compare differences and similarities between the two sets.
- Distribute the **Subsets of Real Numbers (Blank)** and have students work on filling in the chart in their Random Groups using VNPS
- Consider using the YouTube video of Rational vs Irrational numbers

Using images such as the one below – may help students to better understand the number systems.



https://www.onlinemathlearning.com/real-numbers-algebra.html

MTH 1W: Sets and Subsets

PROBLEM	HINTS	EXTENSIONS
List the set of natural numbers less than or equal to 11	• What are natural numbers? What do you know about this type of number? • How do you know you have all the natural numbers less than or equal to 11? • What kind of notation do you need to use?	•
List the set of whole numbers less than 8	• What are whole numbers? • What do you know about this type of number? • How do you know you have all the whole numbers less than 8? • What kind of notation do you need to use?	•
What are the similarities and differences between the Natural and Whole number sets?	• Can you use the previous questions to help you? • What is the same about Natural and Whole numbers? • What is different about Natural and Whole numbers? • How do you know?	• Given the two number sets, which is the parent set, and which is the subset?
List the set of all EVEN integers from -4 to 2	• What are integers? • What do you know about this type of number? • How do you know you have all the even integers from -4 to 2? • What kind of notation do you need to use?	•
List the set of all integers that are multiples of 3	• What are multiples? • Is this set finite or infinite? How do you know? • How do you know you have all the integers that are multiples of 3? • What kind of notation do you need to use?	If you were to write a note to your "future forgetful self" about what you have learned so far about sets, subsets and number systems, what information would you include? Discuss in your group what you think the most important ideas are. Why are those the most important?
What are the similarities and differences between the Whole Number and Integer sets?	• Can you use the previous questions to help you? • What is the same about Integers and Whole numbers? • What is different about Integers and Whole numbers? • How do you know?	• Given the two number sets, which is the parent set, and which is the subset?
Create four subsets of the following set: {-8, -7, -6, -5, -4, -3}	• What are subsets? • How can you use what you know about subsets to help you? • Are there any more subsets that you could create?	• Create as many subsets as possible for the given set.

MTH 1W: Sets and Subsets

PROBLEM	HINTS	EXTENSIONS
Justin says there are a total of SEVEN subsets of the set {1,2,3} Correct or not?	{ }, {1}, {2}, {3}, {1,2}, {1,3}, {2,3} {1,2,3} • This is NOT a hint: but these are the subsets above! There are 8 in total.	• Hypothesize a rule for finding the number of subsets for a set containing **n** elements.
How are integers related to rational numbers?	• What are rational numbers? • What are integers? • What is the same about integers and rational numbers? • What is different about integers and rational numbers? • How do you know?	• Given the two number sets, which is the parent set, and which is the subset?
How are rational numbers related to irrational numbers?	• What are irrational numbers? • What is the same about rational and irrational numbers? • What is different about rational and irrational numbers? • How do you know?	•

MTH 1W: Sets and Subsets

Teacher Observations/To Go Back to During Gallery Walk:

