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Rev Level -

Sets in Mathematics and Number Types

Lecture No.A5: Sets in Mathematics and Number Types

"Mathematics is the most powerful tool we have. It controls our world. We can use it to put men on the moon. We use it to calculate how much insulin a diabetic should take. **It is hard to get right**." [Houston, *How To Think Like A Mathematician*, 2009]

"Whatever your hand finds to do, do it with your might." Ecc 9:10

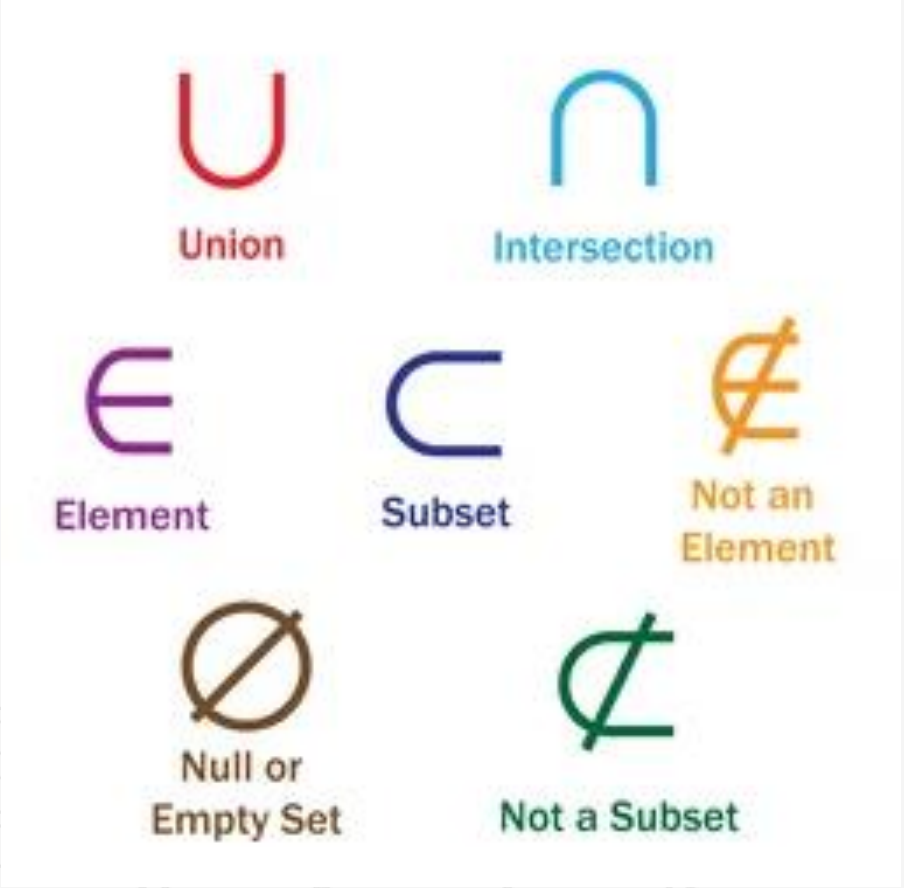
Common Core Standards: X-REF1

Lecture No.A5: Sets in Mathematics and Number Types

"Success is a collection of problems solved. " – L.M. Pei

In this lesson, we will be discovering more symbols central to math. More importantly, these symbols explored here help us organize the math so that we can have the basis upon which to apply Mathematics.

Meet SETS. "**A Set is a well-defined collection of objects. The objects in the set are called the elements or members of the set**." [Kevin Houston, How to Think Like a Mathematician,1992] To master Sets, we will have to learn the symbols and symbology used in sets, which makes up Set Theory, a branch of mathematical logic.



Source: shutterstock.com

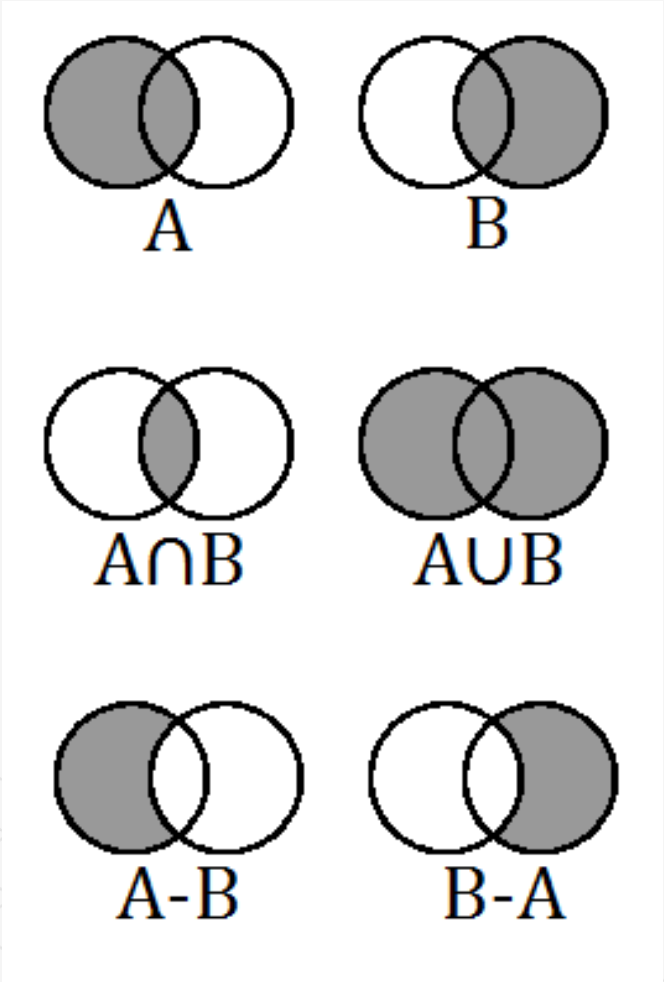
AGENDA/Learning Goals: A5 – Sets in Mathematics and Number Types

Intended audience: Mature audiences (gr 8 and up)

1. **Set Theory:** Sets, defined as a collection of objects nestled in between braces { } in mathematics, each identified by an arbitrary Capital Letter, for example, Set A or Set W, when identifying Subsets, But first, the Universal Set is always noted with the capital letter "U." To help us understand how set symbols are used, Venn diagram are useful in helping to explain and describe each of the various symbols of Set Theory are used to analyze or operate on sets.

2. Number Types: Here we discuss the various flavors (type) numbers come in, in other words the classification of numbers used in mathematics. You will find, the nature of mathematics exposes the complexity innate to numbers in and of themselves. We explore the various types of numbers and the symbols used to identify them, setting up the ability to use them along with Set Theory in the examples here.

3. **Examples:** We close the lesson by examining examples of using Sets with Number types as our examples.



Source: efgh.com

But First: No.A5: Pre-Test PoP-3 (need two of the three to advance)

Problem 1

$$\frac{48}{2^4}$$

Problem 2

$$\frac{(5-2)^3}{2 \times 7 - 5}$$

Problem 3

$$7(x + 4) + 2x;\ x = 2$$

ANSWER KEY: See the next slide.

SCORE: You want to get at least two of the three PoP-3 (Problems of the Day). **HONOR**

Answer Key: Pre-Test (PoP-3)

No.1 **Answer = 3** (48/16)

No.2 **Answer = 3** ((3)^3 / (14 - 5)), (27 / 9)

No.3 **Answer = 46** (7x + 28) + 2x; x =2), (9x + 28; x =2), (18 + 28)

If you **MISSED ONE** or **MORE**, you might want to return to this lesson, and studying it once again. If this make twice, revisit the Foundation skills. **Revisit this lecture again.**

Credit Source: WallaceCCfaculty.org/book/0.3 Order of Operations.pdf

Exploratory Stage: (Got to get your hands dirty!) Student-centered

Experiment 1: **Identify groups**

(1) On a sheet of paper, name four to five objects that are made of flat surfaces, labeling this group set A. (2) name four to five objects that have round or curved surfaces, labeling it set B. (3) Using both sets, identify the two heaviest objects in both sets, identifying this group set C. (4) Group both sets A & B, identify this group as set U. (5) Have one other person evaluate your work. (5) Reflect on their findings.

SUPPLIES: (A1 Experiment 1)

1. Use objects in plain view.
2. Paper and pen/pencil

Experiment 2: **Further analysis**

(1) Using set U from Experiment 1, name all dark colored objects, identify that group as set D. (2) The remaining objects, recognized as light in color, is to be identified as set E. (3) Group the two heaviest objects, identifying those as set F. (4) Compare set C to set F, identify objects in set C not included in set F. as set G, and those in set F but not in set C as set H. (5) Have one other person evaluate your work. (5) Reflect on their findings.

SUPPLIES: (A1 Experiment 2)

1. Paper and pen/pencil

Intervention Stage: (Terms Introduction phase) Teacher-centered

See **A5 Sets in Mathematics** lecture notes. Click the links to pull up the details.

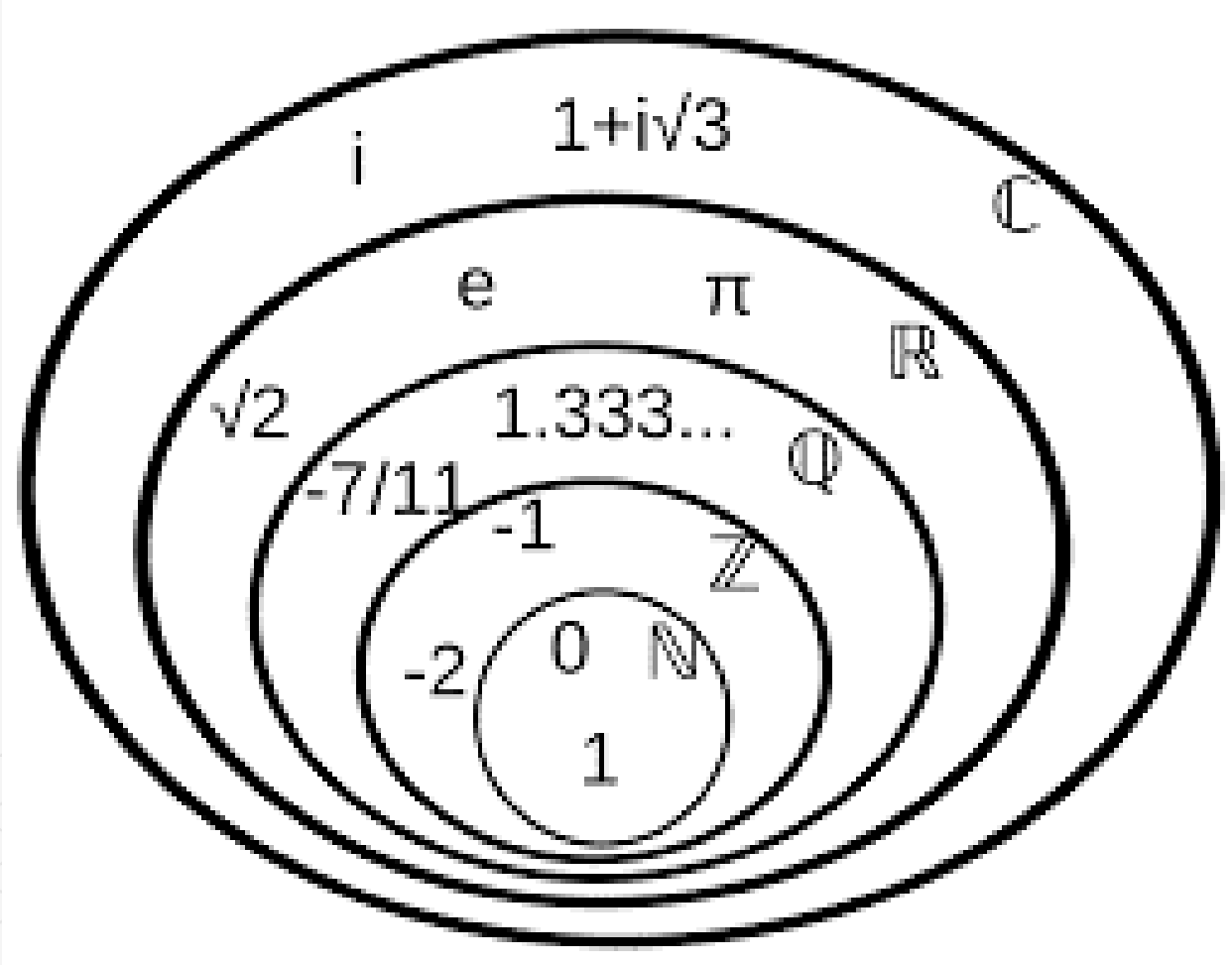
A5: Sets in Mathematics and Number Types

Lecture No.A5: Sets in Mathematics and Number Types

Numbers come in the various flavors (type) predicated on the circumstances upon how they are simplified into and are based on the nature of what is being analyzed. Next, we will explore the various types of numbers and the symbols used to identify them, as we prepare to apply Set theory.

They first breakdown into two major groupings, **Rational numbers** (Q), a number that is expressed absolutely, and **Irrational numbers** (I), a number expressed as an approximation, at best.

In the set of **Rational numbers: Counting numbers**, aka, **Natural numbers** (N) are the first group we are introduced to. Soon after, **Whole numbers** (W), **Integers** (Z) and then **Rational numbers** (R). In the other group, **Irrational numbers** (I) represents a paradox we encounter in math, which sets up the last group, the **Complex numbers** (C), a representation of a number that exists theoretically.



Source: wikipedia.com

Discovery Stage: (Try your hands at the following)

Experiment 3: **Apply Set Theory** (1) Reflecting on experiment 1, using the various groups identified, recreate the various groups, however, document the work completed in experiment 1 in Venn Diagrams, using Set Theory and the appropriate Sets symbols to note their inter-relationships. (2) Consulting with one other person, have them evaluate your expressions. (3) Reflect on their findings.

SUPPLIES: (A1 Experiment 3)

1. Paper and pen/pencil

Experiment 4: **Number Types and Sets** (1) Create using Set Notation the expression identifying Set G being all Natural Numbers equal or less than 7. (2) Create using set Notation the expression identifying Set H being all Integers greater than 3 but equal or less the 9. (3) Create using Set Notation the expression identifying Set J as the Intersection of Set G and Set H. (4) Create using Set Notation the expression identifying Set K as the Difference between Set G and Set H. (5) Consulting with one other person, having them evaluate your expressions.

SUPPLIES: (A1 Experiment 4)

1. Paper and pen/pencil

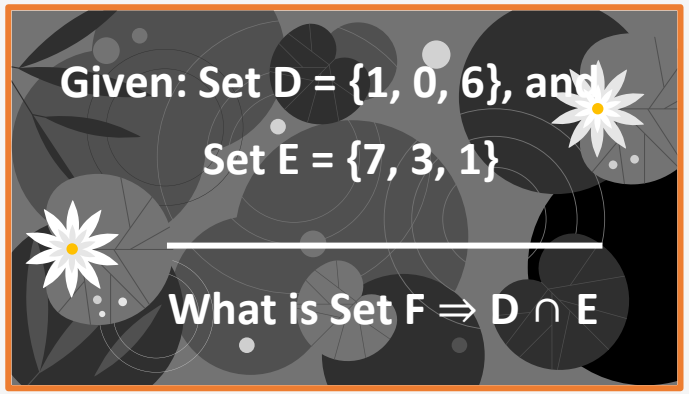
Finally: No.A5: Post-Test PoP-3 (need three of the three to advance)

Problem 1

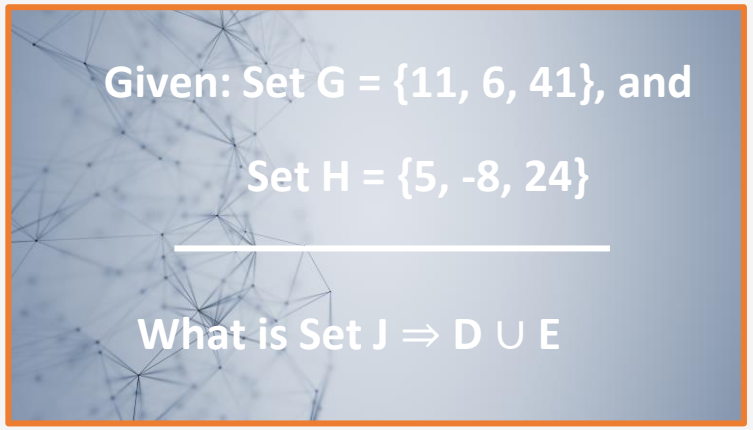
Given: Set A = {2, 3, 4}, and
Set B = {-5, 9, 1}

What is Set C ⇒ A x B

Problem 2



Problem 3



ANSWER KEY: See next slide.

SCORE: You want to get at least two of the three PoP-3 (Problems of the Day).

HONOR SYSTEM: Why fool self?

Answer Key: Post-Test (PoP-3)

No.1 **Answer: Set C =** {(2, -5), (**3, 9**), (**4, 1**)}

No.2 **Answer: Set F =** { 1 }

No.3 **Answer: Set J =** { 11, 6, 41, 5, -8, 24 }

If you **MISSED ONE** or **MORE**, you might want to return to this lesson, and studying it once again. If this make twice, revisit the Foundation skills. **Revisit this lecture again.**

Credit Source: Four Super Hard Order of Operations Problems and How to Solve Them (basic-mathematics.com)

The END! Any questions?

Ready for Next Cookie? Click here **A6: Number Sense and Problem Solving (Bubble Diagrams**

"Remember your PO, and always do good work."