*Unit 1-Sets

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 1**
Length: **6 Blocks**
Status: **Published**

Enduring Understandings

A set is a collection of objects that have something in common or follow a rule. The objects in the set are called its elements.

The purpose of a set is to house a collection of related objects.

Sets are collections of mathematical objects which themselves are mathematical objects.

Infinite sets collect infinitely many objects into one collection.

Essential Questions

What are the different methods to represent a set?

What is the difference between a finite set and an infinite set?

How can sets be used to construct a Venn diagram?

Content

Essential Vocabulary

- Set notation
- Roster Method
- Cardinality of sets
- Finite Set
- Infinite Set
- Well-Defined Set
- Empty Set

- Universal Set
- Complement
- Intersection
- Union
- DeMorgan's Laws
- Venn Diagram
- Cardinal Number of a Set
- One-to-One Correspondence
- Countable Set

Skills

- Define sets by using a word description and the roster method.
- Use set-builder notation to represent a set.
- Calculate the cardinal number of a set.
- Determine if given sets are equal and/or equivalent and explain the difference.
- Know the terms well-defined set and empty set (null set), and interpret the practical applications of these terms.
- Know the term universal set, and find the complement of a set.
- Construct subsets and proper subsets of a given set.
- Use the correct formula to find the number of distinct subsets of a given set.
- Understand and be able to use the terms intersection and union to determine set membership.
- Understand De Morgan's laws for sets and interpret the relationship between sets in a practical context.
- Use Venn diagrams to visualize sets and their relationships and interpret the results in a practical context.
- Calculate the cardinal number of a union of sets and interpret the result in a practical context.
- Analyze and solve application problems using Venn diagrams and interpret the results in the context of the application.
- In an applied situation, interpret set membership and explain this membership in everyday language.
- Place two sets in a one-to-one correspondence to determine if they are equivalent.
- Identify whether a set is infinite and has cardinality of $\aleph_0$.
- Identify whether a set is countable.

Resources

Text: *A Survey of Mathematics with Applications, Pearson 2005*

Each skill is aligned to the text as a reference.

Define sets by using a word description and the roster method (2.1)

Use set-builder notation to represent a set (2.1) o Calculate the cardinal number of a set (2.1)

Determine if given sets are equal and/or equivalent and explain the difference (2.1)

Know the terms well-defined set and empty set (null set), and interpret the practical applications of these terms (2.1)

Know the term universal set, and find the complement of a set (2.2)

Construct subsets and proper subsets of a given set (2.2)

Use the correct formula to find the number of distinct subsets of a given set (2.2)

Understand and be able to use the terms intersection and union to determine set membership (2.3)

Understand De Morgan's laws for sets and interpret the relationship between sets in a practical context (2.3)

Use Venn diagrams to visualize sets and their relationships and interpret the results in a practical context (2.3, 2.4)

Calculate the cardinal number of a union of sets and interpret the result in a practical context (2.4)

Analyze and solve application problems using Venn diagrams and interpret the results in the context of the application (2.4)

In an applied situation, interpret set membership and explain this membership in everyday language (2.1, 2.2, 2.3, 2.4)

Place two sets in a one-to-one correspondence to determine if they are equivalent (2.5)

Identify whether a set is infinite and has cardinality of ℵ0 (2.5)

Identify whether a set is countable (2.5)

http://www.mathwords.com/index_sets_logic_proofs.htm

http://www.mathgoodies.com/lessons/sets/

http://schools.aglasem.com/8763

http://www.math.northwestern.edu/~mlerma/courses/cs310-05s/notes/dm-sets.pdf

http://faculty.swosu.edu/michael.dougherty/book/chapter01.pdf

http://www.blc.edu/fac/rbuelow/cal/ntP-1.htm

https://www.youtube.com/watch?v=En8fI2ixepo

Standards

NJSLS 2016

Math Analysis

MA.K-12.4	Model with mathematics.
MA.K-12.6	Attend to precision.
MA.A-SSE	Seeing Structure in Expressions

Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (★).