*Unit 2-Logic

Content Area: **Mathematics**
Course(s):
Time Period: **Marking Period 1**
Length: **12 Blocks**
Status: **Published**

Enduring Understandings

The study of logic can be applied to a wide range of circumstances such as computer gates and electrical circuits.

The study of logic provides the basis to help to make convincing arguments and develop patterns of reasoning that will be needed in other fields; such as politics and understanding legal documents.

Essential Questions

How can someone use logic in their everyday life?

How do the skills studied in this unit apply to other areas of mathematics and other disciplines?

Content

Essential Vocabulary

- Statements
- Logic Symbols
- Logical Connectives
- Truth tables
- De Morgans Laws
- Equivalence statements
- Conditional Statements
- Converse
- Inverse
- Contrapositive
- Symbolic Arguments

Skills

- Know the term statement, and determine whether or not a given sentence is a statement.
- Interpret logical symbols.
- Use connectives to create compound statements.

- Know conditions under which a connective is true or false and explain the reasons for the truth values of these connectives.
- Create truth tables using and, or, not and if-then and interpret these truth values in a practical context.
- Determine whether a logical statement is a tautology or self-contradiction, and explain how this concept applies to practical statements.
- Determine whether two statements are equivalent and support your answer with explanations and evidence.
- Understand and apply De Morgan's laws for logic; interpret these laws in a practical context.
- Write equivalent forms and negation of the conditional.
- Explain the converse, inverse, and contrapositive of a conditional statement.
- Determine whether an argument is valid or invalid and support your answer with explanations and evidence.

Resources

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

Each skill is aligned to the text as a reference.

Know the term statement, and determine whether or not a given sentence is a statement (3.1)

Interpret logical symbols (3.1)

Use connectives to create compound statements (3.1)

Know conditions under which a connective is true or false and explain the reasons for the truth values of these connectives (3.1, 3.2, 3.3)

Create truth tables using and, or, not and if-then and interpret these truth values in a practical context (3.1, 3.2, 3.3)

Determine whether a logical statement is a tautology or self-contradiction, and explain how this concept applies to practical statements (3.2)

Determine whether two statements are equivalent and explain how you know (3.2, 3.3)

Understand and apply De Morgan's laws for logic; interpret these laws in a practical context (3.2)

Writing equivalent forms and negation of the conditional (3.3, 3.4) o Explain the converse, inverse, and contrapositive of a conditional statement (3.4)

Determine whether an argument is valid or invalid and explain how you know (3.5)

http://study.com/academy/topic/high-school-geometry-logic-in-mathematics.html

http://www.logic-puzzles.org/

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

http://logic.stanford.edu/intrologic/notes/notes.html

Standards

NJSLS 2016

Math Analysis

MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.S-MD.B.7	Analyze decisions and strategies using probability concepts (e.g., product testing, medical testing, pulling a hockey goalie at the end of a game).