SECTION HEADING

MATH 1109: Math Skills for Elementary Education

Description

Math Skills for Elementary Education develops mathematical skills required for Elementary Education majors by pairing various skills with a beginning discussion of pedagogy and best-practices in Elementary Math Education. This course fulfills some of the Minnesota Professional Educators Licensing and Standards Board competencies required for Elementary teachers.

Credits

3

Prerequisite

Two years of high school Algebra, Math 0092, or placement by multiple measures

Corequisite

None

Topics to be Covered

1. Number properties and operations.

2. Measurement principles and Geometry concepts.

3. Discrete and Finite concepts like recursion, combinatorics and graph theory.

4. Mathematical models, working with data and analyzing problems.

5. Multiple representations of Math including: verbal, algebraic, pictorial (geometric), graphical, and numerical.

6. Best teaching practices.

Learning Outcomes

1) The student will apply and explain the use of number properties and number operations.

A. Compute proficiently with integers and rational numbers (including decimals, fractions and percents).

B. Discuss and apply properties appropriately including: closure, associative, commutative, identity, inverse, and distributive properties.

C. Extend these properties to real numbers.

D. Compute proficiently using order of operations.

2) The student will apply and explain measurement principles and geometry concepts.

A. Measure objects with both standard and metric systems.

B. Convert measurements within and between systems.

C. Describe how accuracy and precision are related.

D. Name, draw and describe properties of common geometric figures including polygons.

E. Compare and contrast properties in Euclidean geometry (measurements: degrees, length, perimeter, area, volume) with those in graph theory (measurements: adjacency, connectedness, paths, circuits).

3) The student will apply and explain discrete and finite math concepts

A. Use and explain recursion and iteration in mathematical patterns.

B. Apply counting techniques to count finite sets.

C. Use iterative algorithms to perform a given calculation or solve a given problem like in the linear and exponential models and math of finance and logistic populations (Now and Next patterns).

D. Apply basic graph theory to find paths in a network or optimize a process.

4) The student will develop mathematical models to organize data and analyze problems.

A. Identify which type(s) of models can best be used to describe a pattern (for example: iteration, recursion, linear, exponential).

B. Use technology to demonstrate an iterated or recursive pattern.

5) The student will solve problems by multiple representations including verbal, algebraic, geometric (pictorial), graphical, and numerical methods where possible.

A. Use multiple representations to describe authentic situations, data, and patterns.

B. Graph and draw patterns which and use them to describe situations.

C. Solve problems using multiple representations and estimate solutions and evaluate reasonableness for solutions.

6) Complete Competencies 3 - 13 for Teachers of Elem. Ed. (8710.3200, Subp. 3, Standard H1a - H4b) As follows:

H1a) identify and justify observed patterns,

H1b) generate patterns to demonstrate a variety of relationships,

H1c) relate patterns in one strand of mathematics to patterns across the discipline,

H2a) help students investigate situations that involve counting finite sets, calculating probabilities, tracing paths in network graphs, and analyzing iterative procedures,

H2b) apply these ideas and methods in settings in mathematics of finance, population dynamics, and optimization planning,

H3a) possess number sense and be able to use numbers to quantify concepts in authentic problems,

H3b) understand a variety of computational procedures and how to use them in examining the reasonableness of answers,

H3c) understand the concepts of number theory including divisibility, factors, multiples, prime numbers, and a basis for exploring number relationships, H3d) understand the relationships of integers and their properties that can be explored and generalized to other mathematical domains,

H4a) understand the properties of geometric figures,

H4b) understand geometry and measurement from both abstract and concrete perspectives and identify real world applications.

Credit Details

Lecture: 3

Lab: 0

OJT: 0

MnTC Goal Area(s): None