

The North Dakota Standards and Benchmarks

Content Standards – DRAFT

Mathematics Grades 11-12 – Content Only

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North Dakota Department of Public Instruction

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Standard 1: Number and Operation

Standard 1: Students understand and use basic and advanced concepts of number and number systems

BENCHMARK EXPECTATION

Grades 11-12

NUMBERS, NUMBER RELATIONSHIPS, AND NUMBER SYSTEMS

- 11-12.1.1. Translate between radical expressions and expressions involving rational exponents
- 11-12.1.2. Describe the hierarchical relationships (e.g., explain why real numbers are complex) among subsets of the complex number system, i.e., complex, real, and imaginary
- 11-12.1.3. Use imaginary numbers to express the square root of a negative number
- 11-12.1.4. Justify the steps of an algebraic process using the properties of the real number system; e.g., write an algebraic proof

OPERATIONS AND THEIR PROPERTIES

- 11-12.1.5. Determine which properties of the real number system hold for matrices; e.g., matrix multiplication is not commutative
- 11-12.1.6. Apply basic properties of exponents and logarithms to rewrite algebraic expressions; i.e., power of a product, power of a power, products and quotients of powers, zero and negative exponents, and log of a product, quotient, or power

COMPUTATIONAL FLUENCY AND ESTIMATION

- 11-12.1.7. Add, subtract, and multiply complex numbers
- 11-12.1.8. Multiply matrices containing no more than three rows or columns without the use of technology

Standard 2: Geometry and Spatial Sense

Standard 2: Student understands and applies geometric concepts and spatial relationships to represent and solve problems in mathematical and nonmathematical situations

BENCHMARK EXPECTATION

Grades 11-12

TWO- AND THREE-DIMENSIONAL SHAPES, GEOMETRIC PROPERTIES AND RELATIONSHIPS

11-12.2.1. Use trigonometric relationships to determine side lengths and angle measures in triangles; i.e., right triangle trigonometry, Law of Sines, and Law of Cosines

COORDINATE GEOMETRY

No further expectations

TRANSFORMATION AND SYMMETRY

No further expectations

VISUALIZATION, SPATIAL REASONING, AND GEOMETRIC MODELING

No further expectations

Standard 3: Data Analysis, Statistics, and Probability

Standard 3: Students use data collection and analysis techniques, statistical methods, and probability to solve problems

BENCHMARK EXPECTATION

Grades 11-12

DATA COLLECTION, DISPLAY, AND INTERPRETATION

11-12.3.1. Choose, construct, and interpret an appropriate display to represent a set of data

PROBABILITY

11-12.3.2. Make predictions based on theoretical probabilities and experimental results

STATISTICAL METHODS

11-12.3.3. Select, calculate, and use appropriate measures of central tendency and spread (i.e., mean, median, mode, range, and quartiles) to draw meaningful conclusions about a set of data

PREDICTIONS, DATA ANALYSIS AND INFERENCES

11-12.3.4. Given a set of data exhibiting a linear trend, approximate an equation for the line of best fit (with or without technology) and use that model to make predictions

Standard 4: Measurement

Standard 4: Students use concepts and tools of measurement to describe and quantify the world

BENCHMARK EXPECTATION

Grades 11-12

MEASURABLE ATTRIBUTES, MEASUREMENT SYSTEMS AND UNITS

No further expectations

MEASUREMENT TOOLS, TECHNIQUES, AND FORMULAS

No further expectations

Standard 5: Algebra, Functions, and Patterns

Standard 5: Students use algebraic concepts, functions, patterns, and relationships to solve problems

BENCHMARK EXPECTATION

Grades 11-12

PATTERNS, RELATIONS, AND FUNCTIONS

11-12.5.1. Perform advanced operations (i.e., composition and finding inverses) on algebraic functions

11-12.5.2. Generate graphs of a variety of functions (i.e., linear, quadratic, polynomial, absolute value, and exponential), using technology when appropriate

NUMERIC AND ALGEBRAIC REPRESENTATIONS

11-12.5.3. Solve quadratic equations involving complex roots

11-12.5.4. Use transformations (i.e., reflection, translation, dilation) to graph linear, quadratic, and absolute value functions

11-12.5.5. Given the graph of a transformed linear, quadratic, or absolute value function, write its equation

MATHEMATICAL MODELING

11-12.5.6. Determine and write an equation for a function (i.e., linear, quadratic, polynomial, absolute value, and exponential) that models a mathematical relationship

RATES OF CHANGE

No further expectations