Standard 1: Number and Quantity

Mathematics teachers have a broad and comprehensive understanding of number systems, number representations, number operations, and number theory, including:

1.1   properties of the real and complex numbers and their subsets

1.2   ordering and equivalence of different representations of numbers

1.3   attending to accuracy and precision with different representations of numbers

1.4   number sense and place value, including bases other than base 10

1.5   application and use of factors

1.6   properties of vector spaces and matrices and their applications

1.7   traditional and alternative computational algorithms

1.8   problem solving with different representations of numbers (fractions, decimals, percents, scientific notation)

Standard 2: Algebra

Mathematics teachers have a broad and comprehensive understanding of the structure of mathematical expressions, the application of algebraic techniques, and the use of equations and inequalities to model and solve problems, including:

2.1   algebraic notation, language, and expressions

2.2   simplification and manipulation of polynomials and rational expressions

2.3   creating and solving equations and inequalities

2.4   modeling and solving systems of equations and inequalities, including the use of matrix techniques

2.5   algebraic reasoning and the proof and justification of algebraic techniques

2.6   graphical representations of equations and inequalities

2.7   concepts of linear and abstract algebra, including vector spaces and matrices involving both real and complex numbers

Standard 3: Functions
Mathematics teachers have a broad and comprehensive understanding of the characteristics of functions and relations and of the properties, behaviors, and applications of linear and nonlinear functions and their multiple representations (graphs, equations, tables, and concrete models), including:

3.1   properties of patterns, ratios, proportions, relations, and functions

3.2   properties of linear functions, inequalities, systems, and their representations

3.3   modeling problems with linear functions, inequalities, systems, and their representations

3.4   behaviors of nonlinear functions and relationships between their various representations

3.5   manipulation of functions, including transformation, translation, composition, and other manipulations

3.6   modeling problems with nonlinear functions and their representations

3.7   trigonometric functions and the unit circle

3.8   properties of the trigonometric functions

3.9   modeling periodic phenomena with trigonometric functions

3.10   polar coordinates and parametric equations

Standard 4: Measurement and Geometry
Mathematics teachers have a broad and comprehensive understanding of the principles and procedures of measurement, Euclidean plane geometry and its applications, Euclidean coordinate geometry and its applications, and the role of reasoning and proof in geometry, including:

4.1   principles, procedures, and applications of measurement and geometry

4.2   derivation and application of length, perimeter, area, and volume formulas of basic geometric figures

4.3   techniques of indirect measurement, including estimation and proportional reasoning

4.4   properties and construction of figures and shapes in two and three dimensions

4.5   the use of translations, rotations, reflections, dilations, and contractions in relation to similarity, congruence, and symmetries

4.6   coordinate and transformational geometry

4.7   conic sections and their applications

4.8   modeling and solving problems using geometric concepts

4.9   axiomatic structures of Euclidean and non-Euclidean geometries

4.10   logical reasoning, justification, and proof in relation to the axiomatic structure of geometry

Standard 5: Statistics and Probability
Mathematics teachers have a broad and comprehensive understanding of the collection, presentation, and interpretation and misinterpretations of data, and of the fundamental principles of probability, including:

5.1 summarizing, representing, and interpreting data for one or two variables

5.2 making inferences and evaluating claims based on data

5.3 variability and randomization in data

5.4 lines of best fit

5.5 sampling, bias, and misrepresentations in data

5.6 probabilities of simple and compound events

5.7 calculation and application of expected values

5.8 estimation of probabilities by observation and use of simulations

5.9 representations of probabilities

5.10 modeling and solving problems with normal, uniform, and binomial probability distributions

Standard 6: Calculus
Mathematics teachers have a broad and comprehensive understanding of the principles, techniques, and applications of differential and integral calculus, including:

6.1 limits, continuity, and the graphs of functions

6.2 concept and definition of the derivative and the second derivative

6.3 techniques and applications of differentiation

6.4 interpretation and properties of the definite integral

6.5 fundamental theorem of calculus

6.6 techniques and applications of antidifferentiation

6.7 numerical approximations of definite integrals

6.8 infinite sequences and series

6.9 properties of vector functions

Standard 7: Discrete Mathematics
Mathematics teachers have a broad and comprehensive understanding of the principles, techniques, and applications of discrete mathematics, including:

7.1 counting techniques and combinatorics

7.2 symbolic logic

7.3 sequences and series

7.4 induction and recursion

7.5 graphs, trees, arrays, and their representations

7.6 social choice (including apportionment and voting methods) and its applications

7.7 linear programming and its applications

7.8 game theory and its applications

Standard 8: Mathematics Instruction and Assessment
Mathematics teachers have a broad and comprehensive understanding of content-specific curricula, instruction, and assessment in mathematics education, including:

8.1 the Indiana Academic Standards and Core Standards for Mathematics

8.2 the Common Core State Standards for Mathematics, the NCATE/NCTM Standards for Mathematics, and the ISTE National Educational Technology Standards

8.3 instructional strategies and resources for promoting student understanding of concepts and skills related to mathematics, including the use of multiple representations

8.4 evaluation and development of curricula and curricular materials (including textbooks and digital content) that support standards-based instruction and assessment

8.5 strategies and skills for planning and differentiating mathematics instruction, based on the Indiana Response to Instruction (RtI) model, to meet the needs of all learners

8.6 instructional strategies to promote student learning and to connect the *Standards for Mathematical Content* to the *Standards for Mathematical Practice* of the Common Core State Standards

8.7 communication methods that promote student learning and foster active inquiry, interaction, and collaboration in the mathematics classroom

8.8 strategies and skills for selecting, adapting, and using technology to enhance the teaching and learning of mathematics

8.9 strategies and skills for effectively assessing student understanding and mastery of essential mathematics concepts and skills

8.10 implementation of the Indiana Response to Instruction (RtI) model for all students, including differentiation in Tiers 1 and 2 and intensive intervention and extension in Tier 3