PK-12 Stage One: Guiding Document

Content: Mathematics

PK-12 Long-term Transfer Goal(s):

Long-term aims of the PK-12 program: An overall end result of a student's education in Madison.

Students will be able to independently use their learning to:

Transfer Goals

1) model relationships among quantities.
2) manipulate equations/expressions or objects to create order and establish relationships.
3) represent and interpret patterns in numbers, data and objects.
4) draw conclusions about graphs, shapes, equations, or objects.
5) demonstrate fluency with math facts, computation and concepts.
6) make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution.
7) use appropriate tools to make reaching solutions more efficient, accessible and accurate.
8) apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem.
9) evaluate the accuracy and efficiency of a given solution.
10) justify reasoning using clear and appropriate mathematical language.

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Standards:	Understandings:	Essential Questions:
Habits of Mind **CCSS.Math.Practice.MP1 Make sense of problems and persevere in solving them** **CCSS.Math.Practice.MP6 Attend to precision.**	Effective problem solvers work to make sense of the problem before trying to solve it. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions. Mathematicians create dependable arguments by calculating efficiently and accurately. Mathematicians overcome obstacles by employing strategies and learn from success and failure.	• How does a problem solver think? • What is the problem? • How can I break a problem down into manageable parts? • Does this solution make sense? • How can I use symbols to communicate? • What methods can I use to monitor my thinking/accuracy? • How do I work through problems without giving up?
Reasoning and Explaining **CCSS.Math.Practice.MP2 Reason abstractly and quantitatively** **CCSS.Math.Practice.MP3 Construct viable arguments and critique the reasoning of others.**	Mathematicians flexibly use different tools, strategies, and operations to build conceptual knowledge or solve problems. Mathematicians argue the relationships between problem scenarios and mathematical representation. Mathematicians compare the	• How can I explain this mathematically? • What does the solution tell me? • What is another way that this problem could be solved? • What do I need to support my answer? • How would someone critique my answer? • How can I use what I know to help me find what is missing?

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Standards:	**Understandings:**	**Essential Questions:**
	effectiveness of various arguments, by analyzing and critiquing solution pathways. Mathematicians think flexibly by asking useful questions to clarify or improve their arguments.	
Modeling and Using Tools **CCSS.Math.Practice.MP4** Model with mathematics. **CCSS.Math.Practice.MP5** Use appropriate tools strategically.	Mathematicians apply the mathematics they know to solve problems occurring in everyday life. Mathematicians are able to make assumptions and approximations to simplify a complicated situation. Mathematicians create or use models to examine, describe, solve and/or make predictions. Mathematicians identify relevant tools, strategies, relationships, and/or information in order to draw conclusions.	• What math tools/models/strategies can I use to solve the problem? • How can I simplify the problem? • How do I decide if my answer makes sense and if not, what do I do? • What is the best way to show my thinking?

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Standards:	Understandings:	Essential Questions:
Structure and Generalizing **CCSS.Math.Practice.MP7 Look for and make use of structure.** **CCSS.Math.Practice.MP8 Look for and express regularity in repeated reasoning.**	Mathematicians examine relationships to discern a pattern, generalizations, or structure. Mathematicians continually evaluate their process and the reasonableness of the intermediate results. Mathematicians understand that placing a problem in a category gives one a familiar approach to solving it.	• What is the most efficient way to solve this problem? • How can understanding a pattern help me? • What have I seen in the past that might help me now?
Number and Operations Counting and Cardinality Number & Operations in Base Ten Number & Operations in Fractions The Number System Number & Quantity Ratios & Proportional Relationships	Mathematicians use numbers, ways of representing numbers, relationships among numbers, and number systems to build meaning. Mathematicians examine the impact of operations and how they relate to one another. Mathematicians use number sense to compute fluently and make reasonable estimates.	• What is another way to represent this number? • How do operations relate to one another? • How do predictable patterns help us? • How does estimating help me? • How can seeing numbers inside of other numbers help me to understand them? • Have I used what I understand about numbers to make this easier? • How can I decompose a number to make it easier to work with?

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Standards:	Understandings:	Essential Questions:
Algebraic Thinking Operations and Algebraic Thinking Expressions and Equations Algebra Functions	Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems. Mathematicians represent and analyze mathematical situations and structures using algebraic symbols to communicate thinking. Mathematicians use models to represent and make meaning of quantitative relationships. Mathematicians analyze change and make predictions in various contexts.	• How do you express and describe a pattern and use it to make predictions and solve a problem? • What is meant by equality? • How do I think about what is equal and not equal? • How can change be described? • How can a variable/ expression / equation/graph tell a story? • How do I interpret this mathematical model?
Measurement and Data Statistics and Probability	Mathematicians select and use appropriate statistical methods and tools to analyze data, show trends, and describe or make predictions. Mathematicians formulate questions that can be analyzed with data to evaluate inferences, make predictions and/or communicate an answer.	• How does what we measure affect how we measure? • How can measurement help me describe what I see? • How can chance inform choice? • How can presentation change interpretation?

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Standards:	Understandings:	Essential Questions:
Geometry	Mathematicians use geometric models, and spatial sense to interpret and make sense of the physical environment. Mathematicians analyze characteristics and properties of geometric shapes to develop mathematical arguments about geometric relationships. Mathematicians apply transformations and/or use symmetry to analyze mathematical situations and solve problems.	- How does classifying bring clarity? - How can constructing and deconstructing help me know what to do? - How can I use what I know in the world? - What makes these shapes similar? Different? - What are the similarities and differences between the images and pre-images generated by translations?

MP1 Make sense of problems and persevere in solving them
MP2 Reason abstractly and quantitatively
MP3 Construct viable arguments and critique the reasoning of others
MP4 Model with Mathematics
MP5 Use appropriate tools strategically
MP6 Attend to precision
MP7 Look for and make use of structure
MP8 Look for and express regularity in repeated reasoning