Big Picture of Mathematics
Excerpt from Branford Public Schools, CT

Transfer Goals *Long term goals of math education*	MP #s *Related Standard*	Student-Friendly Transfer Goals
1. Based on an understanding of any problem: initiate a plan (using a variety of methods/strategies appropriately), execute it and evaluate the reasonableness and accuracy of the solution.	1, 3, 4, 5, 6, 8	● K-12: I can use what I know to solve new problems. ● K-4: After working carefully to solve the problem, I can check my answer to see if it makes sense ● 5-12: After working carefully to solve the problem, I can verify that my calculations are accurate and my solutions are reasonable.
2. Demonstrate perseverance by attempting the problem, monitor and evaluate the progress and change course if necessary.	1, 2	● K-4: I don't give up if I get stuck. I can change my thinking when my strategy isn't working. ● 5-12: I can demonstrate perseverance as I work to overcome difficulties and obstacles.
3. Justify reasoning or understanding by using appropriate, precise math language. (your own solution or someone else's).	3, 6	● K-4: I can explain/show my work using words, symbols, pictures, charts, graphs, and units of measure. ● 5-12: I can support my ideas clearly and concisely using proper mathematical language/notation. ● K-4: I can agree or disagree with different ideas and strategies, and explain why. ● 5-12: I can justify the reasonableness and accuracy of someone else's solution/attempt using accurate and precise mathematical language.
4. Investigate and explain how mathematical structures or patterns relate to one another in the context of a problem or in a broader sense.	2, 7	● K-4: I can solve problems by thinking about patterns and my experience with similar problems. ● 5-12: I can solve problems by looking for and using rules, patterns, and my experience with similar problems.
5. Demonstrate automaticity in basic computation and critical vocabulary so they can focus on the more sophisticated aspects of the problem.	6, 7	● K-4: I can consistently use my math facts and words efficiently. ● 5-12: I can accurately and efficiently recall basic math facts, formulas, and critical vocabulary.

Essential Questions	Related Transfer Goals	Understandings
Q1: What do I "see" when I look at this problem?	**1, 4, 5**	Effective problem solvers work to understand the problem by picturing what is happening and figuring out relevant information and unknowns.
Q2: Have I solved a problem like this before?	**1, 4, 5**	- Every problem can be categorized based on a similar structure and set of characteristics. - Recognition of patterns and structures fosters efficiency in solving problems.
Q3: What's my plan to solve the problem? Does the plan make sense? Is there another way?	**1, 2**	Mathematicians determine a plan, while remaining open to alternate approaches and revising as necessary, to efficiently and effectively solve problems.
Q4: How does my answer/solution compare to others?	**3**	- Effective justifications are based on logical mathematical thinking and appropriate representations/vocabulary. - Analyzing someone else's mathematical thinking creates clarity about a problem, its model, and the viability of a solution.
Q5: What am I learning? How can I get better at this?	**2**	Mathematicians grow from their experiences, becoming more skillful and flexible in how they approach problem-solving, and more committed to seeing the problem through.

Content Thread and Related Transfer Goals	Understandings	Essential Questions

Operations and Algebraic Thinking (Gr. K-5) ***Expressions and Equations (Gr. 6-8)*** ***Algebra (Gr. 9-12)*** ***Functions (Gr. 8-12)*** **Compose and decompose numbers to establish relationships, perform operations, and solve problems.** **Describe and/or solve problems using algebraic expressions, equations, inequalities, and functions.** **Use operations, functions or equations to model relationships.** **Classify, interpret, or compare functions/ equations.**	U13: Numbers, objects, or elements may repeat in predictable ways (patterns). U14: The same value/expression/equations can be expressed/represented in multiple ways. U15: The relationship among operations and their properties can be used to understand and solve problems. U16: Properties of operations promote computational automaticity. U17: Expressions, equations, inequalities, functions and graphs use symbols to represent quantities, operations, and their relationships. U18: (**Gr. 8**+) A function can represent how quantities relate to one another. U19: The application of properties and order of operations can simplify expressions, solve equations, and combine functions. U20: Trigonometric functions can be composed and decomposed to model a cyclical pattern and to solve problems.	Q9: How can I use rules or patterns to make sense of operations or relationships? Q10: How can I represent numbers/relationships in different ways? Q11: How can I best represent the given information? Q12: How can I apply the properties of math to solve problems? Q13: How can I classify/evaluate functions? Q14: What is the relationship between these values/expressions/operations/functions?