

Branford Draft of Big Picture of Mathematics Transfer Goals (based on Mathematical Practices)

Transfer Goals	MP #s	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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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.

Teacher notes:

Math language: ie symbols, models, specifying units of measurement, explicit use of definitions.

Broader sense: ie addition leads to multiplication and then multiplication leads to exponents

Essential Questions	Related Transfer Goals	Understandings
	1, 4, 5	<ul style="list-style-type: none"> U1: Effective problem solvers work to understand the problem by picturing what is happening and figuring out relevant information and unknowns.
	1, 4, 5	<ul style="list-style-type: none"> U2: Every problem can be categorized based on a similar structure and set of characteristics. U3: Recognition of patterns and structures fosters efficiency in solving problems.
	1, 2	<ul style="list-style-type: none"> U4: Mathematicians determine a plan, while remaining open to alternate approaches and revising as necessary, to efficiently and effectively solve problems.
	3	<ul style="list-style-type: none"> U5: Effective justifications are based on logical mathematical thinking and appropriate representations/vocabulary. U6: Analyzing someone else's mathematical thinking creates clarity about a problem, its model, and the viability of a solution.
	2	<ul style="list-style-type: none"> U7: 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
<p>Represent quantities/expressions in multiple ways without changing their value.</p> <p>Compose and decompose numbers to establish relationships and perform operations, and solve problems (</p>	<p>U8: Objects and sets of objects are represented in a number system.</p> <p>U9: The value of a number is quantified by the placement of its digits.</p> <p>U10: Every number/quantity has a structure that can be used to perform operations and compare values.</p> <p>U11: Mathematical values or situations can be modeled in multiple ways.</p> <p>U12: Symbols can be used to represent numerical descriptions and relationships.</p>	<p>Q6: How do I represent this object, number, or set of objects/numbers in multiple ways?</p> <p>Q7: How do I properly justify the classification of this quantity/expression?</p> <p>Q8: How do I use what I know about numbers to solve problems?</p>

Teacher Notes: Is there a way we can define number sense in order to have a common definition. Can we define what the “structure of numbers” includes -digit, place value, fractions & decimals, rounding?

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

Content Thread and Related Transfer Goals	Understandings	Essential Questions
<ul style="list-style-type: none"> ● Identify, describe, classify and compare objects/shapes based on their attributes. ● Compose objects/shapes in a variety of ways for various purposes ● Identify properties of an object or the relationship between objects based on shape, location, and measurements ● Apply appropriate mathematical principles, theorems or formulas to solve problems 	<p>The students will understand that:</p> <ul style="list-style-type: none"> ● U21: Objects in the world can be described by their shapes and properties. ● U22: Shapes can be categorized using properties and attributes. ● U23: Shapes can be composed of other shapes ● U24: (Gr. 5+) The properties of a shape do not change based on its size or orientation or when it is reflected, rotated, or translated. (Coordinate Plane) ● U25: (Gr. 7+) Geometry can be used to describe or solve problems involving ratios and proportional relationships. ● U26: (Gr. 9+) Trigonometry is based on the relationship between sides and the angles in any triangle. 	<ul style="list-style-type: none"> ● Q15: How can I identify and describe a shape by its attributes? ● Q16: How do the similarities and differences of shapes' attributes help me to categorize them? ● Q17: What can I learn about shapes by composing them? ● Q18: How can I determine if shapes are congruent, similar or neither? ● Q19: (9+) Under what circumstances can trigonometric functions help me solve problems?

Teacher notes: Congruent shapes/objects are the same size and shape.

Content Thread and Related Transfer Goals	Understandings	Essential Questions
<ul style="list-style-type: none"> ● Describe, classify, and compare measurements of objects. ● Represent, summarize, and interpret data to clarify and solve problems. ● Establish the presence of a pattern/ correlation in order to make predictions. 	<ul style="list-style-type: none"> ● U27: A variety of tools can be used to measure and describe the world around us. ● U28: Measurements can be compared, combined, and converted. ● U29: Measurements with the same unit can be used to recognize patterns and solve problems. ● U30: The organization and the display of data makes it possible to recognize patterns, trends, and relationships. <p>(Gr. 6+)</p> <ul style="list-style-type: none"> ● U31: (Gr. 6+) A data set is summarized by its statistical measures (central tendency, variability, etc.). ● U32: (Gr. 6+) Data sets may have correlation or be independent of one another. ● U33: (Gr. 6+) Collected data and its measures can be used to predict future data. ● U34: (Gr. 6+) Measures of the likelihood of future events can be determined through the combination of independent or dependent events. 	<ul style="list-style-type: none"> ● Q20: What measurement units and tools are most appropriate given the problem? How precise do I need to be? ● Q21: How do I effectively organize and display data? What does this data set tell me? ● Q22: (Gr. 6+) What measurements are appropriate to describe the properties of the data set? ● Q23: (Gr. 6+) What is the relationship between data sets? Is there a correlation? ● Q24: (2+) What predictions can be made based on the patterns I see/knowledge of past events in the data set?

Teacher Notes: Measurements in the “world around us” include objects, data, money, and time.