

SHENENDEHOWA

Mathematics

Essential Content and  
Competencies

PROCESS STRANDS

Kindergarten through Grade 5

Based on the New York State Standards

Bold items indicate competencies designed for Shenendehowa's standards

PROCESS STRANDS

Problem Solving Strand

<i>Students will build new mathematical knowledge through problem solving.</i>					
K.PS.1 Explore, examine, and make observations about a social problem or mathematical situation	1.PS.1 Explore, examine, and make observations about a social problem or mathematical situation	2.PS.1 Explore, examine, and make observations about a social problem or mathematical situation	3.PS.1 Explore, examine, and make observations about a social problem or mathematical situation	4.PS.1 Explore, examine, and make observations about a social problem or mathematical situation	5.PS.1 Explore, examine, and make observations about a social problem or mathematical situation
K.PS.2 Interpret information correctly, identify the problem, and generate possible solutions	1.PS.2 Interpret information correctly, identify the problem, and generate possible solutions	2.PS.2 Interpret information correctly, identify the problem, and generate possible solutions	3.PS.2 Understand that some ways of representing a problem are more helpful than others	4.PS.2 Understand that some ways of representing a problem are more helpful than others	5.PS.2 Understand that some ways of representing a problem are more efficient than others
<i>Students will solve problems that arise in mathematics and in other contexts.</i>					
K.PS.3 Act out or model with manipulatives activities involving mathematical content from literature and/or story telling	1.PS.3 Act out or model with manipulatives activities involving mathematical content from literature and/or story telling	2.PS.3 Act out or model with manipulatives activities involving mathematical content from literature and/or story telling	3.PS.4 Act out or model with manipulatives activities involving mathematical content from literature	4.PS.4 Act out or model with manipulatives activities involving mathematical content from literature	5.PS.4 Act out or model with manipulatives activities involving mathematical content from literature
K.PS.4 Formulate problems and solutions from everyday situations(i.e., counting the number of children in the class, using the calendar to teach counting).	1.PS.4 Formulate problems and solutions from everyday situations(i.e., counting the number of children in the class or using the calendar to teach counting)	2.PS.4 Formulate problems and solutions from everyday situations (i.e., counting the number of children in the class, using the calendar to teach counting).	3.PS.5 Formulate problems and solutions from everyday situations	4.PS.5 Formulate problems and solutions from everyday situations	5.PS.5 Formulate problems and solutions from everyday situations

PROCESS STRANDS

			3.PS.6 Translate from a picture/diagram to a numeric expression	4.PS.6 Translate from a picture/diagram to a numeric expression	5.PS.6 Translate from a picture/diagram to a numeric expression
			3.PS.7 Represent problem situations in oral, written, concrete, pictorial, and graphical forms	4.PS.7 Represent problem situations in oral, written, concrete, pictorial, and graphical forms	5.PS.7 Represent problem situations verbally, numerically, algebraically, and/or graphically
			3.PS.8 Select an appropriate representation of a problem	4.PS.8 Select an appropriate representation of a problem	5.PS.8 Select an appropriate representation of a problem
					5.PS.9 Understand the basic language of logic in mathematical situations (and, or, not)
<i>Students will apply and adapt a variety of appropriate strategies to solve problems.</i>					
K.PS.5 Use informal counting strategies to find solutions	1.PS.5 Use informal counting strategies to find solutions	2.PS.5 Use informal counting strategies to find solutions			
K.PS.6 Experience teacher-directed questioning process to understand problems	1.PS.6 Experience teacher-directed questioning process to understand problems	2.PS.6 Experience teacher-directed questioning process to understand problems	3.PS.9 Use trial and error to solve problems	4.PS.9 Use trial and error to solve problems	5.PS.12 Use trial and error and the process of elimination to solve problems
			3.PS.10 Use process of elimination to solve problems	4.PS.10 Use process of elimination to solve problems	5.PS.11 Translate from a picture/diagram to a number or symbolic expression

PROCESS STRANDS

K.PS.7 Compare and discuss ideas for solving a problem with teacher and/or students to justify their thinking	1.PS.7 Compare and discuss ideas for solving a problem with teacher and/or students to justify their thinking	2.PS.7 Compare and discuss ideas for solving a problem with teacher and/or students to justify their thinking	3.PS.13 Work in collaboration with others to solve problems	4.PS.13 Work in collaboration with others to solve problems	5.PS.10 Work in collaboration with others to solve problems
K.PS.9 Use drawings/pictures to model the action in problems	1.PS.9 Use drawings/pictures to model the action in problems	2.PS.9 Use drawings/pictures to model the action in problems	3.PS.11 Make pictures/diagrams of problems	4.PS.11 Make pictures/diagrams of problems	
K.PS.8 Use manipulatives (i.e., tiles, blocks) to model the action in problems	1.PS.8 Use manipulatives (i.e., tiles, blocks) to model the action in problems	2.PS.8 Use manipulatives (i.e., tiles, blocks) to model the action in problems	3.PS.12 Use physical objects to model problems	4.PS.12 Use physical objects to model problems	5.PS.13 Model problems with pictures/diagrams or physical objects
			3.PS.14 Make organized lists to solve numerical problems	4.PS.14 Make organized lists to solve numerical problems	5.PS.15 Make organized lists or charts to solve numerical problems
			3.PS.15 Make charts to solve numerical problems	4.PS.15 Make charts to solve numerical problems	
			3.PS.16 Analyze problems by identifying relationships	4.PS.16 Analyze problems by identifying relationships	
			3.PS.17 Analyze problems by identifying relevant versus irrelevant information	4.PS.17 Analyze problems by identifying relevant versus irrelevant information	5.PS.1 Know the difference between relevant and irrelevant information when solving problems
			3.PS.18 Analyze problems by observing patterns	4.PS.18 Analyze problems by observing patterns	5.PS.14 Analyze problems by observing patterns
			3.PS.19 State a problem in their own words	4.PS.19 State a problem in their own words	

PROCESS STRANDS

<i>Students will monitor and reflect on the process of mathematical problem solving.</i>					
K.PS.10 Explain to others how a problem was solved, giving strategies and justifications	1.PS.10 Explain to others how a problem was solved, giving strategies and justifications	2.PS.10 Explain to others how a problem was solved, giving strategies and justifications	3.PS.22 Discuss the efficiency of different representations of a problem	4.PS.22 Discuss the efficiency of different representations of a problem	5.PS.18 Determine the efficiency of different representations of a problem  5.PS.21 Explain the methods and reasoning behind the problem solving strategies used
		3.PS.20 Determine what information is needed to solve a problem	4.PS.20 Determine what information is needed to solve a problem	5.PS.16 Discuss with peers to understand a problem situation	
		3.PS.21 Discuss with peers to understand a problem situation	4.PS.21 Discuss with peers to understand a problem situation	5.PS.17 Determine what information is needed to solve problem	
		3.PS.23 Verify results of a problem	4.PS.23 Verify results of a problem	5.PS.23 Verify results of a problem	
		3.PS.24 Recognize invalid approaches	4.PS.24 Recognize invalid approaches	5.PS.19 Differentiate between valid and invalid approaches	5.PS.20 Understand valid counterexamples
		3.PS.25 Determine whether a solution is reasonable in the context of the original problem	4.PS.25 Determine whether a solution is reasonable in the context of the original problem	5.PS.22 Discuss whether a solution is reasonable in the context of the original problem	

PROCESS STRANDS

Reasoning and Proof Strand

<i>Students will recognize reasoning and proof as fundamental aspects of mathematics.</i>					
K.RP.1 Understand that mathematical statements can be true or false	1.RP.1 Understand that mathematical statements can be true or false 1.RP.2 Recognize that mathematical ideas need to be supported by evidence	2.RP.1 Understand that mathematical statements can be true or false 2.RP.2 Recognize that mathematical ideas need to be supported by evidence	3.RP.1 Use representations to support mathematical ideas 3.RP.2 Determine whether a mathematical statement is true or false and explain why	4.RP.1 Use representations to support mathematical ideas 4.RP.2 Determine whether a mathematical statement is true or false and explain why	5.RP.1 Recognize that mathematical ideas can be supported using a variety of strategies 5.RP.2 Understand that mathematical statements can be justified, using models, facts and relationships to explain their thinking
<i>Students will make and investigate mathematical conjectures.</i>					
K.RP.2 Investigate the use of knowledgeable guessing as a mathematical tool	1.RP.3 Investigate the use of knowledgeable guessing as a mathematical tool	2.RP.3 Investigate the use of knowledgeable guessing as a mathematical tool	3.RP.3 Investigate the use of knowledgeable guessing by generalizing mathematical ideas	4.RP.3 Investigate the use of knowledgeable guessing by generalizing mathematical ideas	5.RP.3 Investigate conjectures, using arguments and appropriate mathematical terms
K.RP.3 Explore guesses, using a variety of objects and manipulatives	1.RP.4 Explore guesses, using a variety of objects and manipulatives	2.RP.4 Explore guesses, using a variety of objects and manipulatives	3.RP.4 Make conjectures from a variety of representations	4.RP.4 Make conjectures from a variety of representations	5.RP.4 Make and evaluate conjectures, using a variety of strategies

PROCESS STRANDS

<i>Students will develop and evaluate mathematical arguments and proofs.</i>					
	1.RP.5 Justify general claims, using manipulatives	2.RP.5 Justify general claims, using manipulatives	3.RP.5 Justify general claims or conjectures, using manipulatives, models, and expressions	4.RP.5 Justify general claims or conjectures, using manipulatives, models, and expressions	5.RP.5 Justify general claims or conjectures, using manipulatives, models, expressions, and mathematical relationships
	1.RP.6 Develop and explain an argument verbally or with objects	2.RP.6 Develop and explain an argument verbally or with objects	3.RP.6 Develop and explain an argument using oral, written, concrete, pictorial, and/or graphical forms	4.RP.6 Develop and explain an argument using oral, written, concrete, pictorial, and/or graphical forms	5.RP.6 Develop and explain an argument verbally, numerically, and/or graphically
K.RP.4 Listen to claims other students make	1.RP.7 Listen to and discuss claims other students make	2.RP.7 Listen to and discuss claims other students make	3.RP.7 Discuss, listen, and make comments that support or reject claims made by other students	4.RP.7 Discuss, listen, and make comments that support or reject claims made by other students	5.RP.7 Verify claims other students make, using examples and counterexamples when appropriate
<i>Students will select and use various types of reasoning and methods of proof.</i>					
	1.RP.8 Use trial and error strategies to verify claims	2.RP.8 Use trial and error strategies to verify claims	3.RP.8 Justify an argument by trying many cases	4.RP.8 Justify an argument by trying many cases 4.RP.9 Disprove an argument by finding counterexamples	5.RP.8 Justify an argument through examples/counterexamples and special cases

PROCESS STRANDS

Communication Strand

<i>Students will organize and consolidate their mathematical thinking through communication.</i>					
K.C.M.1 Understand how to organize their thought processes with teacher guidance	1.CM.1 Understand how to organize their thought processes with teacher guidance	2.CM.1 Understand how to organize their thought processes	3.CM.1 Understand and explain how to organize their thought process	4.CM.1 Understand and explain how to organize their thought process	5.CM.1 Provide an organized thought process that is correct, complete, coherent, and clear
1.CM.2 Verbally support their reasoning and answer	2.CM.2 Verbally support their reasoning and answer	3.CM.2 Verbally explain their rationale for strategy selection	4.CM.2 Verbally explain their rationale for strategy selection	5.CM.2 Explain a rationale for strategy selection	
		3.CM.3 Provide reasoning both in written and verbal form	4.CM.3 Provide reasoning both in written and verbal form	5.CM.3 Organize and accurately label work	
		3.CM.4 Organize and accurately label work	4.CM.4 Organize and accurately label work		
<i>Students will communicate their mathematical thinking coherently and clearly to peers, teachers, and others</i>					
K.C.M.2 Share mathematical ideas through the manipulation of objects, drawings, pictures, and verbal explanations	1.CM.3 Share mathematical ideas through the manipulation of objects, drawings, pictures, charts, and symbols in both written and verbal explanations	2.CM.3 Share mathematical ideas through the manipulation of objects, drawings, pictures, charts, and symbols in both written and verbal explanations	3.CM.5 Share organized mathematical ideas through the manipulation of objects, drawings, pictures, charts, graphs, tables, diagrams, models, symbols, and expressions in written and verbal form	4.CM.5 Share organized mathematical ideas through the manipulation of objects, drawing, pictures, charts, graphs, tables, diagrams, models, symbols, and expressions in written and verbal form	5.CM.4 Share organized mathematical ideas through the manipulation of objects, numerical tables, drawings, pictures, charts, graphs, tables, diagrams, models, and symbols in written and verbal form
			3.CM.6 Answer clarifying questions from others	4.CM.6 Answer clarifying questions from others	5.CM.5 Answer clarifying questions from others

PROCESS STRANDS

<i>Students will analyze and evaluate the mathematical thinking and strategies of others.</i>					
K.CM.3 Listen to solutions shared by other students	1.CM.4 Listen to solutions shared by other students	2.CM.4 Listen to solutions shared by other students	3.CM.7 Listen for understanding of mathematical solutions shared by other students	4.CM.7 Restate mathematical solutions shared by other students	5.CM.6 Understand mathematical solutions shared by other students
K.CM.4 Formulate mathematically relevant questions with teacher guidance	1.CM.5 Formulate mathematically relevant questions	2.CM.5 Formulate mathematically relevant questions	3.CM.8 Consider strategies used and solutions found in relation to their own work	4.CM.8 Consider strategies used and solutions found in relation to their own work	5.CM.7 Raise questions that elicit, extend, or challenge others' thinking 5.CM.8 Consider strategies used and solutions found by others in relation to their own work
<i>Students will use the language of mathematics to express mathematical ideas precisely</i>					
K.CM.5 Use appropriate mathematical terms, vocabulary, and language	1.CM.6 Use appropriate mathematical terms, vocabulary, and language	2.CM.6 Use appropriate mathematical terms, vocabulary, and language	3.CM.9 Increase their use of mathematical vocabulary and language when communicating with others	4.CM.9 Increase their use of mathematical vocabulary and language when communicating with others	5.CM.9 Increase their use of mathematical vocabulary and language when communicating with others
			3.CM.10 Describe objects, relationships, solutions and rationale using appropriate vocabulary	4.CM.10 Describe objects, relationships, solutions, and rationale using appropriate vocabulary	5.CM.10 Use appropriate vocabulary when describing objects, relationships, mathematical solutions, and rationale
			3.CM.11 Decode and comprehend mathematical visuals and symbols to construct meaning	4.CM.11 Decode and comprehend mathematical visuals and symbols to construct meaning	5.CM.11 Decode and comprehend mathematical visuals and symbols to construct meaning

PROCESS STRANDS

Connections Strand

<i>Students will recognize and use connections among mathematical ideas.</i>					
1.CN.1 Recognize the connections of patterns in their everyday experiences to mathematical ideas	2.CN.1 Recognize the connections of patterns in their everyday experiences to mathematical ideas	3.CN.1 Recognize, understand, and make connections in their everyday experiences to mathematical ideas	4.CN.1 Recognize, understand, and make connections in their everyday experiences to mathematical ideas	5.CN.1 Understand and make connections and conjectures in their everyday experiences to mathematical ideas	
1.CN.2 Understand the connections between numbers and the quantities they represent	2.CN.2 Understand and use the connections between numbers and the quantities they represent to solve problems	3.CN.3 Connect and apply mathematical information to solve problems	4.CN.3 Connect and apply mathematical information to solve problems	5.CN.3 Connect and apply mathematical information to solve problems	
1.CN.3 Compare the similarities and differences of mathematical ideas	2.CN.3 Compare the similarities and differences of mathematical ideas	3.CN.2 Compare and contrast mathematical ideas	4.CN.2 Compare and contrast mathematical ideas	5.CN.2 Explore and explain the relationship between mathematical ideas	
<i>Students will understand how mathematical ideas interconnect and build on one another to produce a coherent whole.</i>					
1.CN.4 Understand how models of situations involving objects, pictures, and symbols relate to mathematical ideas	2.CN.4 Understand how models of situations involving objects, pictures, and symbols relate to mathematical ideas	3.CN.5 Model situations with objects and representations and be able to make observations	4.CN.5 Model situations with objects and representations and be able to make observations	5.CN.5 Model situations with objects and representations and be able to draw conclusions	
1.CN.5 Understand meanings of operations and how they relate to one another	2.CN.5 Understand meanings of operations and how they relate to one another	3.CN.4 Understand multiple representations and how they are related	4.CN.4 Understand multiple representations and how they are related	5.CN.4 Understand multiple representations and how they are related	
1.CN.6 Understand how mathematical models represent quantitative relationships	2.CN.6 Understand how mathematical models represent quantitative relationships				

PROCESS STRANDS

<i>Students will recognize and apply mathematics in contexts outside of mathematics.</i>					
K.CN.1 Recognize the presence of mathematics in their daily lives	1.CN.7 Recognize the presence of mathematics in their daily lives	2.CN.7 Recognize the presence of mathematics in their daily lives	3.CN.6 Recognize the presence of mathematics in their daily lives	4.CN.6 Recognize the presence of mathematics in their daily lives	5.CN.6 Recognize and provide examples of the presence of mathematics in their daily lives
K.CN.2 Use counting strategies to solve problems in their daily lives	1.CN.8 Recognize and apply mathematics to solve problems	2.CN.8 Recognize and apply mathematics to solve problems	3.CN.7 Apply mathematics to solve problems that develop outside of mathematics	4.CN.7 Apply mathematics to solve problems that develop outside of mathematics	5.CN.7 Apply mathematics to problem situations that develop outside of mathematics
K.CN.3 Recognize and apply mathematics to objects and pictures	1.CN.9 Recognize and apply mathematics to objects, pictures, and symbols	2.CN.9 Recognize and apply mathematics to objects, pictures and symbols	3.CN.8 Recognize and apply mathematics to other disciplines	4.CN.8 Recognize and apply mathematics to other disciplines	5.CN.8 Investigate the presence of mathematics in careers and areas of interest
					5.CN.9 Recognize and apply mathematics to other disciplines and areas of interest

PROCESS STRANDS

Representation Strand

<i>Students will create and use representations to organize, record, and communicate mathematical ideas.</i>					
K.R.1 Use multiple representations, including verbal language, acting out or modeling a situation, and drawing pictures as representations	1.R.1 Use multiple representations including verbal and written language, acting out or modeling a situation, drawings, and/or symbols as representations	2.R.1 Use multiple representations, including verbal and written language, acting out or modeling a situation, drawings, and/or symbols as representations	3.R.1 Use verbal and written language, physical models, drawing charts, graphs, tables, symbols, and equations as representations	4.R.1 Use verbal and written language, physical models, drawing charts, graphs, tables, symbols, and equations as representations	5.R.1 Use physical objects, drawings, charts, tables, graphs, symbols, equations, and technology as representations
	1.R.2 Share mental images of mathematical ideas and understandings	2.R.2 Share mental images of mathematical ideas and understandings	3.R.2 Share mental images of mathematical ideas and understandings	4.R.2 Share mental images of mathematical ideas and understandings	5.R.2 Explain, describe, and defend mathematical ideas using representations
K.R.2 Use standard and nonstandard representations	1.R.3 Use standard and nonstandard representations	2.R.3 Use standard and nonstandard representations	3.R.4 Use standard and nonstandard representations with accuracy and detail	4.R.4 Use standard and nonstandard representations with accuracy and detail	5.R.4 Use standard and nonstandard representations with accuracy and detail
			3.R.3 Recognize and use external mathematical representations	4.R.3 Recognize and use external mathematical representations	5.R.3 Read, interpret, and extend external models
<i>Students will select, apply, and translate among mathematical representations to solve problems.</i>					
			3.R.5 Understand similarities and differences in representations.	4.R.5 Understand similarities and differences in representations	5.R.5 Use models to explore problem situations

PROCESS STRANDS

	1.R.4 Connect mathematical representations with problem solving	2.R.4 Connect mathematical representations with problem solving	3.R.6 Connect mathematical representations with problem solving	4.R.6 Connect mathematical representations with problem solving	5.R.6 Investigate relationships between different representations and their impact on a given problem
			3.R.7 Construct effective representations to solve problems	4.R.7 Construct effective representations to solve problems	
<i>Students will use representations to model and interpret physical, social, and mathematical phenomena.</i>					
K.R.3 Use objects to show and understand physical phenomena (i.e., guess the number of cookies in a package)	1.R.5 Use mathematics to show and understand physical phenomena (i.e., estimate and represent the number of apples in a tree)	2.R.5 Use mathematics to show and understand physical phenomena (i.e., estimate and represent the number of apples in a tree)	3.R.8 Use mathematics to show and understand physical phenomena (i.e., estimate and represent the number of apples in a tree)	4.R.8 Use mathematics to show and understand physical phenomena (i.e., estimate and represent the number of apples in a tree)	5.R.7 Use mathematics to show and understand physical phenomena (i.e., determine the perimeter of a bulletin board)
K.R.4 Use objects to show and understand social phenomena (i.e., count and represent sharing cookies between friends)	1.R.6 Use mathematics to show and understand social phenomena (i.e., count and represent sharing cookies between friends)	2.R.6 Use mathematics to show and understand social phenomena (i.e., count and represent sharing cookies between friends)	3.R.9 Use mathematics to show and understand social phenomena (i.e., determine the number of buses required for a field trip)	4.R.9 Use mathematics to show and understand social phenomena (i.e., determine the number of buses required for a field trip)	5.R.8 Use mathematics to show and understand social phenomena (i.e., construct tables to organize data showing book sales)
K.R.5 Use objects to show and understand mathematical phenomena (i.e., draw pictures to show a story problem, show number value using fingers on your hand)	1.R.7 Use mathematics to show and understand mathematical phenomena (i.e., draw pictures to show a story problem, show number value using fingers on your hand)	2.R.7 Use mathematics to show and understand mathematical phenomena (i.e., draw pictures to show a story problem or show number value using fingers on your hand)	3.R.10 Use mathematics to show and understand mathematical phenomena (i.e., use a multiplication grid to solve odd and even number problems)	4.R.10 Use mathematics to show and understand mathematical phenomena (i.e., use a multiplication grid to solve odd and even number problems)	5.R.9 Use mathematics to show and understand mathematical phenomena (i.e., find the missing value that makes the equation true: $(3 + 4) + 5 = 3 + (4 + \underline{\quad})$ )