

# 4th Grade OAS/PASS Companion Guide

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## Purpose of the Companion Guide

This companion guide was created during the 2014 convening by educators from Mid-Del, Broken Arrow, Sallisaw, Glenpool, Ada, and Oklahoma City. The convening was an effort to bring educators from across the state together to create resources they thought would be useful for teachers in the coming year. This companion guide was created to provide teachers with:

- Clarification on grade level content standards
- A broad pacing schedule based on the blueprints for testing
- Vertical alignment for the grade levels above and below
- Resources specific to grade level content standards

## Table of Contents

### One-Page 4<sup>th</sup> Grade PASS standards

#### Process Standards

These process standards are the same for Grades K-5 and give students a consistent definition of mathematics to help foster a positive attitude toward their own mathematical abilities. The process standards are a list of skills needed to perform math in any area and promote active involvement, deeper understanding, and conceptual understanding as opposed to content standards that focus on individual topics that need to be learned at a grade level.

- One-Page Process Standards
- Planning and Delivery

### Major Concept Vertical Alignment and Pacing Guide

These tools were created during the convening of educators in the summer 2014 to give teachers a broad overview and idea of a timeline. Teachers are encouraged to tweak the timeline to fit the curriculum they are using in their classrooms.

### Major Concepts and “I can” statements with Sample Math Tasks

The major concepts are defined in PASS at the beginning of each grade level. The educators at the convening blended them and the highest ranked concepts on the testing blueprints to determine the most important concepts in each grade level as a focus for this document. They took each statement and hunted sample math tasks or lessons to be used as a possible starting point for teachers. There will be/is a page dedicated on okmathteachers.com that will be a running list of these resources and others people will/have added as the year continues. We have tagged these with both PASS and CCSS codes in an effort to help teachers be able to use the millions of shared resources. Teachers need to use their discretion in implementing strategies and activities.

### Resources

*Comprehensive Reviewed Lesson Banks (Links on OKMathTeachers.com page)*  
*Oklahoma Teachers’ Collection (Links on OKMathTeachers.com page)*

### How/Where to send Feedback

*OSDE Emails/phones*  
*Google Survey?*

## 4<sup>th</sup> Grade Math | Priority Academic Student Skills

**Standard 1: Algebraic Reasoning: Patterns and Relationships - The student will use a variety of problem-solving approaches to create, extend, and analyze patterns.**

- 4.1.1 Discover, describe, extend, and create a wide variety of patterns using tables, graphs, rules, and verbal models (e.g., determine the rule from a table or “function machine”, extend visual and number patterns).
- 4.1.2 Find variables in simple arithmetic problems by solving open sentences (equations) and other problems involving addition, subtraction, multiplication, and division with whole numbers.
- 4.1.3 Recognize and apply the associative property of multiplication.  
(e.g.,  $6 \cdot (2 \cdot 3) = (6 \cdot 2) \cdot 3$ )

**Standard 2: Number Sense and Operation – The student will use numbers and number relationships to acquire basic facts. The student will estimate and compute with whole numbers and fractions.**

### 4.2.1 Number Sense

#### 4.2.1a Place Value

- 4.2.1ai Apply the concept of place value through 6 digits (e.g., write numbers in expanded form).
- 4.2.1aii Model, read, write and rename decimal numbers to the hundredths (e.g., money, numerals to words).

#### 4.2.1b Whole Numbers, Fractions and Decimals

- 4.2.1bi Compare and order whole numbers and decimals to the hundredths place (e.g., pictures of shaded regions of two-dimensional figures, use  $>$ ,  $<$ ,  $=$  symbols).
- 4.2.1bij Use 0,  $1/2$ , and 1 or 0, 0.5, and 1 as benchmarks and place additional fractions, decimals, and percents on a number line (e.g.,  $1/3$ ,  $3/4$ , 0.7, 0.4, 62%, 12%).
- 4.2.1biii Compare, add, or subtract fractional parts (fractions with like denominators and decimals) using physical or pictorial models. (e.g., egg cartons, fraction strips, circles, and squares).
- 4.2.1biv\* Explore and connect negative numbers using real world situations (e.g. owing money, temperature, measuring elevations above and below sea level).

### 4.2.2 Number Operations

4.2.2a Estimate and find the product of up to three-digit by three-digit using a variety of strategies to solve application problems.

#### 4.2.2b Division Concepts and Fact Families

4.2.2bi Demonstrate fluency (memorize and apply) with basic division facts up to  $144 \div 12$  and the associated multiplication facts  
(e.g.,  $144 \div 12 = 12$  and  $12 \times 12 = 144$ )

4.2.2bij Estimate the quotient with one- and two-digit divisors and a two- or three-digit dividend to solve application problems.

4.2.2biii Find the quotient (with and without remainders) with 1-digit divisors and a 2- or 3-digit dividend to solve application problems.

**Standard 3: Geometry - The student will use geometric properties and relationships to analyze shapes.**

4.3.1 Identify, draw, and construct models of intersecting, parallel, and perpendicular lines.

4.3.2 Identify and compare angles equal to, less than, or greater than 90 degrees (e.g., use right angles to determine the approximate size of other angles).

4.3.3 Identify, draw, and construct models of regular and irregular polygons including triangles, quadrilaterals, pentagons, hexagons, heptagons, and octagons to solve problems.

4.3.4 Describe the effects on two-dimensional objects when they slide (translate), flip (reflect), and turn (rotate) (e.g., tessellations)..

Standard 4: Measurement - The student will use appropriate units of measure to solve problems.

**Standard 4: Measurement The student will solve problems using appropriate units of measure in a variety of situations.**

### 4.4.1 Measurement

4.4.1a Estimate the measures of a variety of objects using customary units.

4.4.1b Establish benchmarks for metric units and estimate the measures of a variety of objects (e.g., mass: the mass of a raisin is about 1 gram, length: the width of a finger is about 1 centimeter).

4.4.1c Select appropriate customary and metric units of measure and measurement instruments to solve application problems involving length, weight, mass, area, and volume.

4.4.1d Develop and use the concept of area of different shapes using grids to solve problems.

### 4.4.2 Time and Temperature

4.4.2a Solve elapsed time problems.

4.4.2b Read thermometers using different intervals (intervals of 1, 2, or 5) and solve for temperature change.

4.4.3 Money: Money: Determine the correct amount of change when a purchase is made with a twenty dollar bill.

**Standard 5: Data Analysis - The student will demonstrate an understanding of collection, display, and interpretation of data and probability.**

### 4.5.1 Data Analysis

4.5.1a Read and interpret data displays such as tallies, tables, charts, and graphs and use the observations to pose and answer questions (e.g., choose a table in social studies of population data and write problems).

4.5.1b Collect, organize and record data in tables and graphs (e.g., line graphs (plots), bar graphs, pictographs).

4.5.2 Probability: Predict the probability of outcomes of simple experiments using words such as certain, equally likely, impossible (e.g., coins, number cubes, spinners).

4.5.3 Central Tendency: Determine the median (middle), and the mode (most often) of a set of data.

## Elementary Math | Process Skills

### Process Standard 1: Problems Solving

- 1.1 Use problem-solving approaches (e.g., act out situations, represent problems with drawings and lists, use concrete, pictorial, graphical, oral, written, and/or algebraic models, understand a problem, devise a plan, carry out the plan, look back).
- 1.2 Formulate problems from every day and mathematical situations (e.g., how many forks are needed?, how many students are absent?, how can we share/divide these cookies?, how many different ways can we find to compare these fractions?).
- 1.3 Develop, test, and apply strategies to solve a variety of routine and non-routine problems (e.g., look for patterns, make a table, make a problem simpler, process of elimination, trial and error).
- 1.4 Verify and interpret results with respect to the original problem (e.g., students explain verbally why an answer makes sense, explain in a written format why an answer makes sense, verify the validity of each step taken to obtain a final result).
- 1.5 Distinguish between necessary and irrelevant information in solving problems (e.g., play games and discuss “best” clues, write riddles with sufficient information, identify unnecessary information in written story problems).

### Process Standard 2: Communication

- 2.1 Express mathematical ideas coherently and clearly to peers, teachers, and others (e.g., with verbal ideas, models or manipulatives, pictures, or symbols).
- 2.2 Extend mathematical knowledge by considering the thinking and strategies of others (e.g., agree or disagree, rephrase another student’s explanation, analyze another student’s explanation).
- 2.3 Relate manipulatives, pictures, diagrams, and symbols to mathematical ideas.
- 2.4 Represent, discuss, write, and read mathematical ideas and concepts. Start by relating everyday language to mathematical language and symbols and progress toward the use of appropriate terminology (e.g., “add more” becomes “plus”, “repeated addition” becomes “multiplication”, “fair share” becomes “divide”, “balance the equation” becomes “solve the equation”).

### Process Standard 3: Reasoning

- 3.1 Explain mathematical situations using patterns and relationships (e.g., identify patterns in situations, represent patterns in a variety of ways, and extend patterns to connect with more general cases).
- 3.2 Demonstrate thinking processes using a variety of age-appropriate materials and reasoning processes (e.g., manipulatives, models, known facts, properties and relationships, inductive [specific to general], deductive [general to specific], spatial, proportional, logical reasoning [“and” “or” “not”] and recursive reasoning).
- 3.3 Make predictions and draw conclusions about mathematical ideas and concepts. Predictions become conjectures and conclusions become more logical as students mature mathematically.

### Process Standard 4: Connections

- 4.1 Relate various concrete and pictorial models of concepts and procedures to one another (e.g., use two colors of cubes to represent addition facts for the number 5, relate patterns on a hundreds chart to multiples, use base-10 blocks to represent decimals).
- 4.2 Link concepts to procedures and eventually to symbolic notation (e.g., represent actions like snap, clap, clap with symbols A B B, demonstrate 3 4 with a geometric array, divide a candy bar into 3 equal pieces that represent one piece as  $\frac{1}{3}$ ).
- 4.3 Recognize relationships among different topics within mathematics (e.g., the length of an object can be represented by a number, multiplication facts can be modeled with geometric arrays, can be written as .5 and 50%).
- 4.4 Use mathematical strategies to solve problems that relate to other curriculum areas and the real world (e.g., use a timeline to sequence events, use symmetry in art work, explore fractions in quilt designs and to describe pizza slices).

### Process Standard 5: Representation

- 5.1 Create and use a variety of representations appropriately and with flexibility to organize, record, and communicate mathematical ideas (e.g., dramatizations, manipulatives, drawings, diagrams, tables, graphs, symbolic representations).
- 5.2 Use representations to model and interpret physical, social, and mathematical situations (e.g., counters, pictures, tally marks, number sentences, geometric models; translate between diagrams, tables, charts, graphs).

## Math Process Standard 1: Problem Solving

Sub-Standards	Questions to Develop Mathematical Thinking
<p>1. Use problem-solving approaches (e.g., act out situations, represent problems with drawings and lists, use concrete, pictorial, graphical, oral, written, and/or algebraic models, understand a problem, devise a plan, carry out the plan, look back).  <a href="#"><u>CCSS.MATH.PRACTICE.MP1</u></a> <i>Make sense of problems and persevere in solving them.</i></p> <p>2. Formulate problems from everyday and mathematical situations (e.g., how many forks are needed?, how many students are absent?, how can we share/divide these cookies?, how many different ways can we find to compare these fractions?).  <a href="#"><u>CCSS.MATH.PRACTICE.MP1</u></a> <i>Make sense of problems and persevere in solving them.</i></p> <p>3. Develop, test, and apply strategies to solve a variety of routine and non-routine problems (e.g., look for patterns, make a table, make a problem simpler, process of elimination, trial and error).  <a href="#"><u>CCSS.MATH.PRACTICE.MP1</u></a> <i>Make sense of problems and persevere in solving them.</i></p> <p>4. Verify and interpret results with respect to the original problem (e.g., students explain verbally why an answer makes sense, explain in a written format why an answer makes sense, verify the validity of each step taken to obtain a final result).  <a href="#"><u>CCSS.MATH.PRACTICE.MP6</u></a> <i>Attend to precision.</i></p> <p>5. Distinguish between necessary and irrelevant information in solving problems (e.g., play games and discuss “best” clues, write riddles with sufficient information, identify unnecessary information in written story problems).  <a href="#"><u>CCSS.MATH.PRACTICE.MP2</u></a> <i>Reason abstractly and quantitatively.</i></p>	<ul style="list-style-type: none"> <li>○ How would you describe the problem in your own words?</li> <li>○ How would you describe what you are trying to find?</li> <li>○ What information is given in the problem?</li> <li>○ Describe the relationship between the quantities.</li> <li>○ Describe what you have already tried. What might you change?</li> <li>○ Talk me through the steps you’ve used to this point.</li> <li>○ What steps in the process are you most confident about?</li> <li>○ What are some other strategies you might try?</li> <li>○ How might you use one of your previous problems to help you begin?</li> <li>○ How would you organize...represent...show...?</li> <li>○ Interpret and make meaning of the problem looking for starting points.</li> <li>○ Plan a solution instead of jumping to a solution.</li> <li>○ Monitor the progress and change the approach if necessary.</li> <li>○ See relationships between various representations.</li> <li>○ Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another.</li> <li>○ Students ask themselves, “Does this make sense?” and understand various approaches to solutions.</li> </ul>
<b>What does it look like in planning and delivery?</b>	
<p><b>Tasks:</b> elements to keep in mind when determining learning experiences</p> <ul style="list-style-type: none"> <li>○ Requires students to engage with conceptual ideas that underlie the procedures to complete the task and develop understanding.</li> <li>○ The problem focuses students’ attention on a mathematical idea and provides an opportunity to develop and/or use mathematical habits of mind.</li> <li>○ Could allow for multiple entry points and solutions as well as, multiple representations, such as visual diagrams, manipulatives, symbols, and problem situations.</li> <li>○ Making connections among multiple representations to develop meaning.</li> <li>○ Requires students to access relevant knowledge and experiences and make appropriate use of them in working through the task.</li> <li>○ Requires students to defend and justify their solutions.</li> </ul>	<p><b>Teacher:</b> actions that further promote mathematical thinking</p> <ul style="list-style-type: none"> <li>○ Allows students time to initiate a plan; uses question prompts as needed to assist students in developing a pathway.</li> <li>○ Continually asks students if their plans and solutions make sense.</li> <li>○ Questions students to see connections to previous solution attempts and/or tasks to make sense of current problem.</li> <li>○ Consistently asks to defend and justify their solution by comparing solution paths.</li> <li>○ Differentiates to keep advanced students challenged during work time</li> </ul>

*Math Practice references included to make it easier for teachers to find resources on the internet pertaining to the teaching and learning of good math practice. Format and some content adapted from LouisianaBelieves.com.*

## Math Process Standard 2: Communication

Math Process Standard 2: Communication	
Sub-Standards	Questions to Develop Mathematical Thinking
<p>1. Express mathematical ideas coherently and clearly to peers, teachers, and others (e.g., with verbal ideas, models or manipulatives, pictures, or symbols).  <a href="#">CCSS.MATH.PRACTICE.MP3</a> Construct viable arguments and critique the reasoning of others.</p> <p>2. Extend mathematical knowledge by considering the thinking and strategies of others (e.g., agree or disagree, rephrase another student’s explanation, analyze another student’s explanation).  <a href="#">CCSS.MATH.PRACTICE.MP3</a> Construct viable arguments and critique the reasoning of others.</p> <p>3. Relate manipulatives, pictures, diagrams, and symbols to mathematical ideas.  <a href="#">CCSS.MATH.PRACTICE.MP2</a> Reason abstractly and quantitatively.</p> <p>4. Represent, discuss, write, and read mathematical ideas and concepts. Start by relating everyday language to mathematical language and symbols and progress toward the use of appropriate terminology (e.g., “add more” becomes “plus”, “repeated addition” becomes “multiplication”, “fair share” becomes “divide”, “balance the equation” becomes “solve the equation”).  <a href="#">CCSS.MATH.PRACTICE.MP4</a> Model with mathematics.</p>	<ul style="list-style-type: none"> <li>○ What do the numbers used in the problem represent?</li> <li>○ What is the relationship of the quantities?</li> <li>○ What properties might we use to find a solution?</li> <li>○ What information do you have?</li> <li>○ What do you know that is not stated in the problem?</li> <li>○ Understand the meaning of quantities and are flexible in the use of operations and their properties.</li> <li>○ Calculate efficiently and accurately.</li> </ul>
What does it look like in planning and delivery?	
<p><b>Tasks:</b> elements to keep in mind when determining learning experiences</p> <ul style="list-style-type: none"> <li>○ Apply general mathematical rules to specific situations.</li> <li>○ Create mathematical ideas using models, manipulatives, pictures, or symbols to express mastery.</li> <li>○ Determine patterns and structures.</li> <li>○ Create a logical representation of the problem.</li> <li>○ Justify their conclusions, explain them to others and respond to the arguments of others.</li> <li>○ Listen to the arguments of others and ask useful questions to determine if an argument makes sense.</li> <li>○ Embeds discussion and communication of reasoning and justification with others.</li> <li>○ Requires students to provide evidence to explain their thinking beyond merely using computational skills to find a solution.</li> <li>○ Requires students to use precise vocabulary (in written and verbal responses) when communicating mathematical ideas.</li> </ul>	<p><b>Teacher:</b> actions that further promote mathematical thinking</p> <ul style="list-style-type: none"> <li>○ Asks students about the appropriateness of the model chosen.</li> <li>○ Assists students in seeing and making connections among models.</li> <li>○ Demonstrates and provides students experiences with the use of various math tools. A variety of tools are within the classroom learning environment and readily available.</li> <li>○ Allows students to choose appropriate learning tools and questions students as to why they chose the tools they used to solve the problem.</li> <li>○ Asks student to explain their mathematical thinking with the chosen tool.</li> <li>○ Asks students to explore other options when some tools are not available.</li> <li>○ Consistently demands and models precision in communication and in mathematical solutions. (Uses and models correct content terminology).</li> <li>○ Expects students to use precise mathematical vocabulary during mathematical conversations. (Identifies incomplete responses and asks students to revise their response).</li> <li>○ Questions students to identify symbols, quantities, and units in a clear manner</li> </ul>

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## Math Process Standard 3: Reasoning

Sub-Standards	Questions to Develop Mathematical Thinking
<p>1. Explain mathematical situations using patterns and relationships (e.g., identify patterns in situations, represent patterns in a variety of ways, extend patterns to connect with more general cases).  <a href="#">CCSS.MATH.PRACTICE.MP7</a> Look for and make use of structure.</p> <p>2. Demonstrate thinking processes using a variety of age-appropriate materials and reasoning processes (e.g., manipulatives, models, known facts, properties and relationships, inductive [specific to general], deductive [general to specific], spatial, proportional, logical reasoning [“and” “or” “not”] and recursive reasoning).  <a href="#">CCSS.MATH.PRACTICE.MP2</a> Reason abstractly and quantitatively.</p> <p>3. Make predictions and draw conclusions about mathematical ideas and concepts. Predictions become conjectures and conclusions become more logical as students mature mathematically.  <a href="#">CCSS.MATH.PRACTICE.MP2</a> Reason abstractly and quantitatively.</p>	<ul style="list-style-type: none"> <li>○ What do the numbers used in the problem represent?</li> <li>○ How did you decide in this task that you needed to use...? Could you have used another operation or property to solve this task? Why or why not?</li> <li>○ What mathematical evidence supports your solution?</li> <li>○ How can you be sure that...? / How could you prove that...? Will it still work if...?</li> <li>○ How did you decide to try that strategy?</li> <li>○ How did you test whether your approach worked?</li> <li>○ How did you decide what the problem was asking you to find? (What was unknown?)</li> <li>○ Did you try a method that did not work? Why didn't it work? Would it ever work?</li> <li>○ Why or why not?</li> <li>○ What is the same and what is different about...?</li> <li>○ What approach are you considering trying first?</li> <li>○ What estimate did you make for the solution?</li> <li>○ In this situation would it be helpful to use a graph..., number line..., ruler..., diagram..., calculator..., manipulative?</li> <li>○ Why was it helpful to use ____?</li> <li>○ What can using a _____ show us that _____ may not?</li> <li>○ In what situations might it be more informative or helpful to use...?</li> <li>○ How did you know your solution was reasonable?</li> <li>○ What patterns do you find in...?</li> <li>○ How do you know if something is a pattern?</li> </ul>

### What does it look like in planning and delivery?

<b>Tasks:</b> elements to keep in mind when determining learning experiences	<b>Teacher:</b> actions that further promote mathematical thinking
<ul style="list-style-type: none"> <li>○ Is structured to bring out multiple representations, approaches, or error analysis.</li> <li>○ Embeds discussion and communication of reasoning and justification with others.</li> <li>○ Requires students to provide evidence to explain their thinking beyond merely using computational skills to find a solution.</li> <li>○ Expects students to give feedback and ask questions of others' solutions.</li> <li>○ Requires multiple learning tools. (Tools may include: manipulatives (concrete models), calculator, measurement tools, graphs, diagrams, spreadsheets, statistical software, etc.)</li> <li>○ Requires students to determine and use appropriate tools to solve problems.</li> <li>○ Present several opportunities to reveal patterns or repetition in thinking so generalizations can be made.</li> <li>○ Requires students to see patterns or relationships in order to develop a mathematical rule.</li> </ul>	<ul style="list-style-type: none"> <li>○ Encourages students to use proven mathematical understandings, (definitions, properties, conventions, theorems, etc.), to support their reasoning.</li> <li>○ Questions students so they can tell the difference between assumptions and logical conjectures.</li> <li>○ Asks questions that require students to justify their solution.</li> <li>○ Prompts students to respectfully evaluate peer arguments when solutions are shared.</li> <li>○ Asks students to compare and contrast various solution methods.</li> <li>○ Creates various instructional opportunities for students to engage in mathematical discussions (whole group, small group, partners, etc.).</li> <li>○ Expects students to interpret, model, and connect multiple representations.</li> <li>○ Asks students to explain the meaning of the symbols in the problem and in their solution.</li> <li>○ Expects students to give meaning to all quantities in the task.</li> <li>○ Questions students so that understanding of the relationships between the quantities and/or the symbols in the problem and the solution are fully understood.</li> <li>○ Asks students about the appropriateness of the model chosen.</li> <li>○ Asks student to explain their mathematical thinking with the chosen tool.</li> <li>○ Asks students to explore other options when some tools are not available.</li> </ul>

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## Math Process Standard 4: Connections

Sub-Standards	Questions to Develop Mathematical Thinking
<p>1. Relate various concrete and pictorial models of concepts and procedures to one another (e.g., use two colors of cubes to represent addition facts for the number 5, relate patterns on a hundreds chart to multiples, use base-10 blocks to represent decimals).  <a href="#">CCSS.MATH.PRACTICE.MP7</a> Look for and make use of structure.</p> <p>2. Link concepts to procedures and eventually to symbolic notation (e.g., represent actions like snap, clap, clap with symbols A B B, demonstrate 3 4 with a geometric array, divide a candy bar into 3 equal pieces that represent one piece as 1/3).  <a href="#">CCSS.MATH.PRACTICE.MP8</a> Look for and express regularity in repeated reasoning.</p> <p>3. Recognize relationships among different topics within mathematics (e.g., the length of an object can be represented by a number, multiplication facts can be modeled with geometric arrays, can be written as .5 and 50%).  <a href="#">CCSS.MATH.PRACTICE.MP7</a> Look for and make use of structure.</p> <p>4. Use mathematical strategies to solve problems that relate to other curriculum areas and the real world (e.g., use a timeline to sequence events, use symmetry in art work, explore fractions in quilt designs and to describe pizza slices).  <a href="#">CCSS.MATH.PRACTICE.MP4</a> Model with mathematics.</p>	<ul style="list-style-type: none"> <li>○ What do the numbers used in the problem represent?</li> <li>○ What is the relationship of the quantities?</li> <li>○ How is _____ related to _____?</li> <li>○ What is the relationship between _____ and _____?</li> <li>○ What does _____ mean to you? (e.g. symbol, quantity, diagram)</li> <li>○ What properties might we use to find a solution?</li> <li>○ What observations do you make about...?</li> <li>○ What ideas have we learned before that were useful in solving this problem?</li> <li>○ What are some other problems that are similar to this one?</li> <li>○ In what ways does this problem connect to other mathematical concepts?</li> <li>○ Make sense of quantities and their relationships.</li> <li>○ Look for the overall structure and patterns in mathematics.</li> <li>○ Apply the math students know to solve problems in everyday life.</li> </ul>
<b>What does it look like in planning and delivery?</b>	
<b>Tasks:</b> elements to keep in mind when determining learning experiences	<b>Teacher:</b> actions that further promote mathematical thinking
<ul style="list-style-type: none"> <li>○ Consistently expects students to convert situations into symbols in order to solve the problem and then requires students to explain the solution within a meaningful situation.</li> <li>○ Contains relevant, realistic content.</li> <li>○ Requires students to look for the structure within mathematics in order to solve the problem. (i.e. – decomposing numbers by place value, working with properties, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>○ Assists students in seeing and making connections among models.</li> <li>○ Give students opportunity to evaluate the appropriateness of the model.</li> <li>○ Expects students to explain the overall structure of the problem and the big math idea used to solve the problem.</li> <li>○ Encourages students to connect task to prior concepts and tasks.</li> <li>○ Asks what math relationships or patterns can be used to assist in making sense of the problem.</li> <li>○ Asks for predictions about solutions at midpoints throughout the solution process and encourages students to monitor each other’s intermediate results.</li> <li>○ Questions students to assist them in creating generalizations based on repetition in thinking and procedures.</li> </ul>

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## Math Process Standard 5: Representation

Sub-Standards	Questions to Develop Mathematical Thinking
<p>1. Create and use a variety of representations appropriately and with flexibility to organize, record, and communicate mathematical ideas (e.g., dramatizations, manipulatives, drawings, diagrams, tables, graphs, symbolic representations).  <a href="#">CCSS.MATH.PRACTICE.MP7</a> Look for and make use of structure.</p> <p>2. Use representations to model and interpret physical, social, and mathematical situations (e.g., counters, pictures, tally marks, number sentences, geometric models; translate between diagrams, tables, charts, graphs).  <a href="#">CCSS.MATH.PRACTICE.MP5</a> Use appropriate tools strategically.</p>	<ul style="list-style-type: none"> <li>○ What do the numbers used in the problem represent?</li> <li>○ What number model could you construct to represent the problem?</li> <li>○ What are some ways to represent the quantities?</li> <li>○ Would it help to create a diagram, graph, table, ...?</li> <li>○ What are some ways to visually represent...?</li> <li>○ What mathematical tools could we use to visualize and represent the situation?</li> <li>○ Create a logical representation of the problem.</li> <li>○ Justify conclusions with mathematical ideas.</li> <li>○ Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation.</li> <li>○ Use mathematical models for visualizing and analyzing information</li> </ul>
<b>What does it look like in planning and delivery?</b>	
<p><b>Tasks:</b> elements to keep in mind when determining learning experiences</p> <ul style="list-style-type: none"> <li>○ Is structured to bring out multiple representations, approaches, or error analysis.</li> <li>○ Expects students to use symbols appropriately.</li> <li>○ Requires multiple learning tools. (Tools may include: manipulatives (concrete models), calculator, measurement tools, graphs, diagrams, spreadsheets, statistical software, etc.)</li> <li>○ Requires students to determine and use appropriate tools to solve problems.</li> <li>○ Requires students to demonstrate fluency in mental computations.</li> </ul>	<p><b>Teacher:</b> actions that further promote mathematical thinking</p> <ul style="list-style-type: none"> <li>○ Demonstrates and provides student's experiences with the use of various mathematical models.</li> <li>○ Questions students to justify their choice of model and the thinking behind the model.</li> <li>○ Expects students to interpret, model, and connect multiple representations.</li> <li>○ Asks students to explain the meaning of the symbols in the problem and in their solution.</li> <li>○ Expects students to give meaning to all quantities in the task.</li> <li>○ Questions students so that understanding of the relationships between the quantities and/or the symbols in the problem and the solution are fully understood</li> </ul>

*Math Practice references included to make it easier for teachers to find resources on the internet pertaining to the teaching and learning of good math practice. Format and some content adapted from LouisianaBelieves.com.*

## Major Concepts for 4<sup>th</sup> Grade

The Major Concepts are defined in PASS, however the educators at the convening used the testing blueprints to determine if some needed to be added. While these are the heaviest weighted standards for the assessment, **they are not all of the standards**. For a complete list of standards, refer to the first page of this document.

1. Develop quick recall of multiplication facts and related division facts (fact families) and fluency with whole number multiplication.

Blueprint of Testing - 20% (Number Operations)

Student Performance

I can easily remember and use the basic math facts up to  $12 \times 12$  and  $144/12$ .

I can estimate the product of a problem up to a three digit by three digit number.

I can find the product of a problem up to a three digit by one digit number.

2. Develop an understanding of decimals and their connection to fractions.

Blueprint of Testing - 16% (Number Sense)

Student Performance:

I can model, read, write and rename decimals to the hundredths place.

I can compare and order numbers to the hundredths place.

I can place decimals, fractions and percents on a numberline using 0, 0.5 and 1 as benchmarks.

I can use a model to compare, add or subtract fractions.

3. Use Customary and Metric Measurement Systems to solve application problems

Blueprint of Testing - 10%

Student Performance:

I can estimate a variety of objects using customary units.

I can use metric measurements to estimate and measure a variety of objects.

I can choose the appropriate measurement instrument to solve problems.

I can use grids to measure the area of shapes.

4. Develop an understanding of area and acquire strategies for finding area of two-dimensional shapes.

Blueprint of Testing - One part of the 10% for Measurement (Number 3 above)

Student Performance:

I can identify and draw intersecting, parallel and perpendicular lines.

I can identify the different types of angles.

Identify, draw, and construct models of regular and irregular polygons.

I can identify and draw the different types of polygons.

I can describe the transformations of 2-D objects.

## Vertical Alignment of Learning Goals 3<sup>rd</sup> through 5<sup>th</sup> Grades

Major concepts, defined by grade level in PASS, aligned with 3 <sup>rd</sup> Grade blueprint			
3 <sup>rd</sup> Grade	4 <sup>th</sup> Grade	Blueprint 4 <sup>th</sup> Grade	5 <sup>th</sup> Grade
Develop an understanding of fractional parts and fraction equivalence.	Develop quick recall of multiplication facts and related division facts (fact families) and fluency with whole number multiplication.	<b>20%</b> 4.2.2 Number Operations	Develop an understanding of and fluency with division of whole numbers
Develop an understanding of multiplication and division and acquire strategies for basic multiplication facts and related division facts (fact families).	Develop an understanding of decimals and their connection to fractions.	<b>16%</b> 4.2.1 Number Sense	Develop an understanding of and fluency with addition and subtraction of fractions and decimals.
Apply the concepts of time, money, temperature, and measurement to real life situations.	Use Customary and Metric Measurement Systems to solve application problems and an understanding of area and acquire strategies for finding area of two-dimensional shapes.	<b>10%</b> 4.1 Measurement	
Describe and analyze various properties of two- and three-dimensional shapes.	Develop an understanding of geometric properties and relationships of shapes.	<b>18%</b>	
			Algebraic Reasoning: Recognize patterns and their associated rules and develop basic algebraic strategies for solving problems with variables.

## Vertical Alignment of Blueprints 3<sup>rd</sup> through 6<sup>th</sup> Grades

This chart shows the vertical alignment of the OCCT Math Blueprints from 3<sup>rd</sup> through 6<sup>th</sup> grade. It was designed so you have an at-a-glance look at the progression of major concepts in each grade level as well as the percentage of the test which will be made up of that concept.

	3 <sup>rd</sup> Grade		4 <sup>th</sup> Grade			5 <sup>th</sup> Grade			6 <sup>th</sup> Grade		
<b>Standard 1: Algebraic Reasoning: Patterns and Relationships</b>	7	14%		7	14%		13	26%		13	26%
1.1. Algebra Patterns	2			3			5			4	
1.2. Equations	2			2			4		1.2. Expressions & Equations	4	
1.2. Number Properties	3			2			4			3	
									1.4. Solving Equations	2	
<b>Standard 2: Number Sense and Operations</b>	20	40%		18	36%		16	32%		15	30%
2.1. Number Sense	10			8			8			5	
2.2. Number Operations	10			10			8			10	
<b>Standard 3: Geometry</b>	7	14%		9	18%		7	14%		8	16%
3.1. Properties of Shapes	3		3.1. Lines	2		3.1. Circles & Polygons	4		3.1. 3-D Figures	2	
3.2. Spatial Reasoning	2		3.2. Angles	2		3.2. Angles	3		3.2. Congruent & Similar Figures	2	
3.3. Coordinate Geometry	2		3.3. Polygons	3					3.3. Coordinate Geometry	4	
			3.4. Transformations	2							
<b>Standard 4: Measurement</b>	9	18%		9	18%		7	14%		7	14%
4.1. Measurement	4			5			5		4.1. Circles	4	
4.2. Time & Temperature	2			2		4.2. Money	2		4.2. Conversions	3	
4.3. Money	2			2							
<b>Standard 5: Data Analysis</b>	7	14%		7	14%		7	14%		7	14%
5.1. Data Analysis	4			2			3			3	
5.2. Probability	4		5.2. Central Tendency	3		5.2. Central Tendency	2		5.2. Central Tendency	2	
			5.3. Probability	2		5.3. Probability	2		5.3. Probability	2	

## Sample Pacing/Sequence Guide 3<sup>rd</sup> through 5<sup>th</sup> Grade Math PASS Objectives

This chart is intended as a starting point for a more specific pacing guide aligned with your district's school calendar. We recognize that not all districts operate on a 9 month schedule from September to May. This table provides guidance as to the general amount of time to be spent on each strand. It was created to aid in the vertical alignment and progression going through the 3<sup>rd</sup> through 5<sup>th</sup> grade Math OCCT using the Math OCCT blueprints as the reference points.

	September	October	November	December	January	February	March	April	May
<b>3<sup>rd</sup> Grade</b>									
Standard 1: Algebraic Reasoning									
Standard 2: Number Sense and Operations									
Standard 3: Geometry									
Standard 4: Measurement									
Standard 5: Data Analysis									
<b>4<sup>th</sup> Grade</b>									
Standard 1: Algebraic Reasoning									
Standard 2: Number Sense and Operations									
Standard 3: Geometry									
Standard 4: Measurement									
Standard 5: Data Analysis									
<b>5<sup>th</sup> Grade</b>									
Standard 1: Algebraic Reasoning									
Standard 2: Number Sense and Operations									
Standard 3: Geometry									
Standard 4: Measurement									
Standard 5: Data Analysis									

	Do not teach at this time
	Strands to be the focus of classroom instruction and assessment
	Strands to be practiced, reviewed and maintained through whole group instruction, centers, small groups, interventions, remediation, etc.

## Sample Math Tasks

### Number Operations

**Major Concept:** Develop quick recall of multiplication facts and related division facts (fact families) and fluency with whole number multiplication.

- I can easily remember and use the basic math facts up to  $12 \times 12$  and  $144/12$ .

**Standard:** PASS: Grade 4 Standard 2.2bi (CCSS: Math Practice 7)

**Math Task:** Giddy Up, Round Up: Relating Division to Multiplication

Link: <http://www.cpalms.org/Public/PreviewResource/Preview/49479>

**Synopsis:** In this lesson, students will learn to solve division problems by relating them to multiplication facts. Includes practice materials focus on the 6's and 8's multiplication facts.

- I can estimate the product of a problem up to a three digit by three digit number.

**Standard:** PASS: Grade 4 Standard 2.2b.ii (CCSS: 4.NBT.5 and 6)

**Math Task:** Number Line Dancing

Link: <http://illuminations.nctm.org/Lesson.aspx?id=3311>

**Synopsis:**

Students will:

- Identify position of whole numbers on a number line with various intervals
- Increase fluency in multiplication facts
- Solve multiplication problems using mental math
- Increase fluency in estimating products

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**Math Task:** Chaperones Needed

Link:

<http://www.okcps.org/Portals/Okcs/District/docs/Pacing%20Guides/Fourth%20Grade/4th%20Grade%20Pearson%20Performance%20Tasks.pdf>

**Synopsis:** Solve multistep problems posed with whole numbers answers using multiple operations.

- I can find the product of a problem up to a three digit by one digit number.

**Standard:** PASS: Grade 4 Standard 2.2b.iii (CCSS: 3.OA.A)

**Math Task:** Division Lesson Plans – 3rd Grade

Link: <http://www.math-lesson-plans.com/Division.html>

**Synopsis:** This series of lessons is marked as a third grade grouping, however, it covers division facts from 0 – 12. This is an excellent resource for reinforcing division skills.

## Number Sense

**Major Concept:** Develop an understanding of decimals and their connection to fractions.

- **I can model, read, write and rename decimals up to the 100ths place.**

**Standard:** PASS Grade 4 Standard 2.1a.ii (CCSS: 4.NF.6 & 4.NF.7)

**Math Task:** Fraction/Decimal War

Link: <http://www.oercommons.org/courses/fraction-decimal-war>

**Synopsis:** This lesson plan introduces a game that will reinforce fractions and decimals. This activity is best played in groups of 3-4. You may choose to use as an activity when work is completed or as a center activity.

- **I can compare and order numbers to the hundredths place.**

**Standard:** PASS Grade 4 Standard 2.1b.i (CCSS: 4.NBT.1, 4.NBT.2, 4.NBT.3)

**Math Task:** Decimal Place Value

Link: <http://www.cpalms.org/Public/PreviewResource/Preview/31832>

**Synopsis:** Students learn about decimal place value and the relationship between tenths, hundredths, and thousandths. Students will explore decimal place value, read and write decimals using tenths, hundredths, and thousandths, and compare decimals using greater-than and less-than notation.

\*also recommended: complete unit that can be downloaded on Numbers and Operation

<http://www.nps.k12.nj.us/Page/8238>

- **I can place decimals, fractions and percents on a numberline using 0, 0.5 and 1 as benchmarks.**

**Standard:** PASS Grade 4 Standard 2.1b.ii (CCSS: 4.NF.2)

**Math Task:** Fractions: Number Line

Link: <http://Betterlesson.com/lesson/14936/fractions-number-line>

**Synopsis:** This lesson provides a direct and indirect approach to identifying fractions on a number line.

- **I can use a model to compare, add or subtract fractions.**

**Standard:** PASS Grade 4 Standard 2.1b.iii (CCSS: 4.NF.3)

**Math Task:** Leap Frog Fractions

Link: <http://www.insidemathematics.org/common-core-math-tasks/4th-grade/4-2009%20Leapfrog%20Fractions.pdf>

**Synopsis:** This task challenges a student to demonstrate understanding of the concept of equivalent fractions and addition of fractions as joining parts referring to the same whole.

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**Standard:** PASS Grade 4 Standard 2.1b.iii (CCSS: 4.NF.3)

**Math Task:** "Fraction Feud" Comparing & Ordering Fractions

Link: <http://illuminations.nctm.org/Lesson.aspx?id=3729>

**Synopsis:**

Students will:

- Model fractions with single digit denominators.
- Compare and order fractions with single digit denominators

**Measurement**

**Major Concept:** Use Customary and Metric Measurement Systems to solve application problems and an understanding of area and acquire strategies for finding area of two-dimensional shapes.

- **I can estimate a variety of objects using customary units.**
- **I can use metric measurements to estimate and measure a variety of objects.**

**Standard:** PASS Grade 4 Standard 4.1a (CCSS: no fourth grade correlation)

**Math Task:** On the Hunt for Measurements: Estimation, Area and Perimeter of Rectangles

Link: <http://www.cpalms.org/Public/PreviewResource/Preview/30373>

**Synopsis:** Students look for rectangular objects in the classroom or on the school campus that match the measurements for given clues. Students will estimate the measurements of the object, then take the exact measurements and use this information to determine its area and perimeter.

- **I can choose the appropriate measurement instrument to solve problems.**

**Standard:** PASS Grade 4 Standard 4.1c (CCSS: Math Practice 5)

**Math Task:** Wagon Wonders Measurement MEA

Link: <http://www.cpalms.org/Public/PreviewResource/Preview/69254>

**Synopsis:** After reading a book about a boy who claims to catch one million fish, students will work to help Wagon Willy of Wagon Wonders to design a custom wagon big enough to haul his fish. He will also seek their input on the best building material for the wagon, based on students' analysis of data. After students collaborate to solve the problem, they will be presented with a twist. Wagon Willy will need to convert their measurements from feet to inches and will have to reconsider which wood to recommend based on a change in data.\*also recommended: complete unit that can be downloaded on Measurement <http://www.doe.k12.de.us/infosuites/schools/charterschools/files/NCSMath2013Gr4.pdf> This unit is designed to help students obtain a better sense of metric and customary measurement. Begins with basic understanding and includes hands-on activities.

- **I can use grids to measure the area of shapes.**

**Standard:** PASS Grade 4 Standard 4.1c (CCSS: 4.MD.3)

**Math Task:** State Population Projections

Link: <http://illuminations.nctm.org/Lesson.aspx?id=652>

**Synopsis:**

Students will:

- Formulate questions, construct data tables, and display the relevant data in a graph
- Justify their conclusions and design further studies based on their information

## Geometry

**Major Concept:** Develop an understanding of area and acquire strategies for finding area of two-dimensional shapes.

- **I can identify and draw intersecting, parallel and perpendicular lines.**

**Standard:** PASS Grade 4 Standard 3.1 (CCSS: 4.G.1)

**Math Task:** Learnzillion-Draw parallel and perpendicular lines

**Link:** <https://learnzillion.com/lessons/2313-draw-parallel-and-perpendicular-lines>

**Synopsis:** This is the 3<sup>rd</sup> out of 5 videos with lessons that can be done as a class or students can view the lessons individually.

- **I can identify the different types of angles.**

**Standard:** PASS Grade 4 Standard 3.2 (CCSS: 4.MD.5)

**Math Task:** Lines, Rays and Angles

**Link:** <http://www.homeschoolmath.net/teaching/g/angles.php>

**Synopsis:** This fourth grade geometry lesson teaches the definitions for a line, ray, angle, acute angle, right angle, and obtuse angle. We also study how the size of the angle is ONLY determined by how much it has "opened" as compared to the whole circle. The lesson contains many varied exercises for students.

- **I can identify, draw and construct the different types of polygons.**

**Standard:** PASS Grade 4 Standard 3.3 (CCSS: no fourth grade correlation)

**Math Task:** Quilt Making

**Link:** <http://www.insidemathematics.org/common-core-math-tasks/4th-grade/4-2008%20Quilt%20Making.pdf>

**Synopsis:** A student must analyze 2-dimensional shapes and their properties and attributes to determine which shapes can and which shapes can't fit together without any gap.

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**Standard:** PASS Grade 4 Standard 3.3 (CCSS: no fourth grade correlation)

**Math Task:** Shape Up

**Link:** <http://illuminations.nctm.org/Lesson.aspx?id=2989>

**Synopsis:** Students hear geometry terminology around them every day. By playing the games in this lesson, students use their knowledge regarding regular and irregular polygons to explore the properties of the shapes and learn new vocabulary when identifying characteristics of shapes.

- **I can describe the transformations of 2-Dimensional objects.**

**Standard:** PASS Grade 4 Standard 3.4 (CCSS: no fourth grade correlation)

**Math Task:** Analyzing Designs

**Link:** <http://illuminations.nctm.org/Lesson.aspx?id=1246>

**Synopsis:** This lesson encourages students to explore the geometric transformation of rotation, reflection and translation more fully. Students create a design then, using flips, turns, and slides, make a 4-part paper "mini-quilt" square with that design as the basis. This experience focuses students' attention on both the changes produced by the geometric transformations and on line symmetry.