

# Mathematical Processes Standard

*Students use mathematical processes and knowledge to solve problems. They apply the mathematical processes as they learn content from the other mathematical standards.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p><b><u>Problem Solving</u></b></p> <ol style="list-style-type: none"> <li>Apply and adapt a variety of appropriate strategies to solve problems:           <ul style="list-style-type: none"> <li>create a mathematical model</li> <li>draw a picture</li> <li>act it out</li> <li>look for a pattern</li> <li>guess and check</li> <li>make an organized list</li> <li>make a simpler but similar problem</li> </ul> </li> </ol> <p><b><u>Reasoning and Proof</u></b></p> <ol style="list-style-type: none"> <li>Use models and logic to make conclusions.</li> <li>Adjust models as needed.</li> <li>Reason inductively by identifying patterns.</li> <li>Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing.</li> <li>Include enough detail and clarity that the reader/listener can follow the explanation.</li> </ol> <p><b><u>Communication</u></b></p> <ol style="list-style-type: none"> <li>Use developmentally appropriate mathematical language and vocabulary.</li> <li>Respond to instructions orally, visually and in writing as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write.</li> <li>Respond clearly with sufficient detail so that thinking can be understood.</li> <li>Present thinking in a logical and organized in manner and explain to others how a problem was solved.</li> <li>Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem.</li> </ol> <p><b><u>Connections</u></b></p> <ol style="list-style-type: none"> <li>Use learning from one area of mathematics to understand another.</li> </ol>	<p><b><u>Problem Solving</u></b></p> <ol style="list-style-type: none"> <li>Apply and adapt a variety of appropriate strategies to solve problems:           <ul style="list-style-type: none"> <li>create a mathematical model</li> <li>draw a picture</li> <li>act it out</li> <li>look for a pattern</li> <li>guess and check</li> <li>make an organized list</li> <li>make a simpler but similar problem</li> <li>work backwards</li> </ul> </li> <li>Understand when estimation, mental arithmetic, or paper and pencil calculation is more appropriate than technology.</li> </ol> <p><b><u>Reasoning and Proof</u></b></p> <ol style="list-style-type: none"> <li>Use models and logic to make conclusions.</li> <li>Adjust models as needed.</li> <li>Reason inductively by identifying patterns.</li> <li>Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing.</li> <li>Include enough detail and clarity that the reader/listener can follow the explanation.</li> <li>Make multiple trials using manipulatives, drawings or paper and pencil.</li> </ol> <p><b><u>Communication</u></b></p> <ol style="list-style-type: none"> <li>Use developmentally appropriate mathematical language and vocabulary.</li> <li>Respond to instructions orally, visually and in writing as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write.</li> <li>Respond clearly with sufficient detail so that thinking can be understood.</li> <li>Present thinking in a logical and organized in manner and explain to others how a problem was solved.</li> </ol>	<p><b><u>Problem Solving</u></b></p> <ol style="list-style-type: none"> <li>Apply and adapt a variety of appropriate strategies to solve problems:           <ul style="list-style-type: none"> <li>create a mathematical model</li> <li>draw a picture</li> <li>act it out</li> <li>look for a pattern</li> <li>guess and check</li> <li>make an organized list</li> <li>make a simpler but similar problem</li> <li>work backwards</li> <li>use a formula</li> </ul> </li> <li>Understand when estimation, mental arithmetic, or paper and pencil calculation is more appropriate than technology.</li> <li>Use an appropriate tool when the numbers are not easily calculated mentally, when an exact answer is needed, or when computation involves several numbers.</li> </ol> <p><b><u>Reasoning and Proof</u></b></p> <ol style="list-style-type: none"> <li>Use models and logic to make conclusions.</li> <li>Adjust models as needed.</li> <li>Reason inductively by identifying patterns.</li> <li>Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing.</li> <li>Include enough detail and clarity that the reader/listener can follow the explanation.</li> <li>Make multiple trials using manipulatives, drawings or paper and pencil.</li> <li>Look for a case that doesn't work; e.g., a counter-example.</li> </ol> <p><b><u>Communication</u></b></p> <ol style="list-style-type: none"> <li>Use developmentally appropriate mathematical language and vocabulary.</li> <li>Respond to instructions orally, visually and in writing as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write.</li> </ol>

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>2. Relate new and prior knowledge to make sense of new concepts being learned.</p> <p>3. Make connections between mathematics and everyday life.</p> <p>4. Apply a strategy or reference system that draws on previous learning in another context.</p> <p>5. Make connections between different representations; e.g., numeric, graphical, and/or algebraic.</p> <p><u>Representation</u></p> <p>1. Select an appropriate representation of a mathematical idea or situation:</p> <ul style="list-style-type: none"> <li>• physical model/manipulative</li> <li>• picture/drawing/diagram</li> <li>• numerical</li> <li>• geometric</li> <li>• graphical</li> <li>• table/chart</li> <li>• graphical organizers/Venn diagram</li> </ul> <p>2. Understand that more than one representation can be used to appropriately represent the same mathematical idea or situation.</p> <p>3. Use multiple representations, as required; e.g., table/chart, graph.</p> <p><u>Reflection</u></p> <p>1. Reflect on mathematical concepts that have been learned using drawings, pictures and/or words; e.g., as a class group discussion and activity, create a simple classroom chart to show what has been learned.</p> <p>2. In a math journal reflect on mathematical concepts that have been learned using drawings, pictures, math symbols, vocabulary, and language appropriate to the topic. Use writing prompts such as:</p> <ul style="list-style-type: none"> <li>• What did you do in math today?</li> <li>• What did you learn in math today?</li> <li>• Was what you learned easy or difficult?</li> <li>• What did you like or dislike about today's lesson?</li> <li>• What are some of the math words you used today?</li> <li>• Describe uses for what you learned in math today.</li> </ul>	<p>5. Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem.</p> <p>6. Interpret and summarize information from charts and graphs providing appropriate detail; e.g., describe patterns and contrasts.</p> <p><u>Connections</u></p> <p>1. Use learning from one area of mathematics to understand another.</p> <p>2. Relate new and prior knowledge to make sense of new concepts being learned.</p> <p>3. Make connections between mathematics and everyday life.</p> <p>4. Apply a strategy or reference system that draws on previous learning in another context.</p> <p>5. Make connections between different representations; e.g., numeric, graphical, and/or algebraic.</p> <p><u>Representation</u></p> <p>1. Select an appropriate representation of a mathematical idea or situation:</p> <ul style="list-style-type: none"> <li>• physical model/manipulative</li> <li>• picture/drawing/diagram</li> <li>• numerical</li> <li>• geometric</li> <li>• graphical</li> <li>• table/chart</li> <li>• graphical organizers/Venn diagram</li> </ul> <p>2. Understand that more than one representation can be used to appropriately represent the same mathematical idea or situation.</p> <p>3. Use multiple representations, as required; e.g., table/chart, graph.</p> <p>4. Understand that there may be different variations of one representation; e.g., <math>4s</math> is the same as <math>s + s + s + s</math>.</p> <p><u>Reflection</u></p> <p>1. Reflect on mathematical concepts that have been learned using drawings, pictures and/or words; e.g., as a class group discussion and activity, create a simple classroom chart to show what has been learned.</p>	<p>3. Respond clearly with sufficient detail so that thinking can be understood.</p> <p>4. Present thinking in a logical and organized in manner and explain to others how a problem was solved.</p> <p>5. Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem.</p> <p>6. Interpret and summarize information from charts and graphs providing appropriate detail; e.g., describe patterns and contrasts.</p> <p>7. Communicate mathematical learning by combining various representations; e.g., words with diagrams, charts and graphs with verbal descriptions.</p> <p><u>Connections</u></p> <p>1. Use learning from one area of mathematics to understand another.</p> <p>2. Relate new and prior knowledge to make sense of new concepts being learned.</p> <p>3. Make connections between mathematics and everyday life.</p> <p>4. Apply a strategy or reference system that draws on previous learning in another context.</p> <p>5. Make connections between different representations; e.g., numeric, graphical, and/or algebraic.</p> <p><u>Representation</u></p> <p>1. Select an appropriate representation of a mathematical idea or situation:</p> <ul style="list-style-type: none"> <li>• physical model/manipulative</li> <li>• picture/drawing/diagram</li> <li>• numerical</li> <li>• geometric</li> <li>• graphical</li> <li>• table/chart</li> <li>• graphical organizers/Venn diagram</li> <li>• equation/algebraic expression/formula</li> </ul> <p>2. Understand that more than one representation can be used to appropriately represent the same mathematical idea or situation.</p> <p>3. Use multiple representations, as required; e.g., table/chart, graph.</p>

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
	<p>2. In a math journal reflect on mathematical concepts that have been learned using drawings, pictures, math symbols, vocabulary, and language appropriate to the topic. Use writing prompts such as:</p> <ul style="list-style-type: none"> <li>• What did you do in math today?</li> <li>• What did you learn in math today?</li> <li>• Was what you learned easy or difficult?</li> <li>• What did you like or dislike about today's lesson?</li> <li>• What are some of the math words you used today?</li> <li>• What did you not understand in math today?</li> <li>• Describe uses for what you learned in math today.</li> </ul>	<p>4. Understand that there may be different variations of one representation; e.g., <math>2l + 2w</math> is the same as <math>2(l + w)</math>.</p> <p><u>Reflection</u></p> <ol style="list-style-type: none"> <li>1. Reflect on mathematical concepts that have been learned using drawings, pictures and/or words: e.g., as a class group discussion and activity, create a simple classroom chart to show what has been learned.</li> <li>2. In a math journal reflect on mathematical concepts that have been learned using drawings, pictures, math symbols, vocabulary, and language appropriate to the topic. Use writing prompts such as: <ul style="list-style-type: none"> <li>• What did you do in math today?</li> <li>• What did you learn in math today?</li> <li>• Was what you learned easy or difficult?</li> <li>• What did you like or dislike about today's lesson?</li> <li>• What are some of the math words you used today?</li> <li>• What did you not understand in math today?</li> <li>• Describe uses for what you learned in math today.</li> </ul> </li> </ol>

## Numbers, Number Sense and Operations Standard

*Students demonstrate number sense, including an understanding of number systems and operations and how they relate to one another. Students compute fluently and make reasonable estimates using paper and pencil, technology-supported and mental methods.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>1. Represent whole numbers to hundred thousands place using physical models, numerals, words, and expanded notation.</p> <p>2. Compare and order numbers 1,000 to 1,000,000, using mathematical language and symbols: greater than, less than, equal to, <math>&gt;</math>, <math>&lt;</math>, <math>=</math>.</p> <p>3. Round 2, 3, and 4-digit numbers to the nearest 10, 100, or 1,000.</p> <p>4. Add and subtract 3-digit whole numbers with and without regrouping.</p> <p>5. Estimate the results of whole number addition and subtraction problems using rounding, and front end estimation, and judge the reasonableness.</p> <p>6. Model, represent and explain the meaning of multiplication; e.g., repeated addition, skip counting, rectangular arrays.</p> <p>7. Model, represent and explain the meaning of division; e.g., repeated subtraction, separating a large group of items into smaller equal groups.</p> <p>8. Develop multiplication and division facts to the 12's.</p> <p>9. Explain and use relationships between operations such as addition and subtraction are inverse operations, and multiplication and division are inverse operations; e.g., fact families.</p> <p>10. Mentally compute with multiples of 10; e.g., <math>30 \times 5</math>, <math>40 \times 60</math>, <math>200 \times 9</math></p> <p>11. Multiply 2-digit numbers by a single digit number.</p>	<p>1. Represent whole numbers to hundred millions place using numerals, words, and expanded notation.</p> <p>2. Compare and order numbers 1,000,000 to 100,000,000, using mathematical language and symbols: greater than, less than, equal to, <math>&gt;</math>, <math>&lt;</math>, <math>=</math>.</p> <p>3. Round whole numbers to a given place up to hundred millions.</p> <p>4. Add and subtract 4-digit whole numbers with and without regrouping.</p> <p>5. Estimate the results of whole number addition and subtraction problems using rounding, and front end estimation, and judge the reasonableness.</p> <p>6. Develop fluency multiplication and division facts to the 12's.</p> <p>7. Identify and represent factors and multiples of whole numbers 1 - 100.</p> <p>8. Multiply whole numbers by powers of 10 and multiples of 10.</p> <p>9. Multiply whole numbers by 1 and 2-digit multipliers.</p> <p>10. Divide 2, 3 and 4-digit numbers by a single digit number and by multiples of 10.</p> <p>11. Interpret the meaning of remainders.</p> <p>12. Estimate the results of whole number multiplication and division using rounding and compatible numbers.</p>	<p>1. Represent whole numbers to hundred billions place using numerals, words, and expanded notation.</p> <p>2. Compare and order numbers 1 billion to 100 billion using mathematical language and symbols: greater than, less than, equal to, <math>&gt;</math>, <math>&lt;</math>, <math>=</math>.</p> <p>3. Round whole numbers to a given place up to hundred billions.</p> <p>4. Add and subtract 5-digit whole numbers with and without regrouping.</p> <p>5. Estimate the results of whole number addition and subtraction problems using rounding, and front end estimation, and judge the reasonableness.</p> <p>6. Explain the meaning of prime and composite numbers.</p> <p>7. Multiply whole numbers by 2 and 3-digit multipliers.</p> <p>8. Divide 3, 4 and 5-digit numbers by 1 and 2-digit numbers and by multiples of 10.</p> <p>9. Interpret and explain, in oral and written form, the meaning of remainders.</p> <p>10. Estimate the results of whole number multiplication and division using rounding and compatible numbers.</p> <p>11. Recognize perfect square numbers and their roots.</p> <p>12. Use the order of operations, including parentheses, to simplify numerical expressions.</p>

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>12. Divide numbers with remainders; e.g. <math>12 \div 5 =</math>, <math>25 \div 6</math> (digit single quotients).</p> <p>13. Divide 2 digit numbers by a single digit number, without remainders.</p> <p>14. Model and use the commutative and associative properties for addition and multiplication using number sentences.</p> <p>15. Represent fractions and mixed numbers using physical models, numerals, and words:</p> <p>16. Compare and order commonly used fractions using physical or visual models; e.g. fraction circles or bars, number lines.</p> <p>17. Explore equivalent forms of fractions found by using physical models and visual models.</p> <p>18. Represent decimal numbers for tenths and hundredths using physical or visual models, numerals and words, and be able to write the fraction equivalents; e.g., 0.2, <math>\frac{2}{10}</math>, two tenths.</p> <p>19. Count money using coins and bills to ten dollars.</p> <p>20. Make change using coins and bills for amounts up to \$5.00.</p> <p>21. Add and subtract decimals and amounts of money.</p> <p>22. Explore numbers less than 0 by extending the number line and through familiar applications; e.g., temperature.</p>	<p>13. Identify and explain, in oral and written form, the commutative and associative properties of addition and multiplication.</p> <p>14. Identify and use the distributive property to mentally find a multiplication answer; e.g., <math>5 \times 47 = (5 \times 40) + (5 \times 7) = 200 + 35 = 235</math>.</p> <p>15. Identify equivalent forms of fractions using visual models, and by multiplying or dividing by a fractional form of one whole; e.g. <math>\frac{2}{3} \times \frac{4}{4} = \frac{8}{12}</math> or <math>\frac{16}{24} \div \frac{8}{8} = \frac{2}{3}</math>.</p> <p>16. Use models and points of reference to compare commonly used fractions; e.g., “Is <math>\frac{1}{3}</math> closer to 0 or 1 on a number line?”</p> <p>17. Add and subtract fractions with like denominators, sums less than 1.</p> <p>18. Represent decimal numbers for tenths, hundredths, and thousandths using physical or visual models, numerals, and words, and be able to identify and write the fraction equivalents; e.g., 0.235, <math>\frac{235}{100}</math>, two hundred thirty-five thousandths.</p> <p>19. Explain that ten tenths is the same as one whole in both fraction and decimal form.</p> <p>20. Add and subtract decimal numbers up to thousandths place and explain how place value is related to the proper alignment of the numerals.</p> <p>21. Explore numbers less than 0 by extending the number line, and through familiar applications; e.g. temperature, and owing money.</p> <p>22. Solve problems involving counting money and making change using coins and bills for amounts up to \$50.00.</p> <p>23. Estimate the results of computations involving fractions and decimals using a variety of strategies.</p>	<p>13. Use the commutative, associative, distributive, identity, zero and inverse properties to simplify and perform computations.</p> <p>14. Locate fractions and mixed numbers on a number line.</p> <p>15. Recognize and explain the meaning of proper and improper fractions.</p> <p>16. Change improper fractions to mixed numbers and change mixed numbers to improper fractions.</p> <p>17. Identify and generate equivalent forms of fractions including reducing to simplest form.</p> <p>18. Use visual models and equivalent forms to compare fractions.</p> <p>19. Add and subtract commonly used fractions with like and unlike denominators.</p> <p>20. Read and write decimal numbers to ten-thousandths place.</p> <p>21. Round decimals to the nearest whole number, tenth, hundredth and thousandth.</p> <p>22. Add and subtract decimal numbers up to ten-thousandths place and explain how place value is related to the proper alignment of the numerals.</p> <p>23. Multiply and divide decimal numbers involving 1 or 2 decimal places.</p> <p>24. Represent and compare numbers less than 0 by extending the number line and using familiar applications.</p> <p>25. Use models and visual representations to develop the concept of ratio as part to part and part to whole and the concept of percent as part to whole.</p> <p>26. Identify and generate equivalent forms of fractions, decimals, and percents.</p>

## Measurement Standard

*Students estimate and measure to a required degree of accuracy and precision by selecting and using appropriate units, tools and technologies.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>1. Identify and select appropriate customary and metric units for measuring length; inches, feet, yards, miles, centimeters, decimeters, meters and use abbreviations.</p> <p>2. Use a ruler to measure length to the nearest inch, <math>\frac{1}{2}</math> in., <math>\frac{1}{4}</math> in., centimeter, decimeter, meter; e.g., measure common objects; draw a rectangle with a length of <math>2\frac{1}{2}</math> in. and a width of 3 in.</p> <p>3. Identify and select appropriate customary and metric units for measuring capacity; cups, pints, quarts, gallons, centiliters, deciliters, liters and use abbreviations.</p> <p>4. Use cups, pints, quarts, gallons, centiliters, liters, to measure capacity; e.g., fill a measuring cup to the <math>\frac{3}{4}</math> cup mark.</p> <p>5. Identify and select appropriate customary and metric units for measuring weight; ounces, pounds, tons, grams, kilograms and use abbreviations.</p> <p>6. Use ounces, pounds, grams, and kilograms to measure weight; e.g., use a scale to weigh and compare common objects.</p> <p>7. Read thermometers in both Fahrenheit and Celsius scales.</p> <p>8. Establish personal or common referents for units of measure to make estimates and comparisons; a paper clip is approximately one gram, the width of a pinky finger is approximately one cm, four times around a football field is approximately one mile, the width of a doorway is approximately one yard.</p> <p>9. Tell time to the nearest minute using digital and analog clocks.</p>	<p>1. Identify and use customary units and metric units to measure length; inches, feet, yards, miles, millimeters, centimeters, decimeters, meters, kilometers.</p> <p>2. Use a ruler to measure objects and draw line segments to the nearest inch, <math>\frac{1}{2}</math> in., <math>\frac{1}{4}</math> in., and <math>\frac{1}{8}</math> in.</p> <p>3. Use a ruler to measure objects and draw line segments to the nearest centimeter and nearest millimeter.</p> <p>4. Convert units of length within the same system; e.g., inches to feet, feet to yards, meters to centimeters, meters to millimeters, centimeters to millimeters.</p> <p>5. Identify and use customary units and metric units to measure capacity; cups, pints, quarts, half gallons, gallons, milliliters, centiliters, deciliters, liters.</p> <p>6. Convert units of capacity within the same system; e.g., cups to pints, pints to quarts, quarts to gallons, liters to milliliters, liters to centiliters, liters to deciliters.</p> <p>7. Identify and use customary units, and metric units to measure weight; pounds, ounces, tons, milligrams, grams, kilograms.</p> <p>8. Convert units of weight with the same system; e.g., pounds to ounces, grams to milligrams, kilograms to grams.</p> <p>9. Develop and use strategies to find perimeter of simple shapes using string or links.</p> <p>10. Identify and select appropriate units to measure perimeter - linear units; e.g., inches, feet, centimeters, meters.</p>	<p>1. Identify customary units of length, capacity and weight.</p> <p>2. Use a ruler to measure objects and draw line segment to the nearest inch, <math>\frac{1}{2}</math> in., <math>\frac{1}{4}</math> in., <math>\frac{1}{8}</math> in., <math>1/16</math> in.</p> <p>3. Identify metric units of length, capacity and weight.</p> <p>4. Identify the six metric prefixes and explain their meanings; create a metric chart for length, capacity and weight.</p> <p>*5. Convert units of length, capacity, weight and time to other units in the same measurement system. Change a smaller unit of measure to a larger unit, and vice versa; e.g., hours to minutes, grams to kilograms using <math>\times</math> and <math>\div</math>.</p> <p>6. Develop and use formulas for calculating the perimeter and area of squares, rectangles, parallelograms, and triangles; e.g., using graph paper, geoboards.</p> <p>*7. Draw a polygon with a given perimeter or area; e.g. draw a rectangle that has a perimeter of 18 cm; draw a rectangle that has an area of 16 sq. cm.</p> <p>8. Develop and use a formula for calculating the volume of rectangular prisms and cubes; using cm cubes or inch cubes.</p> <p>9. Explain the difference between linear units, square units and cubic units.</p> <p>10. Demonstrate that two rectangles can have different perimeters with the same area, or different areas with the perimeter.</p>

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>10. Tell time using words; “before” and “after”, “quarter to”, “quarter after”.</p> <p>11. Calculate elapsed time using a clock (hrs. and half hours), and a calendar (days and weeks).</p> <p>*12. Demonstrate and describe perimeter as distance around a shape; area as covering a two-dimensional shape; volume as filling a three-dimensional shape.</p> <p>*13. Develop strategies for estimating the perimeters, areas, and volumes of regular and irregular shapes; e.g., links, tiles, cubes, grid paper.</p>	<p>11. Develop and use strategies to find area using tiles or a grid (graph paper); e.g., count squares to find the area of regular or irregular shapes on a grid.</p> <p>12. Identify and select appropriate units to measure area - square units; e.g., square tiles, square inches, square centimeters.</p> <p>13. Develop and use strategies to find volume using cubes; e.g., layer cubes in a box.</p> <p>14. Identify and select appropriate units to measure volume - cubic units; e.g., cubes, cubic inches, cubic centimeters.</p> <p>15. Read, record and compare temperature in degrees Fahrenheit and degrees Celsius.</p> <p>16. Calculate elapsed time using a clock (15 min. and 5 min. intervals).</p> <p>17. Use appropriate measuring tools and techniques to construct a figure; e.g., construct a rectangle with a length of <math>5\frac{1}{4}</math> inches and width of <math>3\frac{1}{2}</math> inches; fill a measuring cup to the <math>\frac{3}{8}</math> cup mark.</p>	<p>11. Develop an understanding that the circumference of a circle is about three times the length of its diameter.</p> <p>12. Calculate elapsed time in hours and minutes between two given times. same</p> <p>13. Explore measuring and drawing angles using a protractor.</p>

## Geometry and Spatial Sense Standard

*Students identify, classify, compare and analyze characteristics, properties and relationships of one-, two- and three-dimensional geometric figures and objects. Students use spatial reasoning, properties of geometric objects, and transformations to analyze mathematical situations and solve problems.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<ol style="list-style-type: none"> <li>1. Analyze and describe properties of two-dimensional and three-dimensional objects using terms such as vertex, edge, angle, side and face.</li> <li>2. Build a three-dimensional model based on an illustration or actual object using items such as legos, Lincoln logs, or wooden blocks.</li> <li>3. Identify two-dimensional shapes as congruent or similar.</li> <li>4. Predict and describe the results of sliding, flipping, and turning two-dimensional shapes.</li> <li>5. Draw lines of symmetry to verify symmetrical two-dimensional shapes.</li> <li>6. Identify and describe right angles.</li> <li>7. Use physical models, such as straws, to create different sized angles by opening and closing the sides.</li> <li>8. Identify and draw angles with respect to right angles; greater than <math>90^\circ</math>, less than <math>90^\circ</math>, equal to <math>90^\circ</math>.</li> <li>9. Find and name locations on a labeled grid or coordinate plane.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify similarities and differences of quadrilaterals; e.g., squares, rhombuses, rectangles, parallelograms, and trapezoids.</li> <li>2. Classify two and three-dimensional shapes according to their properties; e.g., develop vocabulary and definitions, compare and model plane and three-dimensional solids.</li> <li>3. Identify and create shapes that show symmetry; e.g., use pattern blocks, geoboards.</li> <li>4. Identify and create shapes that are similar, and shapes that are congruent; e.g. use tangrams, pattern blocks, and geoboards.</li> <li>5. Identify angles as right, acute or obtuse.</li> <li>6. Model and describe intersecting, parallel and perpendicular lines and line segments.</li> <li>7. Identify points, lines, and planes in the environment.</li> <li>8. Describe and define point, line, line segment, ray, and plane.</li> <li>9. Describe, identify and model reflections (flips), rotations (turns) and translations (slides) using concrete materials; e.g. using geoboards.</li> <li>10. Specify locations and plot ordered pairs on a coordinate plane, using the first quadrant.</li> </ol>	<ol style="list-style-type: none"> <li>1. Identify and define parts of a circle, and determine the relationship to each other; center, radius, diameter, chord, circumference.</li> <li>2. Draw circles using a compass given a radius or diameter.</li> <li>3. Identify and draw lines, line segments, rays, angles, skew lines, parallel lines and perpendicular lines.</li> <li>4. Label parts of an angle; vertex, rays, interior and exterior.</li> <li>*5. Explore measuring and drawing angles using a protractor.</li> <li>6. Identify angles as right, acute, obtuse, or straight.</li> <li>*7. Identify and define triangles based on angle measures (acute, right, obtuse), and side lengths (isosceles, equilateral, scalene).</li> <li>8. Name a given angle using the single letter form and the three letter form; e.g. <math>\angle B</math> or <math>\angle ABC</math>.</li> <li>9. Identify polygons with up to 8 sides.</li> <li>10. Predict and describe the results of slides, flips and turns of two-dimensional shapes.</li> <li>11. Identify and create shapes that show symmetry; e.g., use pattern blocks, geoboards, graph paper, dot paper.</li> <li>12. Identify and create shapes that are similar, and shapes that are congruent; e.g., use tangrams, pattern blocks, geoboards, graph paper, dot paper.</li> </ol>

		<p>13. Use physical models to determine the sum of interior angles of triangles and quadrilaterals.</p> <p>14. Extend understanding of a coordinate system to include points when x values may be negative numbers. Specify locations and plot ordered pairs on a coordinate plane, using quadrant I and quadrant II.</p>
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## Patterns, Functions and Algebra Standard

*Students use patterns, relations and functions to model, represent and analyze problem situations that involve variable quantities, Students analyze, model and solve problems using various representations such as tables, graphs and equations.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<p>1. Analyze and extend increasing arithmetic (+) patterns, with or without a calculator, and describe the rules in words; e.g., 4,7,10,13,...; 6,11,16,21,...</p> <p>2. Analyze and extend increasing geometric (x) patterns, with or without a calculator and describe the rule in words; e.g., 1,2,4,8,...; 1,3,9,27,...</p> <p>3. Use patterns to make predictions, identify relationships, and solve problems.</p> <p>4. Write, solve, and explain simple mathematical statements, such as <math>7 + \square &gt; 8</math> or <math>\Delta + 8 = 12</math>.</p> <p>5. Create tables to discover patterns and rules; e.g., input/output tables.</p> <p>6. Model problem situations using objects, pictures, tables, numbers, letters and other symbols.</p> <p>7. Express mathematical relationships as equations and inequalities.</p> <p>8. Identify and describe quantitative changes, especially those involving addition and subtraction; e.g., the heights of water in a glass becoming 1 centimeter lower each week due to evaporation.</p> <p>*9. Investigate ways a change in one variable relates to a change in a second variable by simulating an input/output machine; e.g., “x +12 machine” means if 8 goes in 20 comes out, or 1 sandwich costs \$0.99, so 2 cost _____?</p>	<p>1. Analyze and extend increasing or decreasing arithmetic (+ and -), and geometric patterns (x and <math>\div</math>) with or without a calculator, and describe the rules in words.</p> <p>2. Analyze, represent and describe patterns, functions and mathematical relationships using words, tables and graphs.</p> <p>3. Use patterns to make predictions, identify relationships, and solve problems.</p> <p>4. Represent the idea of a variable as an unknown quantity; e.g., use a letter or symbol.</p> <p>5. Use rules and variables to describe patterns and other mathematical relationships</p> <p>6. Express mathematical relationships as equations and inequalities.</p> <p>7. Construct a table of values as a tool to solve problems associated with mathematical or functional relationships.</p> <p>8. Investigate ways a change in one variable relates to a change in a second variable by simulating an input/output machine; e.g., “x +12 machine” means if 8 goes in 20 comes out, or 1 sandwich costs \$0.99, so 2 cost _____</p> <p>9. Describe how change in one variable affects the value of a related variable; e.g., as one increases the other increases, or as one increases the other decreases.</p>	<p>1. Describe, extend and determine a general rule for arithmetic and geometric patterns.</p> <p>2. Use calculators or computers to develop patterns and generalize them using tables and graphs.</p> <p>3. Use rules to describe patterns, functions and other mathematical relationships.</p> <p>4. Use variables as unknown quantities in general rules when describing patterns and other relationships.</p> <p>5. Write simple expressions and equations using variables to represent problem situations.</p> <p>6. Find the solutions of open sentences including equalities and inequalities.</p> <p>7. Investigate how a change in one variable relates to a change in a related variable; e.g., describe how the rate of growth varies over time, based upon data in a table or graph,</p> <p>*8. Use representations such as tables, graphs and equations to model situations and to solve problems, especially those that involve linear relationships.</p>

## *Data Analysis and Probability Standard*

*Students pose questions and collect, organize, represent, interpret and analyze data to answer those questions. Students develop and evaluate inferences, predictions and arguments that are based on data.*

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
<ol style="list-style-type: none"> <li>1. Collect and organize data from an experiment, such as recording and classifying observations or measurements in response to a question posed.</li> <li>2. Interpret and construct picture graphs in which a symbol or picture represents more than one object.</li> <li>3. Interpret and construct bar graphs with intervals greater than one; e.g., intervals of 2, 5, or 10.</li> <li>4. Support a conclusion orally and in writing, using information in a table or a graph.</li> <li>5. Match a set of data with a graphical representation of that data.</li> <li>6. Fluently translate data among charts, tables, line plots, picture graphs, and bar graphs.</li> <li>7. Analyze and interpret information represented on a time line.</li> <li>8. Identify the mode of a data set and describe the information it gives about the data set.</li> <li>9. Conduct a simple experiment, record the results in a chart, table or graph. Use results to draw conclusions about possible outcomes.</li> <li>10. Use physical models, pictures, diagrams, and lists to solve problems involving possible arrangements or combinations of two to four objects.</li> </ol>	<ol style="list-style-type: none"> <li>1. Create a plan for collecting data for a specific purpose.</li> <li>2. Represent and interpret data using tables, bar graphs, line plots and line graphs.</li> <li>3. Interpret and construct Venn diagrams to sort and describe data.</li> <li>4. Compare different representations of the same data to evaluate orally and in writing how well each representation shows important aspects of the data.</li> <li>5. Identify the median of a set of data and describe what it indicates about the data.</li> <li>6. Identify the range of a set of data.</li> <li>7. Use range, median and mode to make comparisons about related sets of data.</li> <li>8. Describe the characteristics of a set of data based on graphical representations; e.g., range of the data, clumps of data and holes in the data.</li> <li>9. Represent the likelihood of possible outcomes for chance situations; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.</li> <li>10. Place events in order of likelihood and use a diagram of appropriate language to compare the chance of each event occurring; e.g., impossible, unlikely, equally likely, certain.</li> <li>11. Conduct simple probability experiments and draw conclusions from the results; e.g., rolling number cubes or drawing marbles from a bag.</li> </ol>	<ol style="list-style-type: none"> <li>1. Design investigations to address a question and consider how data collection methods affect the nature of the data set.</li> <li>2. Select and use a graph that is appropriate for the type of data to be displayed; e.g. numerical vs. categorical data, discrete vs. continuous data).</li> <li>3. Read, interpret and represent data using frequency tables, bar graphs, line graphs, line plots, and circle graphs.</li> <li>4. Read and interpret increasingly complex displays of data, such as double bar graphs.</li> <li>5. Identify and use measures of central tendency, including mean, median, mode and range, to evaluate and analyze data.</li> <li>6. List and explain all possible outcomes of simple experiments or problems situations using methods such as lists, arrays and tree diagrams; e.g., number of arrangements for 3 or 4 items; number of possible sandwiches combinations from 4 meats, 2 cheeses, 3 bread choices.</li> <li>*7. Describe the probability of an event using ratios in all three forms; e.g., <math>\frac{1}{2}</math>, 1 to 2, 1:2.</li> <li>8. Use 0, 1 and ratios between 0 and 1 to represent the probability of outcomes for an event, and associate the ratio with the likelihood of the outcome; e.g., probability of rolling a six with a single die.</li> <li>9. Compare the theoretical results with the experimental results of a simple experiment; e.g., what should happen (theoretical/expected results) compared to what actually did happen (experimental/actual results).</li> </ol>

Grade 3 Indicators	Grade 4 Indicators	Grade 5 Indicators
	<p>12. List and count all possible combinations using one member from each of several sets; e.g., make a tree diagram to show the number of possible outfits from 3 shirts, 2 shorts and 2 pairs of shoes.</p> <p>13. Relate the concepts of impossible and certain-to-happen events to the numerical values of 0 (impossible) and 1 (certain).</p>	<p>10. Make predictions, in oral and written form, based on experimental and theoretical probabilities.</p>