

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 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
<p><u>Problem Solving</u></p> <ol style="list-style-type: none"> Apply and adapt a variety of appropriate strategies to solve problems: <ul style="list-style-type: none"> create a mathematical model draw a picture act it out look for a pattern guess and check make an organized list make a simpler but similar problem work backwards use a formula Understand when estimation, mental arithmetic, or paper and pencil calculation is more appropriate than technology. Use an appropriate tool when the numbers are not easily calculated mentally, when an exact answer is needed, or when computation involves several numbers. <p><u>Reasoning and Proof</u></p> <ol style="list-style-type: none"> Use models and logic to make conclusions. Adjust models as needed. Reason inductively by identifying patterns. Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing. Include enough detail and clarity that the reader/listener can follow the explanation. Make multiple trials using manipulatives, drawings or paper and pencil. Look for a case that doesn't work; e.g., a counter-example. <p><u>Communication</u></p> <ol style="list-style-type: none"> Use developmentally appropriate mathematical language and vocabulary. Respond to instructions orally, visually and in writing 	<p><u>Problem Solving</u></p> <ol style="list-style-type: none"> Apply and adapt a variety of appropriate strategies to solve problems: <ul style="list-style-type: none"> create a mathematical model draw a picture act it out look for a pattern guess and check make an organized list make a simpler but similar problem work backwards use a formula make a scale drawing Understand when estimation, mental arithmetic, or paper and pencil calculation is more appropriate than technology. Use an appropriate tool when the numbers are not easily calculated mentally, when an exact answer is needed, or when computation involves several numbers. Consider alternative strategies and/or blend strategies. <p><u>Reasoning and Proof</u></p> <ol style="list-style-type: none"> Use models and logic to make conclusions. Adjust models as needed. Reason inductively by identifying patterns. Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing. Include enough detail and clarity that the reader/listener can follow the explanation. Make multiple trials using manipulatives, drawings or paper and pencil. Look for a case that doesn't work; e.g., a counter-example. <p><u>Communication</u></p>	<p><u>Problem Solving</u></p> <ol style="list-style-type: none"> Apply and adapt a variety of appropriate strategies to solve problems: <ul style="list-style-type: none"> create a mathematical model draw a picture act it out look for a pattern guess and check make an organized list make a simpler but similar problem work backwards use a formula make a scale drawing make and state assumptions Understand when estimation, mental arithmetic, or paper and pencil calculation is more appropriate than technology. Use an appropriate tool when the numbers are not easily calculated mentally, when an exact answer is needed, or when computation involves several numbers. Consider alternative strategies and/or blend strategies. <p><u>Reasoning and Proof</u></p> <ol style="list-style-type: none"> Use models and logic to make conclusions. Adjust models as needed. Reason inductively by identifying patterns. Evaluate and analyze the mathematical thinking and strategies of others, orally and in writing. Include enough detail and clarity that the reader/listener can follow the explanation. Make multiple trials using manipulatives, drawings or paper and pencil. Look for a case that doesn't work; e.g., a counter-example. Recognize the characteristics of an acceptable

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<p>as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write.</p> <ol style="list-style-type: none"> Respond clearly with sufficient detail so that thinking can be understood. Present thinking in a logical and organized in manner and explain to others how a problem was solved. Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem. Interpret and summarize information from charts and graphs providing appropriate detail; e.g., describe patterns and contrasts. Communicate mathematical learning by combining various representations; e.g., words with diagrams, charts and graphs with verbal descriptions. <p><u>Connections</u></p> <ol style="list-style-type: none"> Use learning from one area of mathematics to understand another. Relate new and prior knowledge to make sense of new concepts being learned. Make connections between mathematics and everyday life. Apply a strategy or reference system that draws on previous learning in another context. Make connections between different representations; e.g., numeric, graphical, and/or algebraic. <p><u>Representation</u></p> <ol style="list-style-type: none"> Select an appropriate representation of a mathematical idea or situation: <ul style="list-style-type: none"> physical model/manipulative picture/drawing/diagram numerical geometric graphical table/chart graphical organizers/Venn diagram equation/algebraic expression/formula Understand that more than one representation can be used to appropriately represent the same mathematical idea or situation. 	<ol style="list-style-type: none"> Use developmentally appropriate mathematical language and vocabulary. Respond to instructions orally, visually and in writing as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write. Respond clearly with sufficient detail so that thinking can be understood. Present thinking in a logical and organized in manner and explain to others how a problem was solved. Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem. Interpret and summarize information from charts and graphs providing appropriate detail; e.g., describe patterns and contrasts. Communicate mathematical learning by combining various representations; e.g., words with diagrams, charts and graphs with verbal descriptions. Use the symbolic language of mathematics correctly, e.g. using = between two equal expressions, use \angle to name angles. <p><u>Connections</u></p> <ol style="list-style-type: none"> Use learning from one area of mathematics to understand another. Relate new and prior knowledge to make sense of new concepts being learned. Make connections between mathematics and everyday life. Apply a strategy or reference system that draws on previous learning in another context. Make connections between different representations; e.g., numeric, graphical, and/or algebraic. <p><u>Representation</u></p> <ol style="list-style-type: none"> Select an appropriate representation of a mathematical idea or situation: <ul style="list-style-type: none"> physical model/manipulative picture/drawing/diagram numerical geometric 	<p>argument/proof.</p> <p><u>Communication</u></p> <ol style="list-style-type: none"> Use developmentally appropriate mathematical language and vocabulary. Respond to instructions orally, visually and in writing as appropriate; e.g., tell, share, describe, demonstrate, compare, discuss, write. Respond clearly with sufficient detail so that thinking can be understood. Present thinking in a logical and organized in manner and explain to others how a problem was solved. Read and reread all of the given information and instructions to ensure understanding; e.g., identify key information needed to solve the problem. Interpret and summarize information from charts and graphs providing appropriate detail; e.g., describe patterns and contrasts. Communicate mathematical learning by combining various representations; e.g., words with diagrams, charts and graphs with verbal descriptions. Use the symbolic language of mathematics correctly, e.g. using = between two equal expressions, use \angle to name angles. <p><u>Connections</u></p> <ol style="list-style-type: none"> Use learning from one area of mathematics to understand another. Relate new and prior knowledge to make sense of new concepts being learned. Make connections between mathematics and everyday life. Apply a strategy or reference system that draws on previous learning in another context. Make connections between different representations; e.g., numeric, graphical, and/or algebraic. <p><u>Representation</u></p> <ol style="list-style-type: none"> Select an appropriate representation of a mathematical idea or situation: <ul style="list-style-type: none"> physical model/manipulative picture/drawing/diagram

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<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., $2l + 2w$ is the same as $2(l + w)$.</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"> • What did you do in math today? • What did you learn in math today? • Was what you learned easy or difficult? • What did you like or dislike about today's lesson? • What are some of the math words you used today? • What did you not understand in math today? • Describe uses for what you learned in math today. 	<ul style="list-style-type: none"> • graphical • table/chart • graphical organizers/Venn diagram • equation/algebraic expression/formula • scale drawing <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., $2l + 2w$ is the same as $2(l + w)$.</p> <p>5. Understand the role of constants and variables in formulas and patterning rules.</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"> • What did you do in math today? • What did you learn in math today? • Was what you learned easy or difficult? • What did you like or dislike about today's lesson? • What are some of the math words you used today? • What did you not understand in math today? • Describe uses for what you learned in math today. 	<ul style="list-style-type: none"> • numerical • geometric • graphical • table/chart • graphical organizers/Venn diagram • equation/algebraic expression/formula • scale drawing • algorithm/logic model <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., $2l + 2w$ is the same as $2(l + w)$.</p> <p>5. Understand the role of constants and variables in formulas and patterning rules.</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"> • What did you do in math today? • What did you learn in math today? • Was what you learned easy or difficult? • What did you like or dislike about today's lesson? • What are some of the math words you used today? • What did you not understand in math today? • Describe uses for what you learned in math today.

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.

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<p>1. Represent whole numbers to <u>hundred billions</u> place using numerals, words, and <u>expanded notation</u>.</p> <p>2. Compare and order numbers 1 billion to 100 billion using mathematical language and symbols: greater than, less than, equal to, >, <, =.</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 <u>rounding</u>, and <u>front end estimation</u>, and judge the reasonableness.</p> <p>6. Explain the meaning of <u>prime</u> and <u>composite</u> numbers.</p> <p>7. Multiply whole numbers by 2 and 3-digit <u>multipliers</u>.</p> <p>8. Divide 3, 4 and 5-digit numbers by 1 and 2-digit numbers and by <u>multiples</u> of 10.</p> <p>9. Interpret and explain, in oral and written form, the meaning of <u>remainders</u>.</p> <p>10. Estimate the results of whole number multiplication and division using rounding and <u>compatible numbers</u>.</p> <p>11. Recognize <u>perfect square numbers</u> and their <u>roots</u>.</p> <p>12. Use the order of operations, including parentheses, to simplify <u>numerical expressions</u>.</p> <p>13. Use the <u>commutative</u>, <u>associative</u>, <u>distributive</u>, <u>identity</u>, <u>zero</u> and <u>inverse properties</u> to simplify and</p>	<p>1. Write large numbers in <u>expanded form</u> using <u>powers</u> of 10.</p> <p>2. Use the <u>order of operations</u>, with and without grouping symbols, to simplify <u>numerical expressions</u>.</p> <p>3. Identify and apply the <u>commutative</u>, <u>associative</u>, <u>distributive</u>, <u>identity</u> and <u>zero properties</u> for addition and multiplication.</p> <p>4. Use <u>factors</u> and <u>exponents</u> to express whole numbers.</p> <p>5. Identify whole numbers as <u>prime</u> or <u>composite</u>.</p> <p>6. Express whole numbers, 1-100, using <u>prime factorization</u> and be able to express in <u>exponential form</u>; e.g., $32 = 2 \times 2 \times 2 \times 2 \times 2 = 2^5$.</p> <p>7. Find the <u>greatest common factor</u> (GCF) and the <u>least common multiple</u> (LCM) of two given numbers using prime factorization.</p> <p>8. Explain the meaning of <u>divisibility</u> and identify numbers that are divisible by 2, 3, 5, 6, 9, and 10.</p> <p>9. Recognize <u>perfect square numbers</u> and their <u>roots</u> up to 196 (14×14).</p> <p>10. Locate and label fractions and decimals on a number line.</p> <p>11. Generate equivalent forms of fractions and mixed numbers including reducing to <u>simplest form</u>.</p> <p>12. Compare and order fractions with like or unlike <u>numerators</u> and <u>denominators</u>. Using >, <, ≥, ≤ or =.</p> <p>13. Change <u>improper fractions</u> to <u>mixed numbers</u> and</p>	<p>1. Read and write large numbers in <u>standard form</u> and in <u>scientific notation</u>.</p> <p>2. Use the order of operations to simplify <u>numerical expressions</u>, with and without grouping symbols and exponents.</p> <p>3. Identify and apply the <u>commutative</u>, <u>associative</u>, <u>distributive</u>, <u>identity</u> and <u>zero properties</u> for addition and multiplication.</p> <p>4. Demonstrate fluency with adding, subtracting, multiplying and dividing fractions and mixed numbers.</p> <p>5. Change percents to fractions and decimals.</p> <p>6. Use >, <, ≥, ≤, = to compare and order fractions, decimals and percents.</p> <p>7. Work flexibly with fractions, decimals, and percents to solve problems.</p> <p>8. Develop meaning for percents greater than 100 and less than 1.</p> <p>9. Estimate, compute and solve problems involving proportions.</p> <p>10. Find a number (whole) when a percent of it is known; e.g., the number 24 is 40% of _____.</p> <p>11. Find the percent (%) one number is of another; e.g., 24 is _____ % of 60.</p> <p>12. Find a percent (part) of a number; e.g., 40% of 60 is _____.</p> <p>13. Compute <u>discount</u>, <u>rate of discount</u>, and <u>sale prices</u>.</p>

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<p>perform computations.</p> <p>14. Locate fractions and mixed numbers on a number line.</p> <p>15. Recognize and explain the meaning of <u>proper</u> and <u>improper fractions</u>.</p> <p>16. Change improper fractions to mixed numbers and change mixed numbers to improper fractions.</p> <p>17. Identify and generate <u>equivalent</u> forms of fractions including reducing to <u>simplest form</u>.</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 <u>denominators</u>.</p> <p>20. Read and write decimal numbers to <u>ten-thousandths</u> 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 <u>ratio</u> 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 <u>fractions</u>, <u>decimals</u>, and <u>percents</u>.</p>	<p>vice versa.</p> <p>14. Add and subtract fractions, whole numbers and mixed numbers.</p> <p>15. Explain the meaning of <u>reciprocals</u>, and write reciprocals of whole numbers, fractions and mixed numbers.</p> <p>16. Multiply and divide fractions, whole numbers and mixed numbers.</p> <p>17. Locate and label fractions and decimals on a number line.</p> <p>18. Demonstrate fluency in multiplying and dividing decimals by whole numbers and decimals.</p> <p>19. Estimate reasonable solutions to problems involving fractions and decimals; e.g., $\frac{7}{8} + \frac{12}{13} \approx 2$ and $4.23 \times 5.8 \approx 25$</p> <p>20. Use models and pictures to relate concepts of <u>ratio</u> and <u>proportion</u>.</p> <p>21. Use ratios and proportions to represent quantitative relationships and to solve problems.</p> <p>22. Convert among fractions, decimals, and percents.</p> <p>23. Use $<$, $>$, \leq, \geq, $=$ to compare and order fractions, decimals, and percents,</p> <p>24. Find a given percent of a number and solve related problems.</p> <p>25. Represent and compare <u>positive</u> and <u>negative</u> numbers on a number line.</p> <p>26. Use simple expressions involving integers to represent and solve problems; e.g., if a running back loses 15 yards on the first carry but gains 8 yards on the second carry, what is the net gain/loss? $-15 + 8 = -7$</p>	<p>14. Find the <u>total cost</u> of an item or service including sales tax and/or tip.</p> <p>15. Compute total cost of an item bought on an <u>installment plan</u>.</p> <p>16. Compute percent increase and percent decrease.</p> <p>17. Compute <u>commission</u>, <u>sales</u>, and <u>rate of commission</u>.</p> <p>18. Complete a household <u>budget</u>, write checks and deposits, and balance a checkbook.</p> <p>19. Describe the difference between <u>rational</u> and <u>irrational numbers</u>.</p> <p>20. Use $>$, $<$, and $=$ to compare <u>integers</u>.</p> <p>21. Explain the meaning and effect of adding, subtracting, multiplying and dividing integers; e.g., how adding two integers can result in a lesser value.</p> <p>22. Simplify <u>numerical expressions</u> involving integers and use integers to solve real-life problems.</p> <p>23. Use the <u>order of operations</u> and <u>properties</u> to simplify numerical expressions involving integers, fractions and decimals.</p> <p>24. Define and use the symbol for <u>absolute value</u>.</p> <p>25. Recognize <u>perfect square numbers</u> and their <u>roots</u> up to 400 (20×20).</p> <p>26. Approximate the square root of non-perfect square numbers; e.g., the square root of 130 is between 11 and 12.</p> <p>27. Write square roots in simplest form; e.g., $\sqrt{225} = 15$, $\sqrt{27} = \sqrt{9 \times 3} = 3\sqrt{3}$</p> <p>28. Estimate, compute and solve problems involving</p>

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		<u>proportions, scaling, ratios, absolute value, square roots and exponents.</u>

Measurement Standard

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

Grade 5	Grade 6	Grade 7
<p>1. Identify <u>customary</u> units of length, capacity and weight.</p> <p>2. Use a ruler to measure objects and draw line segment to the nearest inch, $\frac{1}{2}$ in., $\frac{1}{4}$ in., $\frac{1}{8}$ in., $\frac{1}{16}$ in.</p> <p>3. Identify <u>metric</u> units of length, capacity and weight.</p> <p>4. Identify the six <u>metric prefixes</u> and explain their meanings; create a <u>metric chart</u> 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 \times and \div.</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 <u>linear units</u>, <u>square units</u> and <u>cubic units</u>.</p> <p>10. Demonstrate that two rectangles can have different perimeters with the same area, or different areas with the perimeter.</p>	<p>1. Identify, use, and perform operations with both <u>metric</u> and <u>customary units</u> of measure.</p> <p>2. Use a ruler to measure objects and draw line segments to the nearest $\frac{1}{16}$ in.</p> <p>3. 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 using multiplication and division; e.g., gallons to cups, milliliters to liters.</p> <p>4. Develop and use <u>formulas</u> for calculating the <u>perimeter</u> and <u>area</u> of squares, rectangles, and triangles, and parallelograms.</p> <p>5. Explain the difference between perimeter and area of two-dimensional shapes, and identify the appropriate units for measuring them.</p> <p>6. Demonstrate that two shapes may have the same perimeter with different areas or may have the same area with different perimeters.</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. Describe what happens to the perimeter and area of a two-dimensional shape when the measurements of the shape are changed; e.g. length of sides are doubled, tripled or halved.</p> <p>9. Explain the difference between <u>surface area</u> and <u>volume</u> of three-dimensional shapes, and identify the appropriate units to use for measuring them.</p>	<p>1. Identify, use, and perform operations with both <u>metric</u> and <u>customary</u> units of measure.</p> <p>2. Understand relationships among units and convert from one to another within same system to include <u>linear</u> measurement, <u>area</u> and <u>volume</u>; e.g., feet to yards, square feet to square yards, cubic feet to cubic yards.</p> <p>3. Compare <u>Fahrenheit</u> temperature to <u>Celsius</u> temperature and know basic conversions.</p> <p>4. Use appropriate levels of precision when estimating and calculating with measurements.</p> <p>5. Develop and use formulas to determine area of triangles, parallelograms, and trapezoids.</p> <p>6. Use formulas for determining the circumference and area of circles and to determine the area of <u>sectors</u>; e.g., $\frac{1}{2}$ circle, $\frac{1}{3}$ circle.</p> <p>7. Develop and use formulas to find the <u>surface area</u> and <u>volume</u> of prisms, cylinders, and pyramids.</p> <p>8. Develop strategies to find the area of <u>composite shapes</u> using the areas of squares, rectangles, triangles, parallelograms, circles, and <u>sectors</u>.</p> <p>9. Explain the difference between surface area and volume and demonstrate that two objects may have the same surface area, but different volumes or vice versa.</p> <p>10. Describe what happens to the surface area and volume of a three-dimensional figure when the measurements are changed; e.g., length of sides are doubled or halved.</p>

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<p>11. Develop an understanding that the <u>circumference</u> of a circle is about three times the length of its <u>diameter</u>.</p> <p>12. Calculate <u>elapsed time</u> in hours and minutes between two given times.</p> <p>13. Explore measuring and drawing angles using a <u>protractor</u>.</p>	<p>10. Develop and use formulas to calculate the surface area and volume of cubes and rectangular prisms using <u>geometric model</u>, <u>geometric nets</u> and common materials.</p> <p>11. Understand the concept and know the value of pi; e.g., ratio of <u>circumference</u> to <u>diameter</u> equals pi (3.14...)</p> <p>12. Develop and use formulas for determining the circumference and area of circles and to determine the area of sectors; e.g., $\frac{1}{2}$ circle, $\frac{1}{3}$ circle.</p> <p>13. Estimate lengths using string or links, areas using tiles or grid and volumes using cubes.</p> <p>14. Explore <u>scale drawings</u> and maps; e.g., learn how scale drawings represent larger or smaller objects.</p>	<p>11. Select appropriate units for measuring derived measurements; e.g., miles per hour, revolutions per minute.</p> <p>12. Use proportions to make and read <u>scale drawings</u> and models.</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 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
<p>1. Identify and define <u>parts of a circle</u>, and determine the relationship to each other; <u>center, radius, diameter, chord, circumference</u>.</p> <p>2. Draw circles using a <u>compass</u> given a radius or diameter.</p> <p>3. Identify and draw <u>lines, line segments, rays, angles, skew lines, parallel lines</u> and <u>perpendicular lines</u>.</p> <p>4. Label <u>parts of an angle</u>; <u>vertex, rays, interior and exterior</u>.</p> <p>5. Explore measuring and drawing angles using a <u>protractor</u>.</p> <p>6. Identify angles as <u>right, acute, obtuse, or straight</u>.</p> <p>7. Identify and define triangles based on angle measures (<u>acute, right, obtuse</u>), and side lengths (<u>isosceles, equilateral, scalene</u>).</p> <p>8. Name a given angle using the single letter form and the three letter form; e.g. $\angle B$ or $\angle ABC$.</p> <p>9. Identify <u>polygons</u> with <u>up to 8 sides</u>.</p> <p>10. Predict and describe the results of <u>slides, flips</u> and <u>turns</u> of two-dimensional shapes.</p> <p>11. Identify and create shapes that show <u>symmetry</u>; e.g., use pattern blocks, geoboards, graph paper, dot paper.</p> <p>12. Identify and create shapes that are <u>similar</u>, and shapes that are <u>congruent</u>; e.g., use tangrams, pattern blocks, geoboards, graph paper, dot paper.</p>	<p>1. Identify and analyze characteristics and properties of <u>polygons</u> with <u>up to 10 sides</u>.</p> <p>2. Identify and define triangles based on angle measures (<u>acute, right, obtuse</u>), and side lengths (<u>isosceles, equilateral, scalene</u>) and classify using multiple criteria; e.g., right scalene triangle.</p> <p>3. Measure and draw angles using a <u>protractor</u>.</p> <p>4. Given two angle measures of a triangle, find the measure of the third angle.</p> <p>5. Apply <u>transformations</u> and use <u>symmetry</u> to analyze mathematical situations; e.g., define, locate, and draw images of figures by <u>translation, reflection, and rotation</u>.</p> <p>6. Draw circles with a <u>compass</u> when given a <u>radius</u> or <u>diameter</u>.</p> <p>7. Draw various 2 and 3 dimensional figures given specified dimensions.</p> <p>8. Draw <u>similar figures</u> that model <u>proportional relationships</u>; e.g., model similar figures with a 1 to 2 relationship by sketching two of the same figure, one with corresponding sides twice the length of the other.</p> <p>9. Predict what three-dimensional object will result from folding a <u>two-dimensional net</u>, and confirm the prediction by folding the net.</p> <p>10. Find the distance between points along <u>horizontal</u> and <u>vertical lines</u> of a <u>coordinate system</u>.</p>	<p>1. Determine when one set of figures is a <u>subset</u> of another; e.g., all squares are rectangles.</p> <p>2. Develop a set of properties that eliminate all but the desired figure; e.g., only squares are quadrilaterals with all sides congruent and all angles congruent.</p> <p>3. Recognize and define <u>complementary</u> and <u>supplementary angles</u>.</p> <p>4. Construct congruent line segments and angles using a <u>compass</u> and a <u>straight edge</u>.</p> <p>5. <u>Bisect</u> line segments and angles using a <u>compass</u> and <u>straight edge</u>.</p> <p>6. Build 3D models of <u>prisms, cylinders, pyramids</u>, investigate their properties and identify their <u>nets</u>.</p> <p>7. Draw representations of three-dimensional geometric objects from different views.</p> <p>8. Apply <u>theorems</u> about the sum of interior angles of <u>regular polygons</u>; e.g., determine the sum of interior angles of a regular pentagon.</p> <p>9. Determine the measure of each interior angle of a regular polygon.</p> <p>10. Use <u>proportional reasoning</u> to describe and express relationships between parts and attributes of <u>similar</u> and <u>congruent figures</u>.</p> <p>11. Determine and use <u>scale factors</u> for similar figures to solve problems using proportional reasoning.</p> <p>12. Perform <u>translations, reflections, rotations</u> and <u>dilations</u> of two-dimensional figures using a variety of</p>

Grade 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
<p>13. Use physical models to determine the sum of <u>interior angles</u> 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 <u>ordered pairs</u> on a <u>coordinate plane</u>, using <u>quadrant I</u> and <u>quadrant II</u>.</p>	<p>11. Extend understanding of a coordinate system to include points when x and y values may be negative numbers. Specify locations and plot <u>ordered pairs</u> on a <u>coordinate plane</u>, using all <u>four quadrants</u>.</p>	<p>methods; e.g., paper folding, tracing, graph paper.</p> <p>13. Explore the meaning of and use the <u>Pythagorean Theorem</u> to find the missing side length of a right triangle given the other two sides.</p> <p>14. Apply properties of <u>congruent or similar triangles</u> to solve problems involving missing side lengths and angle measures.</p>

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 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
<ol style="list-style-type: none"> 1. Describe, extend and determine a general rule for <u>arithmetic</u> and <u>geometric patterns</u>. 2. Use calculators or computers to develop patterns and generalize them using tables and graphs. 3. Use rules to describe patterns, <u>functions</u> and other <u>mathematical relationships</u>. 4. Use variables as unknown quantities in general rules when describing patterns and other relationships. 5. Write simple <u>expressions</u> and <u>equations</u> using variables to represent problem situations. 6. Find the solutions of open sentences including equalities and inequalities. 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, 8. Use representations such as tables, graphs and equations to model situations and to solve problems, especially those that involve <u>linear relationships</u>. 	<ol style="list-style-type: none"> 1. Represent and analyze patterns, rules and functions using physical materials, tables and graphs. 2. Use words and symbols to describe arithmetic and geometric patterns and be able to find the next <u>term</u> of a pattern. 3. Identify, formulate, and graph functions with graph paper, a computer, or a graphing calculator. 4. Produce and interpret graphs that represent the relationship between two variables. 5. Identify and describe situations with <u>constant</u> or <u>varying rates of change</u>, and compare them. 6. Use technology to analyze change; e.g., use computer applications or graphing calculators to display and interpret <u>rate of change</u>. 7. Evaluate simple <u>expressions</u> by replacing variables with given values, and use formulas in problem-solving situations. 8. Recognize and generate equivalent forms of algebraic expressions, and explain how the <u>commutative</u>, <u>associative</u> and <u>distributive properties</u> can be used to generate equivalent forms; e.g., perimeter as $2(l + w)$ or $2l + 2w$. 9. Solve simple <u>linear equations</u> and <u>inequalities</u> using physical models, paper and pencil, tables and graphs. 	<ol style="list-style-type: none"> 1. Represent and analyze patterns, rules and functions with words, tables, graphs, and simple variable expressions 2. Use words and symbols to describe arithmetic and geometric patterns and be able to find the next term of a pattern. 3. Recognize and explain when numerical patterns are <u>linear</u> or <u>nonlinear</u> progressions; e.g., 1,3,5,7... is linear and 1, 3, 4, 8, 16... is nonlinear. 4. Identify, formulate, and graph functions with graph paper, a computer or a graphing calculator. 5. Express numbers and <u>variable expressions</u> using exponents. 6. Recognize a variety of uses for variables; e.g. placeholder for an unknown quantity in an equation, generalization for a pattern, formula. 7. Recognize and combine like <u>algebraic terms</u>. 8. Justify that two forms of an algebraic expression are equivalent, and recognize when an expression is simplified; e.g., $4m = m + m + m + m$ or $a \times 5 + 4 = 5a + 4$ 9. <u>Evaluate expressions</u> by replacing variables with given values, and use formulas in problem-solving situations. 10. Translate word phrases into <u>algebraic expressions</u>. 11. Use order of operations with regard to <u>algebraic logic</u>.

Grade 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
		<p>12. Create visual representations of equation-solving processes that model the use of <u>inverse operations</u>.</p> <p>13. Solve <u>one-step linear equations and inequalities</u> involving +, -, x and ÷.</p> <p>14. Graph linear equations and inequalities on a number line or a coordinate plane.</p> <p>15. Use computers or graphing calculators to analyze change; e.g., distance-time 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.

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<p>1. Design investigations to address a question and consider how data collection methods affect the nature of the data set.</p> <p>2. Select and use a graph that is appropriate for the type of data to be displayed; e.g. <u>numerical vs. categorical data</u>, <u>discrete vs. continuous data</u>).</p> <p>3. Read, interpret and represent data using <u>frequency tables</u>, <u>bar graphs</u>, <u>line graphs</u>, <u>line plots</u>, and <u>circle graphs</u>.</p> <p>4. Read and interpret increasingly complex displays of data, such as <u>double bar graphs</u>.</p> <p>5. Identify and use <u>measures of central tendency</u>, including <u>mean</u>, <u>median</u>, <u>mode</u> and <u>range</u>, to evaluate and analyze data.</p> <p>6. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>; e.g., number of arrangements for 3 or 4 items; number of possible sandwiches combinations from 4 meats, 2 cheeses, 3 bread choices.</p> <p>7. Describe the <u>probability</u> of an event using <u>ratios</u> in all three forms; e.g., $\frac{1}{2}$, 1 to 2, 1:2.</p> <p>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.</p> <p>9. Compare the <u>theoretical results</u> with the <u>experimental results</u> of a simple experiment; e.g., what should happen (theoretical/expected results) compared to what actually did happen (experimental/actual</p>	<p>1. Read, interpret and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate graphs</u>, <u>tables</u>, and <u>histograms</u>.</p> <p>2. Select, create and use graphical representations that are appropriate for the type of data collected.</p> <p>3. Compare orally and in writing representations of the same data in different types of graphs, such as a bar graph and circle graph.</p> <p>4. Give an oral and written analysis of a set of data by using and comparing <u>measures of central tendency</u> (<u>mean</u>, <u>median</u> and <u>mode</u>) and <u>measures of spread</u> (<u>range</u>).</p> <p>5. Describe the <u>frequency distribution</u> of a set of data, as shown in a histogram or frequency table, by general appearance or shape; e.g., number of <u>modes</u>, <u>middle of data</u>, and <u>level of symmetry</u>, <u>outliers</u>.</p> <p>6. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>7. Design an experiment to test a <u>theoretical probability</u> and explain how the results may vary.</p> <p>8. Use conjectures to formulate new questions, plan new studies, and detect misuses of <u>statistical</u> or <u>numerical information</u>.</p> <p>9. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>.</p> <p>10. Develop an understanding of the difference between the between <u>single events</u> and <u>compound</u></p>	<p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, and <u>stem-and-leaf plots</u>.</p> <p>3. Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.</p> <p>4. Find the <u>mean</u>, <u>median</u>, <u>mode</u>, and <u>range</u> and determine which <u>measure of central tendency</u> is most appropriate.</p> <p>5. Analyze a set of data by using and comparing measures of central tendency (mean, median and mode) and measures of spread (<u>range</u>, <u>quartile</u>, <u>interquartile range</u>), and describe how the inclusion or exclusion of <u>outliers</u> affects those measures.</p> <p>6. Compare data from two or more samples to determine how sample selection can influence results.</p> <p>7. Identify misuses of statistical data in articles, advertisements, and other media.</p> <p>8. Collect data to design a statistical experiment to study a problem.</p> <p>9. Construct convincing arguments based on analysis of data and interpretation of graphs.</p> <p>10. Explain the difference between <u>single events</u> and <u>compound events</u> and find the probability of single events or compound events occurring.</p>

Grade 5 Indicators	Grade 6 Indicators	Grade 7 Indicators
<p>results).</p> <p>10. Make predictions, in oral and written form, based on experimental and <u>theoretical probabilities</u>.</p>	<p><u>events</u>.</p>	<p>11. Make predictions, test the predictions and compare the <u>actual results</u> to the <u>predicted results</u>.</p> <p>12. Identify <u>permutations</u> and <u>combinations</u> and the relationships between them.</p> <p>13. Perform calculations and simplify <u>factorials</u> expressions; e.g., $4! = 4 \times 3 \times 2 \times 1 = 24$.</p> <p>14. Explain and define the <u>fundamental counting principle</u>.</p> <p>15. Determine the number of possible permutations and/or combinations for a situation using the fundamental counting principle.</p>