

WASHINGTON WEST SUPERVISORY UNION

MATH CURRICULUM

Washington West Supervisory Union
Math Standards and Assessment

EXPRESSION

Notation and Representation

1.17 Students interpret and communicate using mathematical, scientific, and technological notation and representation.
This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Express ideas in a variety of ways (e.g. words, numbers, symbols, pictures, charts, tables, diagrams, models).</p> <p>B. Use appropriate scientific, technological, and mathematical vocabulary and representations, based upon prior conceptual work.</p> <p>C. Use physical models to confirm and communicate relationships and concepts.</p> <p>D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.</p>	<p>A. Express ideas in a variety of ways (e.g. words, numbers, symbols, pictures, charts, tables, diagrams, models).</p> <p>B. Use appropriate scientific, technological, and mathematical vocabulary and representations based upon prior conceptual work.</p> <p>C. Use physical models to confirm and communicate relationships and concepts.</p> <p>D. Explain scientific, mathematical, or technological concept; explain a procedure they have followed.</p>	<p>A. Express ideas in a variety of ways (e.g. words, numbers, symbols, pictures, charts, tables, diagrams, models).</p> <p>B. Use appropriate scientific, technological, and mathematical vocabulary and representations based upon prior conceptual work.</p> <p>C. Use physical models to confirm and communicate relationships and concepts.</p> <p>D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.</p>	<p>A. Express ideas in a variety of ways (e.g. words, numbers, symbols, pictures, charts, tables, diagrams, models).</p> <p>B. Use appropriate scientific, technological, and mathematical vocabulary and representations based upon prior conceptual work.</p> <p>C. Use physical models to confirm and communicate relationships and concepts.</p> <p>D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.</p>	<p>A. Express ideas in a variety of ways (e.g. words, numbers, symbols, pictures, charts, tables, diagrams, models).</p> <p>B. Use appropriate scientific, technological, and mathematical vocabulary and representations, based upon prior conceptual work.</p> <p>C. Use physical models to confirm and communicate relationships and concepts.</p> <p>D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.</p>

Washington West Supervisory Union
Math Standards and Assessment

QUESTIONING/PROBLEM SOLVING

Types of Questions

2.1 Students ask a variety of questions. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Ask questions about how things get done and how they work.</p> <p>B. Ask questions to determine why events occur.</p> <p>C. Ask questions that compare and contrast, to determine similarities and differences.</p> <p>D. Ask questions that help make connections within and across fields of knowledge and/or between concepts.</p> <p>E. Ask reflective questions that connect known ideas to personal experience.</p>	<p>A. Ask questions about how things get done and how they work.</p> <p>B. Ask questions to determine why events occur.</p> <p>C. Ask questions that compare and contrast, to determine similarities and differences.</p> <p>D. Ask questions that help make connections within and across fields of knowledge and/or between concepts.</p> <p>E. Ask reflective questions that connect known ideas to personal experience.</p>	<p>A. Ask questions about how things get done and how they work.</p> <p>B. Ask questions to determine why events occur.</p> <p>C. Ask questions that compare and contrast, to determine similarities and differences.</p> <p>D. Ask questions that help make connections within and across fields of knowledge and/or between concepts.</p> <p>E. Ask reflective questions that connect known ideas to personal experience.</p>	<p>A. Ask questions about how things get done and how they work.</p> <p>B. Ask questions to determine why events occur.</p> <p>C. Ask questions that compare and contrast, to determine similarities and differences.</p> <p>D. Ask questions that help make connections within and across fields of knowledge and/or between concepts.</p> <p>E. Ask reflective questions that connect known ideas to personal experience.</p>	<p>A. Ask questions about how things get done and how they work.</p> <p>B. Ask questions to determine why events occur.</p> <p>C. Ask questions that compare and contrast, to determine similarities and differences.</p> <p>D. Ask questions that help make connections within and across fields of knowledge and/or between concepts.</p> <p>E. Ask reflective questions that connect known ideas to personal experience.</p>

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PROBLEM SOLVING

Problem Solving Process

2.2 Students use reasoning strategies, knowledge, and common sense to solve complex problems related to all fields of knowledge. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Use information from reliable sources, including knowledge, observation, and trying things out.</p> <p>B. Use a variety of approaches to solve problems.</p> <p>C. Justify and verify answers and solutions.</p> <p>D. Identify patterns and connections.</p> <p>E. Transfer strategies from one situation to others.</p> <p>F. Implement an approach that addresses the problem being posed.</p> <p>G. Use manipulative sketches, webs, etc. to model problems.</p>	<p>A. Use information from reliable sources, including knowledge, observation, and trying things out.</p> <p>B. Use a variety of approaches to solve problems.</p> <p>C. Justify and verify answers and solutions.</p> <p>D. Identify patterns and connections.</p> <p>E. Transfer strategies from one situation to others.</p> <p>F. Implement an approach that addresses the problem being posed.</p> <p>G. Use manipulative sketches, webs, etc. to model problems.</p>	<p>A. Use information from reliable sources, including knowledge, observation, and trying things out.</p> <p>B. Use a variety of approaches to solve problems.</p> <p>C. Justify and verify answers and solutions.</p> <p>D. Identify patterns and connections.</p> <p>E. Transfer strategies from one situation to others.</p> <p>F. Implement an approach that addresses the problem being posed.</p> <p>G. Use manipulative sketches, webs, etc. to model problems.</p>	<p>A. Use information from reliable sources, including knowledge, observation, and trying things out.</p> <p>B. Use a variety of approaches to solve problems.</p> <p>C. Justify and verify answers and solutions.</p> <p>D. Identify patterns and connections.</p> <p>E. Transfer strategies from one situation to others.</p> <p>F. Implement an approach that addresses the problem being posed.</p> <p>G. Use manipulative sketches, webs, etc. to model problems.</p>	<p>A. Use information from reliable sources, including knowledge, observation, and trying things out.</p> <p>B. Use a variety of approaches to solve problems.</p> <p>C. Justify and verify answers and solutions.</p> <p>D. Identify patterns and connections.</p> <p>E. Transfer strategies from one situation to others.</p> <p>F. Implement an approach that addresses the problem being posed.</p> <p>G. Use manipulative sketches, webs, etc. to model problems.</p>

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PROBLEM SOLVING

Types of Problems

2.3 Students solve problems of increasing complexity. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Solve problems that are brief, clear, and concise.</p> <p>B. Solve problems in which the information needed for a solution can be organized within a simple system.</p>	<p>A. Solve problems that are brief, clear, and concise.</p> <p>B. Solve problems in which the information needed for a solution can be organized within a simple system.</p>	<p>A. Solve problems that are brief, clear, and concise.</p> <p>B. Solve problems in which the information needed for a solution can be organized within a simple system.</p>	<p>A. Solve problems that are brief, clear, and concise.</p> <p>B. Solve problems in which the information needed for a solution can be organized within a simple system.</p>	<p>A. Solve problems that are brief, clear, and concise.</p> <p>B. Solve problems in which the information needed for a solution can be organized within a simple system.</p>

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PROBLEM SOLVING

Mathematics Dimensions

2.5 Students produce solutions to mathematical problems requiring decisions about approach and presentation, so that final drafts are appropriate in terms of these dimensions:

PreK-Kindergarten	First	Second	Third	Fourth
<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies & skills used to solve the problem.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations and Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communication the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies & skills used to solve the problem.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations and Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communication the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies & skills used to solve the problem.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations and Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communication the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies & skills used to solve the problem.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations and Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communication the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies & skills used to solve the problem.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations and Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communication the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p>

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PROBLEM SOLVING

Mathematics Dimensions

- 2.5 Students produce solutions to mathematical problems requiring decisions about approach and presentation, so that final drafts are appropriate in terms of these dimensions:

PreK-Kindergarten	First	Second	Third	Fourth
<p>Presentation: Presentation of the solution.</p>	<p>Presentation: Presentation of the solution.</p>	<p>Presentation: Presentation of the solution.</p>	<p>Presentation: Presentation of the solution.</p>	<p>Presentation: Presentation of the solution.</p>

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INQUIRY, EXPERIMENTATION, AND THEORY

Theory

7.3 Students understand the nature of mathematical, scientific, and technological theory. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Show understanding that concepts form the foundation for theories.</p> <p>B. Look for evidence that explains why things happen.</p> <p>C. Modify explanations when new observations are made or new knowledge is gained.</p>	<p>A. Show understanding that concepts form the foundation for theories.</p> <p>B. Look for evidence that explains why things happen.</p> <p>C. Modify explanations when new observations are made or new knowledge is gained.</p>	<p>A. Show understanding that concepts form the foundation for theories.</p> <p>B. Look for evidence that explains why things happen.</p> <p>C. Modify explanations when new observations are made or new knowledge is gained.</p>	<p>A. Show understanding that concepts form the foundation for theories.</p> <p>B. Look for evidence that explains why things happen.</p> <p>C. Modify explanations when new observations are made or new knowledge is gained.</p>	<p>A. Show understanding that concepts form the foundation for theories.</p> <p>B. Look for evidence that explains why things happen.</p> <p>C. Modify explanations when new observations are made or new knowledge is gained.</p>

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INQUIRY, EXPERIMENTATION, AND THEORY

History of Science, Mathematics, and Technology

7.4 Students understand the history of mathematics, science, and technology. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.</p>	<p>A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.</p>	<p>A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.</p>	<p>A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.</p>	<p>A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.</p>

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INQUIRY, EXPERIMENTATION, AND THEORY

Roles and Responsibilities

- 7.5 Students analyze the roles and responsibilities of scientists, mathematicians, and technologists in social, economic, cultural, and political systems. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Explain how discoveries or inventions can help or hurt people (e.g. the environmental impact of energy consumption).</p>	<p>A. Explain how discoveries or inventions can help or hurt people (e.g. the environmental impact of energy consumption).</p>	<p>A. Explain how discoveries or inventions can help or hurt people (e.g. the environmental impact of energy consumption).</p>	<p>A. Explain how discoveries or inventions can help or hurt people (e.g. the environmental impact of energy consumption).</p>	<p>A. Explain how discoveries or inventions can help or hurt people (e.g. the environmental impact of energy consumption).</p>

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Add, subtract, multiply and divide whole numbers, with and without calculators</p> <ul style="list-style-type: none"> . Recognize numerals 0-30. . Rote count to 30 . Order and sequence sets to 9 (1-1) . State which numeral comes before and after a given numeral up to 9, and which numerals are missing from an incomplete number line up to 9 (PS) . Act out addition/subtraction stories using concrete objects (TO) . Add concrete objects to a sum s/he is conserving quantity for (Tst) . Subtract concrete objects from a group whose sum is one more than the number s/he is conserving for (Tst) . Create multiple sets of equal amounts (Tst) . Divide sets into equal parts (Tst) 	<p>A. Add, subtract, multiply and divide whole numbers, with & without calculators.</p> <ul style="list-style-type: none"> . Recognize numerals 0-100 . Write numerals 0-99 . Rote count to 100 . Count by ones forward and backward to 30 starting from any number . Count on from any number 0-100 . Skip count by 2's to 20 . Skip count by 5's and 10's to 100 . Order the numerals 0-30 . Divide sets into equal parts . Given a set of objects 0-9, show + - x / of that set . Can add three single digit numbers . Have immediate recall of all addition and subtraction facts 0-9 	<p>A. Add, subtract, multiply, and divide whole numbers with and without calculators.</p> <ul style="list-style-type: none"> . Recognize and write numerals 0-1000 . Count by ones forward and backward from any number to 100 . Count on from any number 0-1000 . Skip count by 2's, 5's, and 10's to 100 . Order the numerals 0-100 . Recognize without counting groups of 2-10 . Place a given amount of objects in a set . Divide sets into equal parts . Add and subtract 2-digit numbers with or without regrouping . Work with multiplication and division facts for 1, 2, 5, and 10 . Have immediate recall of all addition and subtraction facts 0-20 	<p>A. Add, subtract, multiply, and divide whole numbers, with and without calculators.</p> <ul style="list-style-type: none"> . Recognize and write to the 100,000 . Add 3-digit numbers with regrouping . Subtract 3-digit numbers with regrouping . Multiply any 2-digit by any 1-digit number . Work with multiplication facts for 3, 4, 5, 6, 7, 8, 9 tables . Work with division facts for 3, 4, 5, 6, 7, 8, 9 tables . Have immediate recall of all addition and subtraction number facts 0-20 . Have immediate recall of multiplication and division facts (0, 1, 2, 3, 4, 5, 10) . Communicate relationship between + and - . Use manipulatives to show multiplication as repeated addition 	<p>A. Add, subtract, multiply, and divide whole numbers, with and without calculators.</p> <ul style="list-style-type: none"> . Demonstrate understanding of fact families . Add 4-digit numbers with regrouping (T) . Subtract 4-digit numbers with regrouping (T) . Multiply a 2- or 3-digit number by a 1-digit number with regrouping . Multiply a 2-digit number by a 2-digit number . Multiply multiples of 10 . Divide 2-digit numbers by a 1-digit divisor . Divide 3- and 4-digit numbers by 10 . Have immediate recall of multiplication and division facts (6, 7, 8, 9) . Use calculator to solve equations

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MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit & larger multipliers and divisors, rates and the relationship among fractions, decimals, and percents</p> <ul style="list-style-type: none">. Appropriately chart a negative temperature during winter month (TO). Play "Even Steven" to understand if a set can be divided between two people (PS) (i.e. Here are 5 apples. Can you and I share them "even-Steven?"). Show understanding of ordinal numbers first through fifth, presented orally, by placing self in given position (TO)	<ul style="list-style-type: none">. Find missing addends and subtrahends of the number facts 0-9. Create multiple sets of equal amounts. Divide sets into equal parts <p>B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), three-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.</p> <ul style="list-style-type: none">. Identify the ordinal positions 1st-10th. Determine whether a number is odd or even 0-30	<ul style="list-style-type: none">. Find missing addends and subtrahends of the number facts 0-20 <p>B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.</p> <ul style="list-style-type: none">. Identify ordinal positions first through thirty-first. Determine whether a number is odd or even to 100	<ul style="list-style-type: none">. Use manipulatives to show division as repeated subtraction and partition. Apply learned strategies to mentally compute sums and differences. Choose appropriate operation when using the calculator. Recognize the reasonableness of results. Write +, -, x, number sentences using a variety of notations <p>B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents</p> <ul style="list-style-type: none">. Demonstrate understanding that numbers continue to the left of zero on the number line	<p>B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals & percents.</p> <ul style="list-style-type: none">. Identify square numbers as the product of two equal numbers. Can make arrays depicting "square" numbers (e.g. 4x4, 6x6). Identify prime numbers as numbers with the factors of 1 and itself (exactly 2 factors). Identify composite numbers. Explore percents in relation to the decimals they are familiar with

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MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>C. Describe and compare quantities by using simple fractions, decimals, and whole numbers up to 1,000,000.</p> <ul style="list-style-type: none"> . Record and label groups of objects up to 10 (Tst) . Compare unequal sets of objects by using the words more than, less than (1-1) . Show understanding of fractional parts (your 1/2, my 1/2) . Count by pennies <p>D. Estimate approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <ul style="list-style-type: none"> . Estimate number of items in a set . Estimate length of objects in non-standard units 	<p>C. Describe and compare quantities by using simple fractions and decimals, and whole numbers up to 1,000,000.</p> <ul style="list-style-type: none"> . Create and label sets of 0-9 . Recognize fractional parts 1/2, 1/3, 1/4 . Compare value of penny, nickel, & dime <p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <ul style="list-style-type: none"> . Estimate number of items in a set . Estimate length of objects in non-standard units 	<p>C. Describe and compare quantities by using simple fractions and decimals, and whole numbers up to 1,000,000.</p> <ul style="list-style-type: none"> . Create sets of up to 30 objects . Show 1/2, 1/3, 1/4 of an area . Match fractional parts to a written symbol . Count money and make change using pennies, nickels, dimes and quarters <p>D. Estimate, approximate, round off and/or use exact numbers, as appropriate and necessary in calculation.</p> <ul style="list-style-type: none"> . Round numbers off to the nearest ten and hundred . Estimate the sum or difference of math facts . Estimate length, width and height of an object in feet and inches 	<ul style="list-style-type: none"> . Relate decimals to fractions -- $1/10 = 0.1$. Compare decimals using $<$, $>$, $=$, . Order decimals . Recognize, identify to 10ths using manipulatives <p>C. Describe and compare quantities by using simple fractions and decimals, and whole numbers up to 1,000,000.</p> <ul style="list-style-type: none"> . Order numerals from smallest to largest (and vice versa) up to 10,000 . Compare numerals 0-10,000 using $<$, $>$, $=$, . Draw a regular shape and show a fractional part (1/2, 1/3, 1/4, 1/6, 1/8, 1/10, 1/12) . Compare relative size of fractions being discussed . Compare decimals using $<$, $>$, $=$, (to tenths) . Order decimals (to tenths) . Make purchase and calculate change to \$.00 	<ul style="list-style-type: none"> . Explore the use of 3-digit and larger multipliers and divisors with or without a calculator <p>C. Describe and compare quantities by using simple fractions and decimals, and whole numbers up to 1,000,000.</p> <ul style="list-style-type: none"> . Compare whole numbers up to 1,000,000 using $<$, $>$, $=$, . Compare fractions by using $<$, $>$, $=$, . Order fractions from smallest to largest when given a set . Compare decimals by using $<$, $>$, $=$, . Order decimals from smallest to largest when given a set . Explore percents in relation to the decimals they are familiar with . Order numbers up to 7 digits

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MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>E. Use knowledge of the place value system to solve problems.</p> <ul style="list-style-type: none">. Recognize how zero added to the end of a digit changes the value	<p>E. Use knowledge of the place value system to solve problems.</p> <ul style="list-style-type: none">. Identify place value to 2 places. Group numbers according to place value 0-99. Expanded notation 0-99 using manipulatives or pictures	<ul style="list-style-type: none">. Estimate how many of an object will weigh the same as another object. Estimate amount of liquids using cups, teaspoons, tablespoons, pints, quarts, & gallons. Estimate and compare capacity of various containers. Estimate air temperature <p>E. Use knowledge of the place value system to solve problems.</p> <ul style="list-style-type: none">. Identify place value to 3 places. Group numbers according to place value. Show value of numbers in the 1's, 10's, and 100's place. Expanded notation 0-999	<ul style="list-style-type: none">. Make purchase for any price up to \$5.00 and calculate change in whole dollars through \$5.00. Recognize, give value of coins (penny --→ half-dollar). Read and write money to \$10. Give change from \$1.00. Give change from whole dollar amounts. Use correct notation for any amount, using \$0.00 to 0 <p>D. Estimate, approximate, round off, and/or use exact numbers as appropriate and necessary in calculation.</p> <ul style="list-style-type: none">. Estimate sum, difference, product, or quotient. Round numbers off to the nearest 10, 100, 1000	<p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <ul style="list-style-type: none">. Estimate sums by rounding. Estimate products and quotients <p>E. Use knowledge of the place value system to solve problems.</p> <ul style="list-style-type: none">. Add and subtract numbers with an unlike number of digits (i.e. $760 + 12560$). Add and subtract numbers presented horizontally across the page. Write numbers up to 7 digits when presented orally

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Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
			<p>E. Use knowledge of the place value system to solve problems.</p> <ul style="list-style-type: none">. Identify place value to 100,000. Expanded notation to 1,000,000	<ul style="list-style-type: none">. Understand that weight and size are not necessarily indicators of each other. Use and read correctly: scale, balance, triple beam balances. Weigh accurately to the nearest unit of measure (standard or metric). Estimate weight/mass reasonably. Chose appropriate standard units to measure length. Measure and label to the nearest unit of measure. Identify time equivalents using seconds, minutes, hours, days, weeks, months, years. Compute elapsed calendar time

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Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
				<ul style="list-style-type: none">. Compute elapsed time in hours and minutes with AM or PM. Read clocks accurately to the nearest minute (before/after the hour). Round off time to the nearest 1/2-hour <p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Measure items/line segments that are larger than the measuring tool <p>G. Extend and create geometric patterns, concrete and pictorial models.</p> <ul style="list-style-type: none">. Recognize pattern and continue pattern. Identify designs on paper as representation of concrete model (e.g. pattern block design)

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7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
				on paper can be translated to/from one created with blocks) . (Assessment piece: Walkway Problem)

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Solve problems by showing relationships between figures (e.g. congruence, including flips, slides, and rotations)</p> <ul style="list-style-type: none">. Copy pattern, block, design. Investigate same and different designs. Investigate polygons <p>B. Examine, compare, and analyze real objects and abstract figures by one-, two-, and/or three-dimensional features (e.g. angles).</p> <ul style="list-style-type: none">. Explore 3D shapes <p>C. Identify, classify, and name geometric figures by specific attributes and properties (e.g. symmetry).</p> <ul style="list-style-type: none">. Explore symmetry with figures and mirrors. Identify curved and straight lines. Identify plane figures	<p>A. Solve problems by showing relationships between figures (e.g. congruence, including flips, slides, and rotations).</p> <ul style="list-style-type: none">. Using these shapes (triangle, square, hexagon), construct congruent figures. Investigate same and different designs. Appropriately name polygons <p>B. Examine, compare, and analyze real objects and abstract figures by one-, two-, and/or three-dimensional features (e.g. angles).</p> <ul style="list-style-type: none">. Investigate straightedge use for drawing. Investigate 3D shapes - classify	<p>A. Solve problems by showing relationships between figures (e.g. congruence, including flips, slides, and rotations).</p> <ul style="list-style-type: none">. Using these shapes (rectangle, octagon, trapezoid) construct congruent figures. Create same and different designs. Appropriately name polygons <p>B. Examine, compare, and analyze real objects and abstract figures by one-, two-, and/or three-dimensional features (e.g. angles).</p> <ul style="list-style-type: none">. Identify right angles. Create shapes with straight-edge. Identify basic 3D shapes	<p>A. Solve problems by showing relationships between figures (e.g. congruence, including flips, slides, and rotations).</p> <ul style="list-style-type: none">. Using these shapes - triangles, rectangles, squares, octagons, rhombi, trapezoids, hexagons, parallelograms, construct congruent figures. Determine whether two figures are congruent. Investigate transformational geometry using slides, flips and rotations. Use vocabulary ,notation, and definitions for line segments, lines, polygons	<p>A. Solve problems by showing relationships between figures (e.g. congruence, including flips, slides, and rotations).</p> <ul style="list-style-type: none">. Describe, identify, and construct congruent figures. Describe differences between figures that are not congruent. Use vocabulary, slides, flips, rotations for solving problems. Use vocabulary, notation, and definitions for line segments, rays, lines, polygons, angles

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Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>D. Begin to use simple concepts of scale (constant ratio), using combinations of units (e.g. m.p.h.) and relationships between area, perimeter, and volume.</p> <ul style="list-style-type: none"> . Describe relationship of scale in terms of objects used in everyday play (i.e. Lego people/cars) <p>E. Select and use an appropriate unit (standard or non-standard) with which to measure, according to the properties, size, and use of the quantity to be measured.</p> <ul style="list-style-type: none"> . Explore use of scale to measure weight . Explore standard units of measure . Begin using temporal concept (before, after) . Days of week/months of year . Identify hour and minute hands of clock 	<p>C. Identify, classify, and name geometric figures by specific attributes and properties (e.g. symmetry).</p> <ul style="list-style-type: none"> . Investigate symmetry with figures and mirrors . Describe plane figures (i.e. number of sides) <p>D. Begin to use simple concepts of scale (constant ratio), using combinations of units (e.g. m.p.h.), and the relationships between area, perimeter, & volume.</p> <ul style="list-style-type: none"> . Draw pictures to represent larger things (i.e. map of bedroom) 	<p>C. Identify, classify, and name geometric figures by specific attributes and properties (e.g. symmetry).</p> <ul style="list-style-type: none"> . Identify and construct lines of symmetry in figures . Classify plane figures (i.e. number of sides) <p>D. Begin to use simple concepts of scale (constant ratio), using combinations of units (e.g. m.p.h.), and the relationships between area, perimeter, and volume.</p> <ul style="list-style-type: none"> . Make models or pictures of larger items . Find perimeter of a polygon 	<p>B. Examine, compare and analyze real objects and abstract figures by one-, two-, and/or three-dimensional features (e.g. angles).</p> <ul style="list-style-type: none"> . Identify, name, describe and create right angles . Recognize angles as 90°, less or greater than 90° . Investigate compass use . Identify basic 3D shapes and find in environment <p>C. Identify, classify, and name geometric figures by specific attributes and properties (e.g. symmetry).</p> <ul style="list-style-type: none"> . Identify, construct, define, and find lines of symmetry in figures . Classify open/closed figures 	<p>B. Examine, compare and analyze real objects and abstract figures by one-, two-, and/or three-dimensional features (e.g. angles).</p> <ul style="list-style-type: none"> . Identify, name, describe and create right angles, obtuse angles, acute angles, straight angles . Classify angles . Construct circles, line segments, and polygons with compass and straightedge . Construct geo-solids (surface, face, edge) <p>C. Identify, classify, and name geometric figures by specific attributes and properties (e.g. symmetry).</p>

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Explore measure with n sums <p>G. Extend and create geometric patterns, concrete, and pictorial models.</p> <ul style="list-style-type: none">. Explore patterns with blocks	<p>E. Select and use an appropriate unit (standard or non-standard) with which to measure, according to the properties, size, and use of the quantity to be measured.</p> <ul style="list-style-type: none">. Compare weight using n sums. Investigate standard units of measure. Recognize elapsed time in hours or days. Days of week, months of year. Tell hour of time	<p>E. Select and use an appropriate unit (standard or non-standard) with which to measure, according to the properties, size, and use of the quantity to be measured.</p> <ul style="list-style-type: none">. Compare weight using standard measures. When offered choices, choose appropriate standard unit to measure length. Recognize elapsed time in 1/2 hours or days. Can tell how many minutes are in an hour. Tell time on hour and half-hour; begin recording time <p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Measure items to nearest unit of measure. Begin to read thermometer	<p>D. Begin to use simple concepts of scale (constant ratio), using combinations of units (e.g. m.p.h.) and the relationships between area, perimeter, and volume.</p> <ul style="list-style-type: none">. Interpret scale drawings. Begin to explore area/volume with n sums <p>E. Select and use an appropriate unit (standard or non-standard) with which to measure, according to the properties, size, and use of the quantity to be measured.</p> <ul style="list-style-type: none">. Use and read correctly triple beam balances, scales. Choose appropriate standard units to measure length. Begin finding elapsed time using calendar or clock	<ul style="list-style-type: none">. Identify, describe, and draw vertical, horizontal, parallel, perpendicular, and intersecting designs. Construct symmetrical designs. Identify, describe, label, draw open/closed figures. Identify, classify, describe, label, draw convex/concave figures <p>D. Begin to use simple concepts of scale (constant ratio), using combinations of units (e.g. m.p.h.) and the relationships between area, perimeter, and volume.</p> <ul style="list-style-type: none">. Create scale drawings. Find area and perimeter of given object or drawing

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
	<p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Explore the use of a ruler for measuring (standard/metric). Understand we use a thermometer to measure temperature <p>G. Extend and create geometric patterns, concrete and pictorial models.</p> <ul style="list-style-type: none">. Copy block design	<p>G. Extend and create geometric patterns, concrete and pictorial models.</p> <ul style="list-style-type: none">. Transfer block design to paper	<ul style="list-style-type: none">. Identify time equivalents using seconds, minutes, hours, and/or days, weeks, months, years. Read clocks to nearest minute. Accurately records time <p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Measure items/line segments larger than measuring tool. Chart temperature and identify gauge of thermometer <p>G. Extend and create geometric patterns, concrete and pictorial models.</p> <ul style="list-style-type: none">. Recognize and continue pattern with blocks or drawing	<ul style="list-style-type: none">. Create polygon with given area/perimeter using graph paper (different shapes). Demonstrate conservation of liquid. Identify formula for finding area and volume <p>E. Select and use an appropriate unit (standard or non-standard) with which to measure, according to the properties, size, and use of the quantity to be measured.</p> <ul style="list-style-type: none">. Explore relationship of weight to size/shape and understand they are not necessarily related. Use and read correctly triple beam balances, scales, and balances. Choose appropriate standard units to measure length

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
				<ul style="list-style-type: none">. Compute elapsed time using calendar or clock. Identify time equivalents using seconds, minutes, hours, days, weeks, months, years. Tell time as number of minutes before or after hour. Accurately records time. Measure capacity accurately. Choose appropriate measure for amounts of liquid. Choose appropriate measure for weight

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
				<ul style="list-style-type: none">. Tell time as number of minutes before or after the hour. Record time using o'clock and colon. Distinguish between AM and PM. State date in order, including day, month, ordinal number and year <p>F. Measure as exactly as possible or round off, as appropriate, and justify the choice.</p> <ul style="list-style-type: none">. Measure items/line segments larger than measuring tool. Show understanding of the differences between Celsius and Fahrenheit. Weigh accurately to nearest unit of measure

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
				<p>G. Extend and create geometric patterns, concrete and pictorial models.</p> <ul style="list-style-type: none">. Find the pattern/rule in basic geometric drawings. Using concrete objects and pictorial models will extend geometric patterns

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MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Extend patterns by identifying a rule that generates the pattern.</p> <ul style="list-style-type: none">. Look for, recognize, reproduce, sort/categorize, identify, and construct basic repeating patterns. Continues a pattern by identifying the rule of the pattern (PS). Begin identifying numbers on a 100's chart <p>B. Show how one quantity determines another quantity in a functional relationship; begin to use simple concepts of variables, including functional and proportional relationship, by representing them graphically (e.g. x-axis=time, y-axis=distance).</p> <ul style="list-style-type: none">. Introduce functions: find the rule (grouping by physical attributes and numbers)	<p>A. Extend patterns by identifying a rule that generates the pattern.</p> <ul style="list-style-type: none">. Predict, extend and create basic repeating patterns. Insert missing elements in patterns. Show how patterns are alike or different. Recognize a growing pattern. Show odd and even patterns. Identify patterns on a 100's chart. Recognize & reproduce number sequences <p>B. Show how one quantity determines another quantity in a functional relationship; begin to use simple concepts of variables, including functional and proportional relationship, by representing them</p>	<p>A. Extend patterns by identifying a rule that generates the pattern.</p> <ul style="list-style-type: none">. Describe and extend repeating and growing patterns. Insert a missing element into a pattern. Describe odd and even patterns. Identify and describe patterns on a 100's chart. Identify and construct number sequences. Find and use addition and subtraction fact table patterns <p>B. Show how one quantity determines another quantity in a functional relationship; begin to use simple concepts of variables, including functional and proportional relationship, by representing them graphically (e.g. x-axis=time, y-axis=distance).</p>	<p>A. Extend patterns by identifying a rule that generates the pattern.</p> <ul style="list-style-type: none">. Recognize, extend, describe, and create a wide variety of patterns. Find and use patterns to solve problems. Reproduce arithmetic sequences using a calculator. Predict and continue number sequences <p>B. Show how one quantity determines another quantity in a functional relationship; begin to use simple concepts of variables, including functional and proportional relationship, by representing them graphically (e.g. x-axis=time, y-axis=distance).</p> <ul style="list-style-type: none">. Solve for missing addends ($15=7+x$). Find the missing parts: input, output, or rule	<p>A. Extend patterns by identifying a rule that generates the pattern.</p> <ul style="list-style-type: none">. Find, complete, create and extend a wide variety of patterns (including repeating, growing, numerical, and geometric patterns). Invent & use patterns to create and solve problems. Reproduce and analyze arithmetic sequences using a calculator. Recognize and use patterns in multiplication tables. Communicate about patterns using a number sentence or words <p>B. Show how one quantity determines another quantity in a functional relationship; begin to use simple concepts</p>

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MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>C. Show that an equality relationship between two quantities remains true as long as the same change is made to both quantities.</p> <ul style="list-style-type: none">. Conserves numbers 0-5 in two groups (i.e. "I took one away from this group, what do I have to do to this group so they are the same?"). Make two groups the same	<p>Graphically (e.g. x-axis=time, y-axis=distance).</p> <ul style="list-style-type: none">. Find the input and output based on a rule (e.g. Rule=+2 input 6 output 8) <p>C. Show that an equality relationship between two quantities remains true as long as the same change is made to both quantities.</p> <ul style="list-style-type: none">. Recognize how to make unequal sets equal (take away 1 from one side, so take away 1 from the other side)	<ul style="list-style-type: none">. Find the next number in a sequence based on a rule. Find the missing parts: input, output, or rule <p>C. Show that an equality relationship between two quantities remains true as long as the same change is made to both quantities.</p> <ul style="list-style-type: none">. Recognize, and fill in, the missing addend in an equation ($12 + 28 = \underline{\quad} + 28$)	<p>C. Show that an equality relationship between two quantities remains true as long as the same change is made to both quantities.</p> <ul style="list-style-type: none">. Create number sentences with both sides equal ($2+2=4$, therefore, $2+2+1=4+1$). Given a multiplication number sentence, use parenthesis to make it true ($(7 \times 2) + 1 = 15$)	<p>of variables, including functional and proportional relationship, by representing them graphically (e.g. x-axis=time, y-axis=distance).</p> <p>C. Show that an equality relationship between two quantities remains true as long as the same change is made to both quantities.</p> <ul style="list-style-type: none">. Use parenthesis in number sentences that involve more than one operation; determine if such a sentence is true or false

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MATHEMATICAL UNDERSTANDING

Statistical and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Collect, order, display, and analyze data in order to answer a question or test a hypothesis.</p> <ul style="list-style-type: none">. Working with adult, student will formulate question to be answered, collect data, and display data (i.e. favorite kind of cookie or bread) (PS) <p>B. Begin to use simple concepts of mean, median, and mode, along with various ways to represent data graphically.</p> <ul style="list-style-type: none">. Working with an adult, student can answer questions about data presented (C or TO)	<p>A. Collect, order, display, and analyze data in order to answer a question or test a hypothesis.</p> <ul style="list-style-type: none">. Collect, organize and display data in a chart or graph. Interpret and answer questions about a graph <p>B. Begin to use simple concepts of mean, median, and mode, along with various ways to represent data graphically.</p> <ul style="list-style-type: none">. Student answers questions about data <p>C. Gather data from an entire group or from a sample of its members, and identify the usefulness and limitations of each approach; analyze the validity of inferences about a set of data</p>	<p>A. Collect, order, display, and analyze data in order to answer a question or test a hypothesis.</p> <ul style="list-style-type: none">. Collect data. Organize, describe and compare data. Record data by means of charts, graphs, and diagrams. Construct vertical or horizontal graphs; picture and bar graphs <p>B. Begin to use simple concepts of mean, median, and mode, along with various ways to represent data graphically.</p> <ul style="list-style-type: none">. Students can answer questions about data	<p>A. Collect, order, display, and analyze data in order to answer a question or test a hypothesis.</p> <ul style="list-style-type: none">. Set up problem in which data gathering is essential to the solution. Solve problem that requires data to be gathered and analyzed. Collect information on given topics by surveying, observing, experimenting, researching. Analyze data and explain in own words <p>B. Begin to use simple concepts of mean, median, and mode, along with various ways to represent data graphically.</p> <ul style="list-style-type: none">. Construct picture and bar graphs, tables and charts including titles, labels and accurate calibration	<p>A. Collect, order, display, and analyze data in order to answer a question or test a hypothesis.</p> <ul style="list-style-type: none">. Formulate questions to collect data. Collect data. Organize data. Recognize data presented in many forms (read and interpret). Compare and describe data. Analyze data, explain in own words <p>B. Begin to use simple concepts of mean, median, and mode, along with various ways to represent data graphically.</p> <ul style="list-style-type: none">. Represent data using charts, tables, pictographs, bar graphs accurately and appropriately

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MATHEMATICAL UNDERSTANDING

Statistical and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>C. Gather data from an entire group or from a sample of its members, and identify the usefulness and limitations of each approach; analyze the validity of inferences about a set of data (i.e. figure out whether a statement is true or not).</p> <p>D. Find all possible combinations, arrangements, and/or permutation within given constraints; predict outcomes and find out why certain outcomes are more likely, less likely, or equally likely.</p> <ul style="list-style-type: none">. Explore concept of chance (i.e. coin toss) (TO). With teacher assistance, keep tally of results of chance (i.e. coin toss) (TO)	<p>(i.e. figure out whether a statement is true or not).</p> <ul style="list-style-type: none">. Collect data with teacher's help <p>D. Find all possible combinations, arrangements, and/or permutation within given constraints; predict outcomes and find out why certain outcomes are more likely, less likely, or equally likely.</p> <ul style="list-style-type: none">. Tally results of chance	<p>C. Gather data from an entire group or from a sample of its members, and identify the usefulness and limitations of each approach; analyze the validity of inferences about a set of data (i.e. figure out whether a statement is true or not).</p> <ul style="list-style-type: none">. Collect data from small group <p>D. Find all possible combinations, arrangements, and/or permutation within given constraints; predict outcomes and find out why certain outcomes are more likely, less likely, or equally likely.</p> <ul style="list-style-type: none">. Gather information based on simple chance; a tally of the results & interpret them. Predict future results	<ul style="list-style-type: none">. Find the mean or average of a set of data. Find the mode of the set of data <p>C. Gather data from an entire group or from a sample of its members, and identify the usefulness and limitations of each approach; analyze the validity of inferences about a set of data (i.e. figure out whether a statement is true or not).</p> <ul style="list-style-type: none">. Read and interpret various representations of data collected. Describe observations and conclusions about information in the representation	<ul style="list-style-type: none">. Identify mean, median, and mode when presented with data <p>C. Gather data from an entire group or from a sample of its members, and identify the usefulness and limitations of each approach; analyze the validity of inferences about a set of data (i.e. figure out whether a statement is true or not).</p> <ul style="list-style-type: none">. Gather information based on variety of approaches <p>D. Find all possible combinations, arrangements, and/or permutation within given constraints; predict outcomes and find out why certain outcomes are more likely, less likely, or equally likely.</p>

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MATHEMATICAL UNDERSTANDING

Statistical and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
			<p>D. Find all possible combinations, arrangements, and/or permutations within given restraints; predict outcomes and find out why certain outcomes are more likely, less likely, or equally likely.</p> <p>. Use information to draw conclusions, formulate new questions and make predictions</p>	<ul style="list-style-type: none">. Gather information based on simple chance (e.g. coin toss). Keep tally of results. Interpret results. Predict future results. Assessment Piece: Can You Win a Bike at the Fair?

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MATHEMATICAL PROBLEM SOLVING & REASONING

Applications

7.10 Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems. This is evident when students:

PreK-Kindergarten	First	Second	Third	Fourth
<p>A. Solve problems by reasoning mathematically with concepts and skills expected in these grades.</p> <p>B. Determine what the question, assignment, or problem is really asking them to do.</p> <p>C. Create and use a variety of strategies and approaches to solve problems, and learn approaches that other people use.</p> <p>D. Make connections between concepts in order to solve problems.</p> <p>E. Extend concepts and generalize results to other situations.</p> <p>F. Make sensible, reasonable estimates.</p>	<p>A. Solve problems by reasoning mathematically with concepts and skills expected in these grades.</p> <p>B. Determine what the question, assignment, or problem is really asking them to do.</p> <p>C. Create and use a variety of strategies and approaches to solve problems, and learn approaches that other people use.</p> <p>D. Make connections between concepts in order to solve problems.</p> <p>E. Extend concepts and generalize results to other situations.</p> <p>F. Make sensible, reasonable estimates.</p>	<p>A. Solve problems by reasoning mathematically with concepts and skills expected in these grades.</p> <p>B. Determine what the question, assignment, or problem is really asking them to do.</p> <p>C. Create and use a variety of strategies and approaches to solve problems, and learn approaches that other people use.</p> <p>D. Make connections between concepts in order to solve problems.</p> <p>E. Extend concepts and generalize results to other situations.</p> <p>F. Make sensible, reasonable estimates.</p>	<p>A. Solve problems by reasoning mathematically with concepts and skills expected in these grades.</p> <p>B. Determine what the question, assignment, or problem is really asking them to do.</p> <p>C. Create and use a variety of strategies and approaches to solve problems, and learn approaches that other people use.</p> <p>D. Make connections between concepts in order to solve problems.</p> <p>E. Extend concepts and generalize results to other situations.</p> <p>F. Make sensible, reasonable estimates.</p>	<p>A. Solve problems by reasoning mathematically with concepts and skills expected in these grades.</p> <p>B. Determine what the question, assignment, or problem is really asking them to do.</p> <p>C. Create and use a variety of strategies and approaches to solve problems, and learn approaches that other people use.</p> <p>D. Make connections between concepts in order to solve problems.</p> <p>E. Extend concepts and generalize results to other situations.</p> <p>F. Make sensible, reasonable estimates.</p>

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EXPRESSION

Notation and Representation

- 1.17 Students interpret and communicate using mathematical, scientific, and technological notation and representation.
This is evident when students:

Fifth

D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.

AA. Appropriately represent data and results in multiple ways (e.g. numbers and statistics, drawings and pictures, sentences, charts, tables, equations, simple algebraic equations, models).

BB. Use appropriate scientific, technological, and mathematical vocabulary and representations to communicate simple and complex situations.

CC. Use physical models to confirm and communicate relationships and concepts.

Sixth

D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.

AA. Appropriately represent data and results in multiple ways (e.g. numbers and statistics, drawings and pictures, sentences, charts, tables, equations, simple algebraic equations, models).

BB. Use appropriate scientific, technological, and mathematical vocabulary and representations to communicate simple and complex situations.

CC. Use physical models to confirm and communicate relationships and concepts.

Seventh

D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.

AA. Appropriately represent data and results in multiple ways (e.g. numbers and statistics, drawings and pictures, sentences, charts, tables, equations, simple algebraic equations, models).

BB. Use appropriate scientific, technological, and mathematical vocabulary and representations to communicate simple and complex situations.

CC. Use physical models to confirm and communicate relationships and concepts.

Eighth

D. Explain a scientific, mathematical, or technological concept; explain a procedure they have followed.

AA. Appropriately represent data and results in multiple ways (e.g. numbers and statistics, drawings and pictures, sentences, charts, tables, equations, simple algebraic equations, models).

BB. Use appropriate scientific, technological, and mathematical vocabulary and representations to communicate simple and complex situations.

CC. Use physical models to confirm and communicate relationships and concepts.

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QUESTIONING/PROBLEM SOLVING

Types of Questions

2.1 Students ask a variety of questions. This is evident when students:

Fifth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- F.** Ask critical evaluation questions that judge the quality of evidence from within a problem, text, work of art, etc.

Sixth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- F.** Ask critical evaluation questions that judge the quality of evidence from within a problem, text, work of art, etc.

Seventh

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- F.** Ask critical evaluation questions that judge the quality of evidence from within a problem, text, work of art, etc.

Eighth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- F.** Ask critical evaluation questions that judge the quality of evidence from within a problem, text, work of art, etc.

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PROBLEM SOLVING

Problem Solving Process

2.2 Students use reasoning strategies, knowledge, and common sense to solve complex problems related to all fields of knowledge. This is evident when students:

Fifth

- F.** Implement an approach that addresses the problem being posed.
- G.** Use manipulatives, sketches, webs, etc. to model problems.
- AA.** Seek information from reliable sources, including knowledge, observation, and trying things out.
- BB.** Evaluate approaches for effectiveness and make adjustments.
- CC.** Consider, test, and justify more than one solution.
- DD.** Find meaning in patterns and connections.
- EE.** Select and apply appropriate methods, tools, and strategies.

Sixth

- F.** Implement an approach that addresses the problem being posed.
- G.** Use manipulatives, sketches, webs, etc. to model problems.
- AA.** Seek information from reliable sources, including knowledge, observation, and trying things out.
- BB.** Evaluate approaches for effectiveness and make adjustments.
- CC.** Consider, test, and justify more than one solution.
- DD.** Find meaning in patterns and connections.
- EE.** Select and apply appropriate methods, tools, and strategies.

Seventh

- F.** Implement an approach that addresses the problem being posed.
- G.** Use manipulatives, sketches, webs, etc. to model problems.
- AA.** Seek information from reliable sources, including knowledge, observation, and trying things out.
- BB.** Evaluate approaches for effectiveness and make adjustments.
- CC.** Consider, test, and justify more than one solution.
- DD.** Find meaning in patterns and connections.
- EE.** Select and apply appropriate methods, tools, and strategies.

Eighth

- F.** Implement an approach that addresses the problem being posed.
- G.** Use manipulatives, sketches, webs, etc. to model problems.
- AA.** Seek information from reliable sources, including knowledge, observation, and trying things out.
- BB.** Evaluate approaches for effectiveness and make adjustments.
- CC.** Consider, test, and justify more than one solution.
- DD.** Find meaning in patterns and connections.
- EE.** Select and apply appropriate methods, tools, and strategies.

Washington West Supervisory Union
Math Standards and Assessment

PROBLEM SOLVING

Types of Problems

2.3 Students solve problems of increasing complexity. This is evident when students:

Fifth

AA. Solve problems that require processing several pieces of information.

BB. Solve problems that are related to diverse topics, including the less familiar.

Sixth

AA. Solve problems that require processing several pieces of information.

BB. Solve problems that are related to diverse topics, including the less familiar.

Seventh

AA. Solve problems that require processing several pieces of information.

BB. Solve problems that are related to diverse topics, including the less familiar.

Eighth

AA. Solve problems that require processing several pieces of information.

BB. Solve problems that are related to diverse topics, including the less familiar.

Washington West Supervisory Union
Math Standards and Assessment

PROBLEM SOLVING

Improving Effectiveness

2.4 Students devise and test ways of improving the effectiveness of a system. This is evident when students:

Fifth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time.
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Sixth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time.
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Seventh

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time.
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Eighth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time.
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Washington West Supervisory Union
Math Standards and Assessment

PROBLEM SOLVING

Mathematics Dimensions

2.5 Students produce solutions to mathematical problems requiring decisions about approach and presentation, so that final drafts are appropriate in terms of these dimensions:

Fifth	Sixth	Seventh	Eighth
<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies and skills used to solve problems.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations & Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communicating the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p> <p>Presentation: Presentation of the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies and skills used to solve problems.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations & Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communicating the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p> <p>Presentation: Presentation of the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies and skills used to solve problems.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations & Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communicating the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p> <p>Presentation: Presentation of the solution.</p>	<p>Understanding: Demonstration of understanding of the problem.</p> <p>Approach: The strategies and skills used to solve problems.</p> <p>Reasoning: The reasoning used to solve the problem.</p> <p>Observations & Extensions: Demonstration of observation, connections, application, extensions, and generalizations.</p> <p>Mathematical Language: The use of mathematical language in communicating the solution.</p> <p>Mathematical Representation: The use of mathematical representation to communicate the solution.</p> <p>Presentation: Presentation of the solution.</p>

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

Theory

7.3 Students understand the nature of mathematical, scientific and technological theory. This is evident when students:

Fifth

AA. Explain theories based upon observations, concepts, principles, and historical perspective.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Sixth

AA. Explain theories based upon observations, concepts, principles, and historical perspective.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Seventh

AA. Explain theories based upon observations, concepts, principles, and historical perspective.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Eighth

AA. Explain theories based upon observations, concepts, principles, and historical perspective.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

History of Science, Mathematics, and Technology

7.4 Students understand the history of science, mathematics, and technology. This is evident when students:

Fifth

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present, and future understanding.

Sixth

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present, and future understanding.

Seventh

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present, and future understanding.

Eighth

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present, and future understanding.

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

Roles and Responsibilities

7.5 Students analyze the roles and responsibilities of scientists, mathematicians, and technologists in social, economic, cultural, and political systems. This is evident when students:

Fifth

AA. Analyze the roles and responsibilities of scientists, mathematicians, and technologists in relation to ongoing research and discoveries that impact society (e.g. the dangers and benefits of nuclear energy).

Sixth

AA. Analyze the roles and responsibilities of scientists, mathematicians, and technologists in relation to ongoing research and discoveries that impact society (e.g. the dangers and benefits of nuclear energy).

Seventh

AA. Analyze the roles and responsibilities of scientists, mathematicians, and technologists in relation to ongoing research and discoveries that impact society (e.g. the dangers and benefits of nuclear energy).

Eighth

AA. Analyze the roles and responsibilities of scientists, mathematicians, and technologists in relation to ongoing research and discoveries that impact society (e.g. the dangers and benefits of nuclear energy).

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth

- AA.** Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.
- . Consistently and accurately add, subtract, multiple and divide whole numbers
 - . Add and subtract rational numbers (C, Tst, SAT 9)
- BB.** Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.
- . Interchange fractions and decimals
- CC.** Show a sense of the sizes and relative sizes of numbers, and the helpful role of exponents and scientific notation.
- . Compare numbers using $<$, $>$, $=$,
 - . Order decimals to thousandths
 - . Compare decimals and/or fractions using $<$, $>$, $=$,
 - . Order fractions

Sixth

- AA.** Consistently and accurately add, subtract, multiply and divide rational numbers, and convert them into exponents.
- . Consistently and accurately add, subtract, multiply and divide rational numbers (C, Tst, SAT 9)
- BB.** Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.
- . Interchange fractions, decimals, and percents
- CC.** Show a sense of the sizes and relative sizes of numbers, and the helpful role of exponents and scientific notation.
- . Compare numbers using $>$, $<$, $=$,
 - . Order decimals to 100,000
 - . Compare decimals and/or fractions using $<$, $>$, $=$,
 - . Order fractions

Seventh

- AA.** Consistently & accurately add, subtract, multiply, & divide rational numbers, & convert them into exponents.
- . Whole number skills review of four operations, exponents
 - . Number theory of prime factorization; associative and commutative
 - . Fractions & mixed numbers - addition/subtraction, multiplication/division
 - . Decimals: addition, subtraction, multiplication, division
 - . Add, subtract, multiply, & divide positive & negative integers mentally, on paper & with a calculator
 - . Calculate expressions using more than one operation
 - . Calculate expressions involving powers of a number
- BB.** Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form

Eighth

- AA.** Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.
- . Whole number skills review of four operations, exponents
 - . Number theory of prime factorization; associative and commutative
 - . Fractions and mixed numbers - addition/subtraction, multiplication/division
 - . Decimals: addition, subtraction, multiplication, division
 - . Working with variables: writing open sentences
 - . Positive and negative numbers: wholes (negative and positive), addition, subtraction, multiplication, division; rationals (negative and positive), addition, subtraction, multiplication and division
 - . Add, subtract, multiply & divide positive & negative integers mentally, on paper & with a calculator

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth

D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.

(PS)

- . Round numbers to one million
- . Decide when exact answers are needed, and when estimates are enough
- . Use estimation or approximation as a tool for checking calculations
- . Estimate sums and differences by front digits
- . Estimate products and quotients by rounding

E. Use knowledge of the place value system to solve problems (SAT 9, Tst, PS).

- . Identify place value to seven places (whole numbers)
- . Identify decimal place value to three places

Sixth

D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.

(PS).

- . Round numbers larger than one million
- . Decide when exact answers are needed, and when estimates are enough
- . Use estimation or approximation as a tool for checking calculations
- . Estimate sums and differences by front digits to one hundred million
- . Estimate products and quotients by rounding to one hundred million

E. Use knowledge of the place value system to solve problems (SAT 9, Tst, PS).

- . Identify place value to larger than 1 million (whole numbers)
- . Identify place value to five places (decimals)
- . Use expanded notations to millions

Seventh

- . Number theory: factors, multiples, lowest common multiple, composite numbers, divisibility
- . Fractions and mixed numbers: equivalent fractions, lowest terms, using fractions
- . Decimals: decimals to fractions and back, decimals to percent and back
- . Interchange equivalent fractions, decimals & percents
- . Use, interpret, compare & solve problems with whole numbers, fractions, decimals, & percents
- . Determine, round, and compare decimals that are terminating or non-terminating

CC. Show a sense of the magnitudes and relative magnitudes of numbers, and the helpful role of scientific notation.

- . Fractions and mixed numbers: understanding meaning

Eighth

- . Insert instructions into computer spreadsheet cells to program arithmetic calculations
- . Calculate expressions using more than one operation
- . Calculate expressions involving powers of a number

BB. Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.

- . Number theory: factors, multiples, lowest common multiple, composite numbers, divisibility
- . Fractions and mixed numbers: equivalent fractions, lowest terms, using fractions
- . Decimals: decimals to fractions and back, decimals to percent and back
- . Working with variables: writing "in terms of", simplifying expressions, functions, inequalities
- . Graphs: coordinate plane

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.

- . Demonstrate, identify and apply multiplication as repeated addition and as group (3x4 means three groups of four)
- . Demonstrate, identify, and apply division as repeated subtraction, inverse of multiplication

G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.

- . Recognize fractions and ratios as part of a whole

H. Interpret percent as part of 100, as means of comparing quantities of different sizes, and as rate of change; order real numbers with the "<", ">", relationships, and by location on a number line.

Sixth

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.

- . Demonstrate, identify and apply multiplication as repeated addition and as group (3x4 means three groups of four)
- . Demonstrate, identify, and apply division as repeated subtraction, inverse of multiplication
- . Understand exponentiation as repeated multiplication ($5^2 = 5 \times 5$)
- . Identify square root of perfect squares (49, 81)

G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.

- . Recognize fractions as a ratio to the whole ($1/4 = 1:4$)

Seventh

. Decimals: place value, comparing, rounding
. Represent, order, & calculate expressions with numbers like 1,000, 10,000 and 1,000,000 as powers of 10

D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.

- . Whole number skills review: order of operations

E. Use knowledge of the place value system to solve problems.

- . Whole number skills review: place value

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.

- . Demonstrate & explain how + and - are inverses of each other; likewise x and ÷
- . Find prime factors of composite numbers and

Eighth

. Interchange equivalent fractions, decimals & percents
. Use, interpret, compare & solve problems with whole numbers, fractions, decimals, and percents

. Determine, round, and compare decimals that are terminating or non-terminating

CC. Show a sense of the magnitudes and relative magnitudes of numbers, and the helpful role of scientific notations.

- . Fractions and mixed numbers: understanding meaning
- . Decimals: place value, comparing, rounding
- . Working with variables: equations/replacement set, solving simple equations
- . Represent, order, and calculate expressions with numbers like 1,000, 10,000, and 1,000,000 as powers of 10

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth

Sixth

H. Interpret percent as part of 100, as means of comparing quantities of different sizes, and as rate of change; order real numbers with the "<", ">", relationships, and by location on a number line.
. Identify less than 100% as less than a whole and greater than 100% as more than the whole
. Identify reasonable percentages in different problem solving situation

Seventh

Express them using exponents
. Identify square roots of whole numbers using paper or calculator

G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.
. Number theory: greatest common factor
. Fractions and mixed numbers: introduction to ratio, proportion
. Explain different interpretations for fractions and ratios (i.e. a/b can mean $a \div b$; "a" parts of size "1/b;" or a compared to b
. Use proportions and scale drawings to estimate actual sizes, distances, (travel) times & solve problems
. Use and interpret ratios and proportions in appropriate problems
. Use calculators to compare amounts proportionally

Eighth

D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation. place value system to solve problems
. Whole number skills review: order of operations
. Whole number skills review: place value

E. Use knowledge of the place value system to solve problems.
. Whole number skills review: place value

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.
. Demonstrate & explain how + and - are inverses of each other; likewise x and \div
. Find prime factors of composite numbers and express them using exponents

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth	Sixth	Seventh	Eighth
		<p>H. Interpret percent as part of 100, as means of comparing quantities of different sizes, and as rate of change; order real numbers with the "<", ">" relationships, and by location on a number line.</p> <ul style="list-style-type: none">. Fractions and mixed numbers: percent, pie graphs with percent. Calculate any percentage of any number using paper or calculator. Use, compare, and interpret negative numbers in real world applications (time, ground zero, temperature, budget)	<ul style="list-style-type: none">. Identify square roots of whole numbers using paper or calculator <p>G. Reason proportionally to solve problems involving ratios.</p> <ul style="list-style-type: none">. Equivalent fractions or equal. Number theory: greatest common factor. Working with variables: solving proportion. Ratio, proportion, and percent: unit rate, commission, discounts, sales tax, tips, loan interest - % increase/decrease. Graphs: direct variation. Explain different interpretations for fractions & ratios (i.e. "a/b" can mean "a ÷ b;" "a" parts of size "1/b;" or "a compared to b"). Use proportions & scale drawings to estimate actual sizes, distances, (travel) times & solve problems. Use & interpret ratios & proportions, including constant rates, in appropriate problems

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Fifth

Sixth

Seventh

Eighth

. Use calculators to compare amounts proportionally

H. Interpret percent as part of 100, as means of comparing quantities of different sizes, and as rate of change; order real numbers with the "<", ">" relationships, and by location on a number line.

. Fractions and mixed numbers: percent, pie graphs with percent

. Calculate any percentage of any number using paper or calculator

. Use, compare, and interpret negative numbers in real world applications (time, ground zero, temperature, budget)

. Calculate rates of change

I. Recognize and represent basic number patterns.

. Continual review of fraction/decimal skills: multiple operations, with distributive, algebraic fractions (add/subtract, multiply/divide)

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Fifth

AA. Model situations geometrically to formulate and solve problems; recognize rotational and bilateral symmetry in two and three-dimensional figures.

- . Make scale drawings to assist in problem solving
- . Describe, identify, and construct congruent figures

BB. Understand the relationships, properties, and measures within and among one-, two-, and three-dimensional geometric objects.

- . Identify, describe, label, and draw: line, line segment, ray, end point, intersecting lines, parallel lines, perpendicular lines
- . Identify, describe, label, draw angles: right, acute, obtuse, straight
- . Name and label angles
- . Estimate number of degrees of an angle

Sixth

AA. Model situations geometrically to formulate and solve problems; recognize rotational and bilateral symmetry in two and three-dimensional figures.

- . Make scale drawings to assist in problem solving
- . Create meaningful similar drawings to assist with problem solving
- . Describe, identify, and construct congruent figures

BB. Understand the relationships, properties, and measures within and among one-, two-, and three-dimensional geometric objects.

- . Identify, describe, label and draw: line, line segment, ray, end point, intersecting lines, parallel lines, perpendicular lines, skew lines, vertex
- . Identify, describe, label, draw angles: right, acute, obtuse, straight
- . Name and label angles

Seventh

AA. Model situations geometrically to formulate and solve problems; recognize rotational and bilateral symmetry in two- and three-dimensional figures.

- . Use lines or points of symmetry in symmetric figures
- . Geometry: making 3-D models, tessellations
- . Problem solving strategies: draw a sketch
- . Patterns: geometric/visual

BB. Understand the relationships, properties, and measures within and among one-, two-, and three-dimensional geometric objects.

- . Define, draw and use proper notation to name: point, end point, line, line segment, ray, perpendicular lines, parallel lines, vertex, and planes
- . Define and identify sides, acute, obtuse, straight, and right angles

Eighth

AA. Model situations geometrically to formulate and solve problems; recognize rotational and bilateral symmetry in two- and three-dimensional figures.

- . Accurately use and define lines and points of symmetry in symmetric figures
- . Creative constructions with circles

BB. Understand the relationships, properties, and measures within and among one-, two-, and three-dimensional geometric objects.

- . Define, draw and use proper notation to name: point, end point, line, line segment, ray, perpendicular lines, parallel lines, transversal, alternate interior angles, corresponding angles, skew lines, vertex, and planes
- . Define, identify and use sides, acute, obtuse, straight, and right angles, adjacent angles, vertical

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Fifth

CC. Identify similar and congruent shapes.

- . Identify, label and draw matching shapes
- . Describe, identify and construct similar and congruent figures

DD. Reason proportionally with measurements, to interpret maps and to make smaller and larger scale drawings.

- . Use scale to convert smaller units (inches) to larger units (miles) on a map
- . Use scale to estimate distances on a map

EE. Recognize the differences between measure of length, area, and volume, and the corresponding uses of units, square units, and cubic units; measure angles, weights, masses, capacities, and times.

- . Pick measurement units appropriate to individual projects (cm., inches, etc.)

Sixth

- . Estimate number of degrees in an angle
- . Use a protractor to construct an angle

CC. Identify similar and congruent shapes.

- . Identify, label, and draw matching shapes
- . Describe, identify, and construct similar and congruent figures
- . Create a scale drawing

DD. Reason proportionally with measurements to interpret maps and to make smaller and larger scale drawings.

- . Use scale to convert smaller units (inches) to larger units (miles) on a map
- . Use scale to estimate distances on a map

Seventh

- . Understand and use length, area, and perimeter to solve problems

- . Know and use the properties of quadrilaterals, squares, rectangles, parallelograms
- . Know and use properties of triangles: acute, obtuse, right, equilateral, isosceles, scalene

- . Define and identify polygons: triangle, square, rectangle, pentagon, hexagon, octagon, decagon
- . Know and use properties of rectangular prisms, cylinders to find surface area and volume

- . Geometry: line designs, classifying

CC. Identify similar and congruent shapes.

- . Use ratios to determine similar shapes
- . Geometry: measuring, naming

Eighth

- angles, complementary angles, supplementary angles, and angle bisectors
- . Understand and use length, area, and perimeter to solve problems

- . Find lines or points of symmetry in symmetric figures

- . Know and use the properties of quadrilaterals, squares, rectangles, parallelograms, rhombuses, trapezoids
- . Know and use properties of triangles; acute, obtuse, right, equilateral, isosceles, scalene, interior angles, exterior angles, and the Pythagorean Theorem

- . Know and use properties of circles; center, circumference, diameter, radius, cord, semicircle, and arc

- . Define and identify polygons; triangle, square, rectangle, pentagon, hexagon, octagon, decagon
- . Know and use properties of prisms, cylinders, pyramids, cones, and spheres to find

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Fifth

- . Define area using square units
- . Estimate number of degrees of an angle
- . Estimate distances from inches (length of a line) to miles (New York to Boston)

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

- G.** Extend and create geometric patterns, concrete and pictorial models.
- . Use tangrams or other manipulatives to help in solving problems involving extension of geometric patterns
 - . Use pictorial models to help in solving problems involving extension of geometric patterns

Sixth

EE. Recognize the differences between measures of length, area, and volume, and the corresponding uses of units, square units, and cubic units; measure angles, weights, masses, capacities, and times.

- . Pick measurement units appropriate to individual projects (cm., inches, etc.)
- . Define area using square units, volume using cubic units, etc.
- . Estimate number of degrees of an angle
- . Estimate distances from inches (length of a line) to miles (New York to Boston)

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

Seventh

DD. Reason proportionally with measurements to interpret maps and to make smaller and larger scale drawings.

- . Demonstrate understanding of proportions by determining distances between locations on a map
- . Drawing an object of choice (from a picture or three-dimensional object) smaller or larger than the original subject

EE. Recognize the differences between measures of length, area, volume, and the corresponding uses of units, square units, and cubic units; measure angles, weights, masses, capacities, and times.

- . Demonstrate understanding of differences between measures through use and application
- . use standard geometric measurement instruments (protractors, graduated cylinders, scales, stop

Eighth

surface area and volume

- . Identify the platonic solids

CC. Identify similar and congruent shapes.

- . Use side-angle-side, angle-side-angle, or side-side-side test to determine congruence of triangles
- . Use congruence of corresponding sides and angles to determine congruence of polygons
- . Use ratios to determine similar shapes
- . Review point, ray, line, plane, angles

DD. Reason proportionally with measurements to interpret maps and to make smaller to larger scale drawings.

- . Demonstrate understanding of proportions by determining distances between locations on a map
- . Precisely draw an object of choice (from a picture or 3-dimensional object) smaller or larger than the original subject

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Fifth

H. Interpret percent as part of 100, as means of comparing quantities of different sizes, and as rate of change; order real numbers with the ">", "<", relationships, and by location on a number line.

Sixth

G. Extend and create geometric patterns, concrete and pictorial models.
. Use tangrams or other manipulatives to help in solving problems involving extension of geometric patterns
. Use pictorial models to help in solving problems involving extension of geometric patterns
. Draw models to scale using an organized method

Seventh

watches, etc.) with accuracy
. Measurement - English, metric

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.
. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various magnitudes

G. Extend and create geometric patterns, concrete and pictorial models.
. Use of different models used to represent the same thing including three-dimensional models

Eighth

. Make a 3-dimensional object smaller or larger than the original
. Positive and negative numbers: coordinate graphing

EE. Recognize the differences between measures of length, area, and volume, and the corresponding uses of units, square units, and cubic units; measure angles, weights, masses, capacities, and times.
. Demonstrate understanding of differences between measures through communication, use, and application
. Use standard geometric measurement instruments (protractors, graduated cylinders, scales, stop watches, etc.) with accuracy
. Geometry: perimeter of polygons, circles (circumference, area), area (rectangles, triangles, parallelograms, trapezoids), volume, surface area

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Fifth

Sixth

Seventh

Eighth

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various magnitudes

G. Extend and create geometric patterns, concrete and pictorial models.

. Use of different models used to represent the same thing, including 3-dimensional models
. Communicate process for creating geometric patterns

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Fifth

AA. Discover, describe, and generalize a variety of patterns mathematically.

- . Find, complete, create and extend a wide variety of patterns (including repeating, growing, numerical, and geometric patterns)

- . Extend the pattern in a table of numbers or ordered pairs

BB. Understand variables in simple functions, especially linear and exponential functions; represent relationships with tables, graphs, and verbal or symbolic rules; analyze tables, graphs, and rules to determine relationships.

- . Write mathematical expressions/math sentences for patterns

- . Compare and connect sequences of numbers and shapes of graphs

- . Relate number patterns to graphical shapes

- . Express patterns in math sentences

Sixth

AA. Discover, describe, and generalize a variety of patterns mathematically.

- . Find, complete, create and extend a wide variety of patterns (including repeating, growing, numerical and geometric patterns)

- . Extend the pattern in a table of numbers or ordered pairs and identify the rules

BB. Understand variables in simple functions, especially linear and exponential functions; represent relationships with tables, graphs, and verbal or symbolic rules; analyze tables, graphs, and rules to determine relationships.

- . Write mathematical expressions/math sentences for patterns

- . Compare and connect sequences of numbers and shapes of graphs

- . Represent graphically relationships among distance, time and speed

Seventh

AA. Discover, describe, and generalize a variety of patterns mathematically.

- . Find, complete, create, and extend a wide variety of patterns including repeating, growing, numerical, geometric, and exponential patterns (perfect numbers, palindromes, twin primes)

- . Extend the pattern in a table of numbers or ordered pairs

- . Use symbolic expression to represent patterns (e.g. arithmetic and geometric, Pascal's triangle, triangular, fibonacci)

- . Introduction to generalizing in algebra

BB. Understand variables in simple functions, especially linear and exponential functions; represent relationships with tables, graphs, and verbal or symbolic rules; analyze tables, graphs, and rules to determine relationships.

- . Graph ordered pairs of integers on coordinate plane

Eighth

AA. Discover, describe, and generalize a variety of patterns mathematically.

- . Find, complete, create and extend a wide variety of patterns including repeating, growing, numerical, geometric, and exponential patterns

- . Extend the pattern in a table of numbers or ordered pairs

- . Create symbolic expression to represent patterns (e.g. arithmetic and geometric)

BB. Understand variables in simple functions, especially linear and exponential functions; represent relationships with tables, graphs, and verbal or symbolic rules; analyze tables, graphs, and rules to determine relationships.

- . Graph ordered pairs of rationals on coordinate plane

- . Compare and connect sequences of numbers and shapes of graphs

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Fifth

CC. Explore solutions of unknown quantities in equations.
. Solve for unknown in addition and subtraction equations using related number sentences ($x-4=6$, thus $x=6+4$, and $x+10$)

Sixth

. Relate number patterns to graphical shapes
. Analyze tables and graphs to identify patterns
. Express patterns in math sentences

CC. Explore solutions of unknown quantities in equations.
. Solve for unknown in equations using related number sentences ($x-4=6$, thus $x=6+4$, and $x=10$)

Seventh

. Compare and connect sequences of numbers and shapes of graphs
. Represent graphically relationships among distance, time, and speed
. Relates number patterns to graphical shapes (e.g. linear)
. Analyze tables and graphs and describe what they show and identify patterns
. Express patterns in math sentences
. Patterns: triangle, exponential, binary, squares, cubes
. Algebra: Introduction to variables, writing expressions "in terms of"

CC. Explore solutions of unknown quantities in equations.
. Solve for unknowns in equations using addition, subtraction, or multiplication to obtain related equations (e.g. $3x = 9$)

Eighth

. Represent graphically relationships among distance, time and speed
. Relate number patterns to graphical shapes (e.g. linear)
. Analyze tables and graphs to describe what they show and identify patterns
. Express patterns in math sentences
. Graph linear functions on a coordinate plane
. Write mathematical equations for word sentences

CC. Explore solutions of unknown quantities in equations.
. Solve for unknowns in equations using addition, subtraction, multiplication or division to obtain related equations
. Solve equations using two step transformations (e.g. $3x+5=30$)
. Solve equations involving rationals by transformation (e.g. $2/3x=8$ or $1.5x=7$)
. Solve equations with distributive variables on both sides

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Statistical and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

AA. Create and interpret statistical tables and charts.

- . Effectively and accurately collect data
- . Display understanding of what a sample is
- . Make valid observations and explanations based on quick sketches of data (i.e. line plots)
- . Organize and display data in appropriate formal forms (i.e. tables, charts, graphs)
- . Collect data
- . Display understanding of what a sample is
- . Make observations based on representations of data (i.e. line plots)
- . Organize & display data
- . Distinguish between tables, charts, and graphs

BB. Appropriately use measures of central tendency -- mean, median, and mode; understand the significance of frequency and distribution.

Sixth

AA. Create and interpret statistical tables and charts.

- . Effectively and accurately collect data
- . Display understanding of what a sample is and what constitutes a valid sample of a population
- . Make valid observations and explanations based on quick sketches of data (i.e. line plots, stem and leaf plots)
- . Organize and display data in appropriate formal forms (i.e. tables, charts, graphs)
- . Accurately collect data
- . Identify important factors when selecting a valid sample
- . Make observations and explanations based on representations of data
- . Organize & display data in appropriate formal forms (i.e. tables, charts, graphs), including labels & titles

BB. Appropriately use measures of central tendency -- mean, median,

Seventh

AA. Create and interpret statistical tables and charts.

- . Effectively and accurately collect data
- . Display understanding of what a sample is and what constitutes a valid sample of a population
- . Make valid observations and explanations based on quick sketches of data (i.e. line plots, stem and leaf plots)
- . Organize and display data in appropriate formal forms (i.e. tables, charts, graphs)
- . Effectively & accurately collect data
- . Distinguish a valid sample from an invalid sample
- . Make valid observations & explanations based on representations of data (i.e. line plots, bar graphs, scatter plots, circle graphs)
- . Organize & display data in appropriate formal forms (i.e. tables, charts, graphs), including accurate labels, spacing of scales on axes, & title

Eighth

AA. Create and interpret statistical tables and charts.

- . Effectively and accurately collect data
- . Display understanding of what a sample is and what constitutes a valid sample of a population
- . Make valid observations and explanations based on quick sketches of data (i.e. line plots, stem and leaf plots)
- . Organize and display data in appropriate formal forms (i.e. tables, charts, graphs)
- . Effectively & accurately collect data
- . Create a valid sample
- . Make valid observations & identify relationships based on representations of data (i.e. line plots, double bar graphs, scatter plots, circle graphs, stem-&-leaf plots)
- . Organize & display data in appropriate formal forms (i.e. tables, graphs, charts), including accurate labels, spacing of scales on axes, and title

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

- . Understand, accurately calculate and appropriately use measures of central tendency (median, mean, mode)
- . Make relevant observations based on frequency and distribution of data (i.e. range, clusters, outliers)
- . Understand that mean, median, and mode tell different things about the middle of a data set
- . Accurately determine the mode of a data set
- . Describe what a frequency plot shows
- . Distinguish data sets with large ranges from those with small ranges

CC. Make conclusions and recommendations based on data analysis, and analyze the conclusions and recommendations of others.

- . Analyze and reach conclusions based on data
- . Use data to analyze conclusions and recommendations of others

Sixth

- mode; understand the significance of frequency and distribution.
- . Understand, accurately calculate and appropriately use measures of central tendency (mean, median, mode)
 - . Make relevant observations based on frequency and distribution of data (i.e. range, clusters, outliers)
 - . Describe the difference between mean, median, and mode of a data set
 - . Calculate mean, median, mode & range of a data set
 - . Use ratios to explain trends in data
 - . Accurately describe what a frequency plot shows

CC. Make conclusions and recommendations based on data analysis, and analyze the conclusions and recommendations of others.

- . Analyze and reach conclusions based on data
- . Use data to analyze conclusions and recommendations of others

Seventh

- . Identify relationships revealed by simple tables and graphs
- BB.** Appropriately use measures of central tendency -- mean, median, mode; understand the significance of frequency and distribution.
- . Understand, accurately calculate and appropriately use measures of central tendency (mean, median, mode)
 - . Make relevant observations based on frequency and distribution of data (i.e. range, clusters, outliers)
 - . Accurately calculate mean, median, mode, and range of a data set
 - . Compare data from two groups in terms of mean, median, mode, and range
 - . Accurately use ratios to explain trends in data
 - . Create frequency plots

Eighth

- . Identify type of correlation on a scatter plot
 - . Create lines of best fit on scatter plots and use to estimate variables
- BB.** Appropriately use measures of central tendency -- mean, median, mode; understand the significance of frequency and distribution.
- . Understand, accurately calculate and appropriately use measures of central tendency (mean, median, mode)
 - . Make relevant observations based on frequency and distribution of data (i.e. range, clusters, outliers)
 - . Accurately calculate mean, median, mode and range of a data set
 - . Compare data from two groups in terms of mean, median, mode, range, and outliers
 - . Accurately rank data sets in terms of mean, median, mode and range

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

- . Make predictions using tables of values and line graphs
- . Consider reasons offered for data analysis conclusions
- . Recognize when comparisons might not be fair because some conditions are not kept the same
- . Make conclusions based on data analysis (mode, median, range)

DD. Make predictions based on experimental or theoretical possibilities; recognize equally likely outcomes and determine the probabilities of events; predict the results of a series of trials once the probability for one trial is known.

- . Differentiate between certain, impossible, likely, unlikely, and equally likely events
- . Estimate the likelihood of events using experimental data
- . Express probabilities as fractions and decimals

Sixth

- . Identify important factors when selecting a sample
- . Appropriately apply conclusions about a sample to a larger population
- . Make accurate predictions using tables of values and line graphs
- . Display understanding that there may be more than one good way to interpret a given set of findings
- . Display skepticism about arguments based on very small samples of data
- . Make conclusions and recommendations based on data analysis (mode, median, mean, range)
- . Appropriately apply conclusions about a sample to a larger population

DD. Make predictions based on experimental or theoretical possibilities; recognize equally likely outcomes and determine the probabilities of events; predict the results of a series of trials once the probability for one trial is known.

Seventh

- CC.** Make conclusions and recommendations based on data analysis, and analyze the conclusions and recommendations of others.
- . Analyze and reach conclusions based on data
 - . Use data to analyze conclusions and recommendations of others
 - . Identify important factors when selecting a sample
 - . Appropriately apply conclusions about a sample to a larger population
 - . Probability in Pascal
 - . Make accurate predictions using tables of values, formulas & line graphs
 - . Interpret a given set of findings in at least two ways
 - . Display skepticism about arguments based on small samples of data and biased samples
 - . Make accurate conclusions and offer recommendations supported by data (mean, median, mode, and range)
 - . Accurately apply conclusions about a sample to a larger population

Eighth

- . Accurately create frequency plots & describe what the distribution shows
- CC.** Make conclusions and recommendations based on data analysis, and analyze the conclusions and recommendations of others.
- . Analyze and reach conclusions based on data
 - . Use data to analyze conclusions and recommendations of others
 - . Identify important factors when selecting a sample
 - . Appropriately apply conclusions about a sample to a larger population
 - . Make accurate predictions using tables of values, formulas, & line graphs, & lines of best fit in scatter plots
 - . Interpret a given set of finding in several ways
 - . Display skepticism about arguments based on small samples of data, biased samples, or samples for which there was no control

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

- . Compare experimental data to theoretical probabilities
- . Understand concept of "fair game" (all participants have an equal chance of winning)
- . Identify unfair games and make adjustments to make them fair

- E.** Construct sample spaces.
- . Demonstrate a systematic approach to generating a sample space (all possible outcomes - 2-3 categories)
 - . Make a simple tree diagram to generate a sample space (2 choices)

Sixth

- . Understand and accurately differentiate between certain, impossible, likely, unlikely, and equally likely events
- . Determine the likelihood of events using experimental data
- . Accurately express probabilities as fractions, decimals and ratios
- . Compare experimental probabilities for small numbers of events and large numbers of events
- . Understand concept of "fair game" (all participants have an equal chance of winning)
- . Identify unfair games and suggest ways to make them fair
- . Use experimental and theoretical probabilities to make reasonable predictions

- E.** Construct sample spaces.
- . Make simple tree diagrams to generate sample spaces (2-4 choices)
 - . Use simple tree diagrams to determine probabilities

Seventh

- DD.** Make predictions based on experimental or theoretical possibilities; recognize equally likely outcomes and determine the probabilities of events; predict the results of a series of trials once the probability for one trial is known.
- . Understand and differentiate between certain, impossible, likely, unlikely, and equally likely events
 - . Determine the likelihood of events using experimental data
 - . Express probabilities as fractions, decimals, & percents on a probability line
 - . Display understanding that probability is a ratio of favorable outcomes to possible outcomes
 - . Determine experimental & theoretical probabilities using data from graphs and tables (student-generated and provided)
 - . Understand concept of "fair game" (all participants have an equal chance of winning)

Eighth

- . Make accurate conclusions and offer reasonable recommendations supported by data (mean, median, mode, range, outliers)
- . Accurately apply conclusions about a sample to a larger population

- DD.** Make predictions based on experimental or theoretical possibilities; recognize equally likely outcomes and determine the probabilities of events; predict the results of a series of trials once the probability for one trial is known.
- . Understand and differentiate between certain, impossible, likely, unlikely, and equally likely events
 - . Determine the likelihood of events using experimental data
 - . Accurately express, compare and rank probabilities as fractions, decimals and percents
 - . Compare experimental data to theoretical probabilities

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

Sixth

Seventh

Eighth

- . Distinguish fair and unfair games of chance and suggest accurate adjustments to unfair games of chance to make them fair
- . Use experimental and theoretical probabilities to make reasonable predictions
- . Display understanding that summary predictions are usually more accurate for a large collection of events than for a small collection of events

- E.** Construct sample spaces.
- . Make tree diagrams to generate sample spaces (3-5 choices)
 - . Use tree diagrams to accurately determine probabilities

- . Understand concept of "fair game" (all participants have an equal chance of winning)
- . Can identify unfair games and make adjustments to make them fair
- . Accurately determine experimental and theoretical probabilities from graphs and tables (student-generated and provided)
- . Display understanding that theoretical probability is a ratio of favorable outcomes to possible outcomes
- . Display understanding that experimental probability is a ratio of favorable outcomes to number of tries or turns
- . Generate and use summary predictions to show that they are usually more accurate for a large number of events than for a small number of events

- E.** Construct sample spaces.
- . Use tree diagrams to accurately determine theoretical probabilities

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MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Fifth

Sixth

Seventh

Eighth

- . Determine the number of combinations given several categories
- . use the Fundamental Counting Principle ("m" choices in one category, "n" choices in second category - number of combinations equals "m \times n".
- . Make accurate tree diagrams to generate permutations (3-6 choices)
- . Use the Permutation Theorem ("m" choices, number of permutations = m!)

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Math Standards and Assessment

MATHEMATICAL PROBLEM SOLVING AND REASONING

Applications

7.10 Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems. This is evident when students:

Fifth

- A.** Solve problems by reasoning mathematically with concepts and skills expected in these grades.
- BB.** Formulate and solve a variety of meaningful problems.
- CC.** Create and use a variety of approaches, and understand and evaluate the approaches that others use; determine how to break down a complex problem into simpler parts; extract pertinent information from situations.
- DD.** Integrate concepts and techniques from different areas of mathematics.
- EE.** Generalize solutions and strategies to new problem situations.
- F.** Make sensible, reasonable estimates.

Sixth

- A.** Solve problems by reasoning mathematically with concepts and skills expected in these grades.
- BB.** Formulate and solve a variety of meaningful problems.
- CC.** Create and use a variety of approaches, and understand and evaluate the approaches that others use; determine how to break down a complex problem into simpler parts; extract pertinent information from situations.
- DD.** Integrate concepts and techniques from different areas of mathematics.
- EE.** Generalize solutions and strategies to new problem situations.
- F.** Make sensible, reasonable estimates.

Seventh

- A.** Solve problems by reasoning mathematically with concepts and skills expected in these grades.
- BB.** Formulate and solve a variety of meaningful problems.
 - . Problem solving with fractions and mixed numbers and decimals
 - . Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes
- CC.** Create and use a variety of approaches, and understand and evaluate the approaches that others use; determine how to break down a complex problem into simpler parts; extract pertinent information from situations.
 - . Problem solving strategies: work backwards, look for patterns, guess and check, decode problem, group problem solving

Eighth

- A.** Solve problems by reasoning mathematically with concepts and skills expected in these grades.
- BB.** Formulate and solve a variety of meaningful problems.
 - . Problem solving with fractions and mixed numbers and decimals
 - . Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions
- CC.** Create and use a variety of approaches, and understand and evaluate the approaches that others use; determine how to break down a complex problem into simpler parts; extract pertinent information from situations.
 - . Problem solving strategies: work backwards, look for patterns, guess and check, decode problem, group problem solving

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MATHEMATICAL PROBLEM SOLVING AND REASONING

Applications

7.10 Students use concrete, formal, & informal strategies to solve mathematical problems, apply the process of mathematical modeling, & extend & generalize mathematical concepts. Students apply mathematics as they solve scientific & technological problems or work with technological systems. This is evident when students:

Fifth

G. Formulate conjectures and argue (short of formal proof) why they must be or seem to be true.

Sixth

G. Formulate conjectures and argue (short of formal proof) why they must be or seem to be true.

Seventh

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

DD. Integrate concepts and techniques from different areas of mathematics.

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

EE. Generalize solutions and strategies to new problem situations.

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

G. Formulate conjectures & argue (short of formal proof) why they must be or seem to be true.

Eighth

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

DD. Integrate concepts and techniques from different areas of mathematics.

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

EE. Generalize solutions and strategies to new problem situations.

. Co-units or cooperation between two or more disciplines, twisters, quizzes, challenge problems, logic problems, test of genius

. Components of portfolio - language, representation, presentation, understanding, approaches, why-decisions, so what-outcomes

Washington West Supervisory Union
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MATHEMATICAL PROBLEM SOLVING AND REASONING

Applications

7.10 Students use concrete, formal, & informal strategies to solve mathematical problems, apply the process of mathematical modeling, & extend & generalize mathematical concepts. Students apply mathematics as they solve scientific & technological problems or work with technological systems. This is evident when students:

Fifth

Sixth

Seventh

. Components of portfolio -
language, representation,
presentation, understanding,
approaches, why-decisions,
so what-outcomes

Eighth

G. Formulate conjectures &
argue (short of formal proof)
why they must be or seem
to be true.
. Components of portfolio -
language, representation,
presentation, understanding,
approaches, why-decisions,
so what-outcomes

Washington West Supervisory Union
Math Standards and Assessment

EXPRESSION

Notation and Representation

- 1.17 Students interpret and communicate using mathematical, scientific, and technological notation and representation.
This is evident when students:

Ninth

AAA. Represent data and results in multiple ways (e.g. numbers and statistics, drawings, diagrams, and pictures, equations, sentences, charts and tables, models), communicating points effectively.

BB. Use appropriate scientific, technological, and mathematical vocabulary and formal symbolic notations to communicate simple and complex situations, with clear links between text and representations, symbolic notations and models, diagrams, graphs, etc.

CC. Use physical models quantitatively to confirm and communicate relationships and concepts.

Tenth

AAA. Represent data and results in multiple ways (e.g. numbers and statistics, drawings, diagrams, and pictures, equations, sentences, charts and tables, models), communicating points effectively.

BB. Use appropriate scientific, technological, and mathematical vocabulary and formal symbolic notations to communicate simple and complex situations, with clear links between text and representations, symbolic notations and models, diagrams, graphs, etc.

CC. Use physical models quantitatively to confirm and communicate relationships and concepts.

Eleventh

AAA. Represent data and results in multiple ways (e.g. numbers and statistics, drawings, diagrams, and pictures, equations, sentences, charts and tables, models), communicating points effectively.

BB. Use appropriate scientific, technological, and mathematical vocabulary and formal symbolic notations to communicate simple and complex situations, with clear links between text and representations, symbolic notations and models, diagrams, graphs, etc.

CC. Use physical models quantitatively to confirm and communicate relationships and concepts.

Twelfth

AAA. Represent data and results in multiple ways (e.g. numbers and statistics, drawings, diagrams, and pictures, equations, sentences, charts and tables, models), communicating points effectively.

BB. Use appropriate scientific, technological, and mathematical vocabulary and formal symbolic notations to communicate simple and complex situations, with clear links between text and representations, symbolic notations and models, diagrams, graphs, etc.

CC. Use physical models quantitatively to confirm and communicate relationships and concepts.

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EXPRESSION

Notation and Representation

1.17 Students interpret and communicate using mathematical, scientific, and technological notation and representation.

This is evident when students:

Ninth

DD. Explain a scientific, mathematical or technological concept, explain a procedure they have followed to others in enough detail that others could repeat or reproduce the results.

Tenth

DD. Explain a scientific, mathematical or technological concept, explain a procedure they have followed to others in enough detail that others could repeat or reproduce the results.

Eleventh

DD. Explain a scientific, mathematical or technological concept, explain a procedure they have followed to others in enough detail that others could repeat or reproduce the results.

Twelfth

DD. Explain a scientific, mathematical or technological concept, explain a procedure they have followed to others in enough detail that others could repeat or reproduce the results.

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QUESTIONING/PROBLEM SOLVING

Types of Questions

2.1 Students ask a variety of questions. This is evident when students:

Ninth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- FF.** Ask critical evaluation questions that judge the quality of evidence from experts, evidence from other disciplines, etc.

Tenth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- FF.** Ask critical evaluation questions that judge the quality of evidence from experts, evidence from other disciplines, etc.

Eleventh

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- FF.** Ask critical evaluation questions that judge the quality of evidence from experts, evidence from other disciplines, etc.

Twelfth

- A.** Ask questions about how things get done and how they work.
- B.** Ask questions to determine why events occur.
- C.** Ask questions that compare and contrast, to determine similarities and differences.
- D.** Ask questions that help make connections within and across fields of knowledge and/or between concepts.
- E.** Ask reflective questions that connect new ideas to known experience.
- FF.** Ask critical evaluation questions that judge the quality of evidence from experts, evidence from other disciplines, etc.

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PROBLEM SOLVING

Problem Solving Process

2.2 Students use reasoning strategies, knowledge, and common sense to solve complex problems related to all fields of knowledge. This is evident when students:

Ninth

AAA. Critically evaluate the validity and significance of sources and interpretations.

BB. Evaluate approaches for effectiveness and make adjustments.

CC. Consider, test, and justify more than one solution.

DD. Find meaning in patterns and connections.

EE. Select and apply appropriate methods, tools and strategies.

F. Implement an approach that addresses the problem being posed.

G. Use manipulative, sketches, webs, etc. to model problems.

Tenth

AAA. Critically evaluate the validity and significance of sources and interpretations.

BB. Evaluate approaches for effectiveness and make adjustments.

CC. Consider, test, and justify more than one solution.

DD. Find meaning in patterns and connections.

EE. Select and apply appropriate methods, tools and strategies.

F. Implement an approach that addresses the problem being posed.

G. Use manipulative, sketches, webs, etc. to model problems.

Eleventh

AAA. Critically evaluate the validity and significance of sources and interpretations.

BB. Evaluate approaches for effectiveness and make adjustments.

CC. Consider, test, and justify more than one solution.

DD. Find meaning in patterns and connections.

EE. Select and apply appropriate methods, tools and strategies.

F. Implement an approach that addresses the problem being posed.

G. Use manipulative, sketches, webs, etc. to model problems.

Twelfth

AAA. Critically evaluate the validity and significance of sources and interpretations.

BB. Evaluate approaches for effectiveness and make adjustments.

CC. Consider, test, and justify more than one solution.

DD. Find meaning in patterns and connections.

EE. Select and apply appropriate methods, tools and strategies.

F. Implement an approach that addresses the problem being posed.

G. Use manipulative, sketches, webs, etc. to model problems.

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PROBLEM SOLVING

Types of Problems

2.3 Students solve problems of increasing complexity. This is evident when students:

Ninth

AAA. Solve problems that require processing several pieces of information simultaneously.

BBB. Solve problems of increasing levels of abstraction, and that extend to diverse settings and situations.

C. Solve problems that require the appropriate use of qualitative and/or quantitative data based on the problem.

Tenth

AAA. Solve problems that require processing several pieces of information simultaneously.

BBB. Solve problems of increasing levels of abstraction, and that extend to diverse settings and situations.

C. Solve problems that require the appropriate use of qualitative and/or quantitative data based on the problem.

Eleventh

AAA. Solve problems that require processing several pieces of information simultaneously.

BBB. Solve problems of increasing levels of abstraction, and that extend to diverse settings and situations.

C. Solve problems that require the appropriate use of qualitative and/or quantitative data based on the problem.

Twelfth

AAA. Solve problems that require processing several pieces of information simultaneously.

BBB. Solve problems of increasing levels of abstraction, and that extend to diverse settings and situations.

C. Solve problems that require the appropriate use of qualitative and/or quantitative data based on the problem.

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PROBLEM SOLVING

Improving Effectiveness

2.4 Students devise and test ways of improving the effectiveness of a system. This is evident when students:

Ninth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Tenth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Eleventh

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

Twelfth

- A.** Evaluate the effectiveness of a system.
- B.** Identify possible improvements.
- C.** Test-run the improvements and evaluate their effects.
- D.** Make changes and monitor their effects over time
- E.** Identify further possible improvements.
- F.** Test-run and evaluate results.

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PROBLEM SOLVING

Mathematics Dimensions

2.5 Students produce solutions to mathematical problems requiring decisions about approach and presentation, so that final drafts are appropriate in terms of these dimensions:

Ninth

Approach and Reasoning:

The strategies and skills used to solve the problem, and the reasoning that supports the approach.

Execution: The answer and the mathematical work that supports it.

Observations and Extensions:

Demonstration of observation, connections, application, extensions, and generalizations.

Mathematical

Communication: The use of mathematical vocabulary and representation to communicate the solution.

Presentation: Effective communication of how the problem was solved and of the reasoning used.

Tenth

Approach and Reasoning:

The strategies and skills used to solve the problem, and the reasoning that supports the approach.

Execution: The answer and the mathematical work that supports it.

Observations and Extensions:

Demonstration of observation, connections, application, extensions, and generalizations.

Mathematical

Communication: The use of mathematical vocabulary and representation to communicate the solution.

Presentation: Effective communication of how the problem was solved and of the reasoning used.

Eleventh

Approach and Reasoning:

The strategies and skills used to solve the problem, and the reasoning that supports the approach.

Execution: The answer and the mathematical work that supports it.

Observations and Extensions:

Demonstration of observation, connections, application, extensions, and generalizations.

Mathematical

Communication: The use of mathematical vocabulary and representation to communicate the solution.

Presentation: Effective communication of how the problem was solved and of the reasoning used.

Twelfth

Approach and Reasoning:

The strategies and skills used to solve the problem, and the reasoning that supports the approach.

Execution: The answer and the mathematical work that supports it.

Observations and Extensions:

Demonstration of observation, connections, application, extensions, and generalizations.

Mathematical

Communication: The use of mathematical vocabulary and representation to communicate the solution.

Presentation: Effective communication of how the problem was solved and of the reasoning used.

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

Theory

7.3 Students understand the nature of mathematical, scientific and technological theory. This is evident when students:

Ninth

AAA. Use principles and observations to formulate theory and to explain or predict phenomena.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Tenth

AAA. Use principles and observations to formulate theory and to explain or predict phenomena.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Eleventh

AAA. Use principles and observations to formulate theory and to explain or predict phenomena.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Twelfth

AAA. Use principles and observations to formulate theory and to explain or predict phenomena.

BB. Determine the validity of a theory by examining the principles on which it was founded, the constraints that apply to its application, and the body of physical evidence that supports it.

CC. Show understanding that new theories develop when phenomena are observed that are not fully explained by old theories.

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

History of Science, Mathematics, and Technology

7.4 Students understand the history of mathematics, science and technology. This is evident when students:

Ninth

A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present and future understanding.

Tenth

A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present and future understanding.

Eleventh

A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present and future understanding.

Twelfth

A. Investigate contributions made to science, technology, and mathematics by many different kinds of people, and explain their importance.

AA. Examine important contributions made to the advancement of science, technology, and mathematics, and respond to their impact on past, present and future understanding.

Washington West Supervisory Union
Math Standards and Assessment

INQUIRY, EXPERIMENTATION, AND THEORY

Roles and Responsibilities

- 7.5 Students analyze the roles and responsibilities of scientists, mathematicians, and technologists in social, economic, cultural, and political systems. This is evident when students:

Ninth

AAA. Analyze the impact of scientific, mathematical, and technological investigations into and findings about human society, including the ethical issues involved (e.g. the dangers and benefits of genetic engineering).

Tenth

AAA. Analyze the impact of scientific, mathematical, and technological investigations into and findings about human society, including the ethical issues involved (e.g. the dangers and benefits of genetic engineering).

Eleventh

AAA. Analyze the impact of scientific, mathematical, and technological investigations into and findings about human society, including the ethical issues involved (e.g. the dangers and benefits of genetic engineering).

Twelfth

AAA. Analyze the impact of scientific, mathematical, and technological investigations into and findings about human society, including the ethical issues involved (e.g. the dangers and benefits of genetic engineering).

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Ninth

A. Add, subtract, multiply, and divide whole numbers, with and without calculators.

AA. Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.

AAA. Understand and use number systems: natural, whole, integer, rational, real and complex.

B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.

BB. Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.

Tenth

A. Add, subtract, multiply, and divide whole numbers, with and without calculators.

AA. Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.

AAA. Understand and use number systems: natural, whole, integer, rational, real and complex.

B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.

BB. Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.

Eleventh

A. Add, subtract, multiply, and divide whole numbers, with and without calculators.

AA. Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.

AAA. Understand and use number systems: natural, whole, integer, rational, real and complex.

B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.

BB. Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.

Twelfth

A. Add, subtract, multiply, and divide whole numbers, with and without calculators.

AA. Consistently and accurately add, subtract, multiply, and divide rational numbers, and convert them into exponents.

AAA. Understand and use number systems: natural, whole, integer, rational, real and complex.

B. Begin to use simple concepts of negative numbers, properties of numbers (e.g. prime, square, composite), 3-digit and larger multipliers and divisors, rates, and the relationship among fractions, decimals, and percents.

BB. Interchange fractions, decimals, and percents; know that irrational numbers neither terminate nor repeat when written in decimal form.

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Ninth

BBB. Represent numbers in decimal or fraction form and in scientific notation, and graph numbers on the number line in the coordinate plane.

C. Describe and compare quantities by using simple fractions and decimals, and whole numbers up to 1,000,000.

CC. Show a sense of the magnitudes and relative magnitudes of numbers, and the helpful role of scientific notation.

D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.

E. use knowledge of the place value system to solve problems.

Tenth

BBB. Represent numbers in decimal or fraction form and in scientific notation, and graph numbers on the number line in the coordinate plane.

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D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.

E. use knowledge of the place value system to solve problems.

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Ninth

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.

FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).

G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.

GG. Use dimensionless numbers (e.g. factors. Proportions, and percents) and numbers with specific units of measure, including length, time, and rate units.

Tenth

F. Realize the inverse relationships between addition and subtraction, multiplication and division, and exponentiation and root-extraction.

FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).

G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.

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Twelfth

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G. Reason proportionally to solve problems involving equivalent fractions or equal ratios.

GG. Use dimensionless numbers (e.g. factors. Proportions, and percents) and numbers with specific units of measure, including length, time, and rate units.

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Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Ninth

H. Interpret percent as part of 100 as means of comparing quantities of different sizes, and as rate of change; order real numbers with the ">" and "<" relationships, and by location on a number line.

HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.

I. Understand the interrelationship of the four binary arithmetic operations, and use the properties of these operations in forming and working with algebraic expressions.

J. Recognize and represent basic number patterns.

K. Show facility with the mechanics of unitary and binary operations, along with an understanding of their typical meanings and uses in applications.

Tenth

H. Interpret percent as part of 100 as means of comparing quantities of different sizes, and as rate of change; order real numbers with the ">" and "<" relationships, and by location on a number line.

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K. Show facility with the mechanics of unitary and binary operations, along with an understanding of their typical meanings and uses in applications.

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H. Interpret percent as part of 100 as means of comparing quantities of different sizes, and as rate of change; order real numbers with the ">" and "<" relationships, and by location on a number line.

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K. Show facility with the mechanics of unitary and binary operations, along with an understanding of their typical meanings and uses in applications.

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Understand commutative property *Fractions and mixed numbers: add/subtract/multiply/divide *Decimals: add/subtract/multiply/divide *Review & use integers</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane. *Interchange fraction, decimal, & percent forms</p>	<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Apply commutative property correctly *Use fractions and mixed numbers; to solve problems *Use decimals to solve problems *Review and use integers</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane. *Interchange fraction, decimal and percent forms *Graph on the coordinate plane</p>	<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Working use of properties "of reals" *Review fractions & mixed numbers; add/subtract/multiply/divide *Review decimals: add/subtract/multiply/divide *Review and use integers *Introduce rationals</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane. *Choose most appropriate form for situations & interchange</p>	<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Understand properties of Real's *Use fractions & mixed numbers appropriately *Use decimals appropriately *Integrate decimals *Review & use integers and rationals *Introduce & use irrationals & reals</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane.</p>	<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Integrate integers, rationals, irrationals, and reals appropriately</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane.</p> <p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation.</p>	<p>AAA. Understand & use number systems: natural, whole, integer, rational, real and complex. *Introduce and use complex numbers</p> <p>BBB. Represent numbers in decimal or fraction form and in scientific notation, & graph numbers on the number line in the coordinate plane.</p> <p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation.</p>

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>*Graph on a number line</p> <p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation.</p> <p>*Review relevance of place value to magnitude</p> <p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <p>*Make decisions about appropriate uses of calculator</p>	<p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation</p> <p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <p>*Use estimating and approximating in problem solving.</p> <p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).</p> <p>*Review and apply: opposite, reciprocal, absolute value, exponents, taking a root</p>	<p>*Graph rationals on number line and in the coordinate plane.</p> <p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation.</p> <p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <p>*Test reasonableness of answers</p> <p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).</p>	<p>*Choose most appropriate form for situations and interchange</p> <p>*Graph rationals on number line and in the coordinate plane</p> <p>CC. Show a sense of magnitudes and relative magnitudes of numbers, and helpful role of scientific notation.</p> <p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p>	<p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).</p> <p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units.</p>	<p>D. Estimate, approximate, round off, and/or use exact numbers, as appropriate and necessary in calculation.</p> <p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm).</p> <p>*Introduce and apply logarithms</p>

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MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm). *Introduce/review opposite: reciprocal, absolute value, exponents, taking a root</p> <p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units. *Use appropriate units</p>	<p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units. *Use appropriate units *Use proportions to solve problems</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change. *Use percent in applications</p> <p>I. Understand the interrelationship of the four binary arithmetic-operations, & use the properties of these operations in forming and</p>	<p>*Review and apply: opposite, reciprocal, absolute value, exponents, taking a root</p> <p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units. *Use appropriate units *Solve proportional equations</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change. *Use $<$, $>$, and number lines to compare numbers as fractions/decimals/ percents *Use percent in applications</p>	<p>FF. Understand and use unitary operations (e.g. opposite, reciprocal, absolute value, raising to a power, taking a root, and taking a logarithm). *Apply: opposite, reciprocal, absolute value, exponents, taking a root</p> <p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units. *Use appropriate units *Solve proportional equations</p>	<p>*Use appropriate units *Use proportions to solve problems, e.g. similarity</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.</p> <p>I. Understand the interrelationship of the four binary arithmetic-operations, and use the properties of these operations in forming and working with algebraic expressions.</p>	<p>GG. Use dimensionless numbers (e.g. factors, proportions, & percents) and numbers with specific units of measure including length, time, and rate units.</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.</p> <p>I. Understand the interrelationship of the four binary arithmetic-operations, and use the properties of these operations in forming and</p>

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Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>*Understand proportions, cross-products/ equivalent fractions</p> <p>*Use proportions to interchange fractions/percents</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.</p> <p>*Use $<$, $>$, to compare numbers as fractions/ decimals/percents</p> <p>*Use percent in applications</p> <p>I. Understand the interrelationship of the four binary arithmetic-operations, & use the properties of these operations in forming and</p>	<p>forming and working with algebraic expressions.</p> <p>J. Recognize and represent basic number patterns.</p> <p>*Recognize & apply patterns, e.g. odds, evens, squares, multiples, to everyday situations</p> <p>K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings & uses in applications.</p> <p>*Explain how a problem represents appropriate use of an operation</p>	<p>I. Understand the interrelationship of the four binary arithmetic-operations, and use the properties of these operations in forming and working with algebraic expressions.</p> <p>*Show examples of applications for each operation</p> <p>*Write algebraic expressions to represent relationships</p> <p>J. Recognize and represent basic number patterns.</p> <p>*Increase familiarity with patterns, e.g. odds, evens, squares, multiples, algebraic</p> <p>K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings & uses in applications.</p> <p>*Solve equations involving unitary or binary operations</p>	<p>*Use proportions to solve problems</p> <p>*Connect proportions to direct variation and rate of change</p> <p>HH. Compare numbers using order relations, differences, ratios, proportions, percents, and proportional change.</p> <p>*Use $<$, $>$, and number lines to compare fractions/ decimals/percents</p> <p>*Translate problems involving percent to mathematical models for solving</p> <p>I. Understand the interrelationship of the four binary arithmetic-operations, & use properties of these operations in</p>	<p>J. Recognize and represent basic number patterns.</p> <p>*Represent geometric relationships with number patterns</p> <p>K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings and uses in applications.</p>	<p>working with algebraic expressions.</p> <p>J. Recognize and represent basic number patterns.</p> <p>K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings and uses in applications.</p>

**Washington West Supervisory Union
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MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>working with algebraic expressions. *Solve equations involving one or two operations (unitary and/or binary)</p> <p>J. Recognize & represent basic number patterns. *Increase familiarity with patterns, e.g. odds, evens, squares, multiples</p> <p>K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings & uses in applications. *Find value of expressions involving a variety of unitary and/or</p>			<p>forming and working with algebraic expressions. *Write a problem to represent a given operation(s), expression, or equation *Use algebraic models to solve problems involving binary and/or unitary operations</p> <p>J. Recognize and represent basic number patterns. *Represent patterns, e.g. odds, evens, squares, multiples, algebraically *Solve problems involving number patterns</p>		

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MATHEMATICAL UNDERSTANDING

Arithmetic, Number, and Operation Concepts

7.6 Students understand arithmetic in computation, and they select and use, in appropriate situations, mental arithmetic, pencil and paper, calculator, and computer. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
*Find value of expressions involving a variety of unitary and/or binary operations			K. Show facility with the mechanics of unitary & binary operations, along with an understanding of their typical meanings & uses in applications. *Solve equations involving combinations of operations (unitary and/or binary)		

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Ninth

AAA. Understand the properties of figures relating to shape, size, location, direction and orientation.

BBB. Work with basic types of solid and plane figures, and with geometric patterns involving such figures.

CCC. Use relationships between figures that involve congruence, similarity, projections, and transformations

DDD. Use quotient measures (e.g. slope and "per unit" amounts) and product measures (e.g. person-days).

EEE. Know, use, and derive formulas for area and volume of many kinds of figures.

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

Tenth

AAA. Understand the properties of figures relating to shape, size, location, direction and orientation.

BBB. Work with basic types of solid and plane figures, and with geometric patterns involving such figures.

CCC. Use relationships between figures that involve congruence, similarity, projections, and transformations

DDD. Use quotient measures (e.g. slope and "per unit" amounts) and product measures (e.g. person-days).

EEE. Know, use, and derive formulas for area and volume of many kinds of figures.

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

Eleventh

AAA. Understand the properties of figures relating to shape, size, location, direction and orientation.

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EEE. Know, use, and derive formulas for area and volume of many kinds of figures.

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

Twelfth

AAA. Understand the properties of figures relating to shape, size, location, direction and orientation.

BBB. Work with basic types of solid and plane figures, and with geometric patterns involving such figures.

CCC. Use relationships between figures that involve congruence, similarity, projections, and transformations

DDD. Use quotient measures (e.g. slope and "per unit" amounts) and product measures (e.g. person-days).

EEE. Know, use, and derive formulas for area and volume of many kinds of figures.

F. Measure as exactly as possible or round off, as appropriate, and justify the choice.

Washington West Supervisory Union
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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Ninth

FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis.

G. Extend and create geometric patterns, concrete and pictorial models.

H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.

I. Analyze geometric figures and prove things about them using deductive methods.

J. Present graphs and figures.

Tenth

FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis.

G. Extend and create geometric patterns, concrete and pictorial models.

H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.

I. Analyze geometric figures and prove things about them using deductive methods.

J. Present graphs and figures.

Eleventh

FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis.

G. Extend and create geometric patterns, concrete and pictorial models.

H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.

I. Analyze geometric figures and prove things about them using deductive methods.

J. Present graphs and figures.

Twelfth

FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis.

G. Extend and create geometric patterns, concrete and pictorial models.

H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.

I. Analyze geometric figures and prove things about them using deductive methods.

J. Present graphs and figures.

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>AAA. Understand the properties of figures relating to shape, size, location, direction, and orientation.</p> <p>BBB. Work with basic types of solid and plane figures, and with geometric patterns involving such figures. *Solve problems involving common geometric figures</p> <p>CCC. Use relationships between figures that involve congruence, similarity, projections, and transformations.</p>	<p>AAA. Understand the properties of figures relating to shape, size, location, direction, and orientation.</p> <p>BBB. Work with basic types of solid & plane figures, and with geometric patterns involving such figures. *Solve problems involving common geometric figures</p> <p>CCC. Use relationships between figures that involve congruence, similarity, projections and transformations.</p>	<p>AAA. Understand the properties of figures relating to shape, size, location, direction, and orientation.</p> <p>BBB. Work with basic types of solid and plane figures, & with geometric patterns involving such figures. *Solve problems involving common geometric figures.</p> <p>CCC. Use relationships between figures that involve congruence, similarity, projections and transformations.</p> <p>DDD. Use quotient measures (e.g. slope & "per unit" amounts) and product measures (e.g. person-days). *Use quotient measures (e.g. slope and "per unit" amounts)</p>	<p>AAA. Understand the properties of figures relating to shape, size, location, direction and orientation. *State & apply Pythagorean Theorem & converse *Apply properties of sides & angles to triangles *Find distances and midpoints</p> <p>BBB. Work with basic types of solid & plane figures and with geometric patterns involving such figures. *Solve problems involving common geometric figures.</p>	<p>AAA. Understand the properties of figures relating to shape, size, location, direction and orientation. *Derive, state and apply Pythagorean Theorem & converse *State & apply properties of various triangles *Define, derive, & apply properties of quadrilaterals *Derive & apply properties of 30-60-90 & isosceles triangles *Derive & apply formulas for distance & midpoints *Relate slope of lines to properties of geometric figures</p>	<p>AAA. Understand the properties of figures relating to shape, size, location, direction and orientation.</p> <p>BBB. Work with basic types of solid and plane figures and with geometric patterns involving such figures.</p> <p>CCC. Use relationships between figures that involve congruence, similarity, projections and transformations.</p> <p>DDD. Use quotient measures (e.g. slope & "per unit" amounts) and product measures (e.g. person-days).</p>

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>DDD. Use quotient measures (e.g. slope and "per unit" amounts) and product measures (e.g. person-days). *Use quotient measures (e.g. "per unit" amounts)</p> <p>EEE. Know, use & derive formulas for area & volume of many kinds of figures. *Use formulas for area of common figures</p> <p>FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues</p>	<p>DDD. Use quotient measures (e.g. slope and "per unit" amounts) and product measures (e.g. person-days). *Use quotient measures (e.g. "per unit" amounts) *Use product measures (e.g. computer-hours)</p> <p>EEE. Know, use, & derive formulas for area & volume of many kinds of figures.</p> <p>FF. Carry out unit conversions, scale changes and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy & error analysis. *Use rulers and protractors</p>	<p>EEE. Know, use & derive formulas for area & volume of many kinds of figures. *Use formulas for area of common figures.</p> <p>FF. Carry out unit conversions, scale changes and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy & error analysis. *Check reasonableness of answers *Carry out unit conversions</p> <p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures. *Use SI & customary units to measure length, perimeter, area</p>	<p>CCC. Use relationships between figures that involve congruence, similarity, projections, and transformations.</p> <p>DDD. Use quotient measures (e.g. slope & "per unit" amounts) and product measures (e.g. person-days). *Use quotient measures (i.e. slope & "per unit" amounts)</p> <p>EEE. Know, use & derive formulas for area & volume of many kinds of figures. *Know & use formulas for area & volume of common figures</p>	<p>BBB. Work with basic types of solid & plane figures, & with geometric patterns involving such figures. *Solve problems involving a variety of plane & solid geometric figures *Derive & apply theorems about interior & exterior angles of triangles & polygons *Inscribe and circumscribe triangles by construction</p> <p>CCC. Use relationships between figures that involve congruence, similarity, projections and transformations. *State & apply congruent and similar polygon theorems</p>	<p>EEE. Know, use & derive formulas for area & volume of many kinds of figures.</p> <p>FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy and error analysis.</p> <p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.</p>

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Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>of precision, accuracy and error analysis. *Use rulers and protractors *Check reasonableness of answers *Carry out unit conversions</p> <p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures. *Use SI and customary units to measure length</p> <p>I. Analyze geometric figures & prove things about them using deductive methods.</p>	<p>*Explain reasonableness of answers *Carry out unit conversions *Use appropriate units for given application</p> <p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures. *Use SI and customary units to measure length, perimeter, area, volume</p> <p>I. Analyze geometric figures & prove things about them using deductive methods.</p>	<p>I. Analyze geometric figures & prove things about them using deductive methods.</p> <p>J. Present graphs and figures. *Extract information from graphs and charts. *Use graphs and charts to represent data</p>	<p>FF. Carry out unit conversions, scale changes and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy, and error analysis. *Defend reasonableness of answers *Carry out unit conversions</p> <p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures. *Use SI & customary units to measure length,</p>	<p>*Construct congruent and similar figures by hand and/or computer</p> <p>DDD. Use quotient measures (e.g. slope & "per unit" amounts) and product measures (e.g. person-days). *Use quotient measures (e.g. "per unit" amounts) *Use product measures (e.g. computer-hours)</p> <p>EEE. Know, use & derive formulas for area & volume of many kinds of figures. *Know, use & derive formulas for area & volume of many kinds of figures.</p>	<p>I. Analyze geometric figures and prove things about them using deductive methods.</p> <p>J. Present graphs and figures.</p>

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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>J. Present graphs and figures. *Extract information from graphs and charts *Use graphs and charts to represent data</p>	<p>J. Present graphs and figures. *Extract information from graphs, charts, and diagrams *Use graphs, charts, and diagrams to represent data and support conclusions</p>		<p>I. Analyze geometric figures and prove things about them using deductive methods.</p> <p>J. Present graphs and figures. *Extract information from graphs and charts *Use graphs and charts to represent data *Make connections between different representations</p>	<p>FF. Carry out unit conversions, scale changes, and dimensional analysis; competently use basic measurement instruments; understand issues of precision, accuracy & error analysis. *Use standard geometric measuring instruments with confidence *Carry out unit conversions & scale changes *Defend reasonableness of answers & appropriateness of units *Use SI and customary units to measure length, perimeter, area, volume</p>	

Washington West Supervisory Union
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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
				<p>H. Understand the structure of standard measurement systems (SI and customary), including basic geometric and non-geometric measures.</p> <p>I. Analyze geometric figures and prove things about them using deductive methods.</p> <p>J. Present graphs and figures. *Extract information from graphs, charts, diagrams, and drawings *Use graphs, charts, diagrams, and drawings to represent data and/or ideas and to support conclusions</p>	

Washington West Supervisory Union
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MATHEMATICAL UNDERSTANDING

Geometric and Measurement Concepts

7.7 Students use geometric and measurement concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry *Make connections between different representations	Algebra II and Trigonometry
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MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Ninth

AAA. Use functions to represent patterns.

BBB. Represent functional relationships in formulas, tables, and graphs, and translate among these; model given situations with functions, and interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational, square, and square roots, and cubes and cube roots); work with properties and mechanics of functions (evaluation, inverse, slope, local maxima and minima).

Tenth

AAA. Use functions to represent patterns.

BBB. Represent functional relationships in formulas, tables, and graphs, and translate among these; model given situations with functions, and interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational, square, and square roots, and cubes and cube roots); work with properties and mechanics of functions (evaluation, inverse, slope, local maxima and minima).

Eleventh

AAA. Use functions to represent patterns.

BBB. Represent functional relationships in formulas, tables, and graphs, and translate among these; model given situations with functions, and interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational, square, and square roots, and cubes and cube roots); work with properties and mechanics of functions (evaluation, inverse, slope, local maxima and minima).

Twelfth

AAA. Use functions to represent patterns.

BBB. Represent functional relationships in formulas, tables, and graphs, and translate among these; model given situations with functions, and interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational, square, and square roots, and cubes and cube roots); work with properties and mechanics of functions (evaluation, inverse, slope, local maxima and minima).

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MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Ninth

CCC. Define and use variables, parameters, constants, and unknowns in work with both functions and equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves such as lines, circles, ellipses, parabolas, and hyperbolas.

DDD. Understand the basic algebraic structures of number systems.

E. Understand rate relationships in constant rate situations.

F. Use arithmetic and geometric sequences.

Tenth

CCC. Define and use variables, parameters, constants, and unknowns in work with both functions and equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves such as lines, circles, ellipses, parabolas, and hyperbolas.

DDD. Understand the basic algebraic structures of number systems.

E. Understand rate relationships in constant rate situations.

F. Use arithmetic and geometric sequences.

Eleventh

CCC. Define and use variables, parameters, constants, and unknowns in work with both functions and equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves such as lines, circles, ellipses, parabolas, and hyperbolas.

DDD. Understand the basic algebraic structures of number systems.

E. Understand rate relationships in constant rate situations.

F. Use arithmetic and geometric sequences.

Twelfth

CCC. Define and use variables, parameters, constants, and unknowns in work with both functions and equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves such as lines, circles, ellipses, parabolas, and hyperbolas.

DDD. Understand the basic algebraic structures of number systems.

E. Understand rate relationships in constant rate situations.

F. Use arithmetic and geometric sequences.

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Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>AAA. Use functions to represent patterns. *Find, complete, create & extend a wide variety of patterns including repeating, growing numerical, geometric, and exponential</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines</p>	<p>AAA. Use functions to represent patterns. *Solve problems by expressing the nth term and solving for a particular term</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational square, & square roots, & cubes & cube roots; work with properties</p>	<p>AAA. Use functions to represent patterns. *Write the nth term of a sequence</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational square, & square roots, & cubes & cube roots; work with properties & mechanics for functions (evaluation, inverse, slope, local maxima & minima). *Make tables of rational values for</p>	<p>AAA. Use functions to represent patterns. *Write functions to represent patterns.</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational square,</p>	<p>AAA. Use functions to represent patterns. *Connect geometric patterns with algebraic models</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational square, & square roots, & cubes & cube</p>	<p>AAA. Use functions to represent patterns.</p> <p>BBB. Represent functional relationships in formulas, tables & graphs, & translate among these; model given situations with functions, & interpret given functions in terms of situations; understand functions as relationships in which one quantity determines another; use basic types of functions (linear, exponential, periodic, power, rational square, & square roots, & cubes & cube</p>

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Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>another; use basic types of functions (linear, exponential, periodic, power, rational square, & square roots, & cubes & cube roots; work with properties & mechanics for functions (evaluation, inverse, slope, local maxima & minima).</p> <p>*Graph ordered pairs of rationals on coordinate plane</p> <p>*Plot data</p> <p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and</p>	<p>& mechanics for functions (evaluation, inverse, slope, local maxima & minima).</p> <p>*Make tables of ordered pairs for applications & graph</p> <p>*Derive or select appropriate formulas for applications</p> <p>*Express data in terms of input/output</p> <p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves, lines, circles,</p>	<p>functions & graph</p> <p>*Draw line of best fit for data</p> <p>*Identify input/output for functions</p> <p>*Express word sentences as equations</p> <p>*Write algebraic models for problems</p> <p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves, lines, circles, ellipses, parabolas, and hyperbolas.</p> <p>*Solve equations involving one or more operations with Rational numbers</p>	<p>& square roots, & cubes & cube roots; work with properties & mechanics for functions (evaluation, inverse, slope, local maxima & minima).</p> <p>*Define maximum & minimum values for functions</p> <p>*Write equation for line of best fit for data</p> <p>*Identify Domain/Range</p> <p>*Write equations to represent & solve problems</p> <p>*Understand slope as rate of change</p> <p>*Identify dependent/independent variables</p> <p>*Write linear functions in different forms</p> <p>*Solve formulas for different</p>	<p>periodic, power, rational square, & square roots, & cubes & cube roots; work with properties & mechanics for functions (evaluation, inverse, slope, local maxima & minima).</p> <p>*Determine maximum & minimum values for problems</p> <p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use</p>	<p>roots; work with properties & mechanics for functions (evaluation, inverse, slope, local maxima & minima).</p> <p>*Derive inverse functions</p> <p>*Link a variety of function types such as exponential, square root, square, cube, cube root, and periodic to applications</p> <p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and graphically,</p>

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>graphically, especially linear, quadratic, and exponential equations; use equations to represent curves, lines, circles, ellipses, parabolas, and hyperbolas. *Solve for unknowns in equations using addition, subtraction, multiplication, or division to obtain related equations *Solve equations involving Rationals by transformations (e.g. $2/3x=8$)</p> <p>DDD. Understand the basic algebraic structure of number systems.</p>	<p>ellipses, parabolas, and hyperbolas.</p> <p>DDD. Understand the basic algebraic structure of number systems.</p> <p>E. Understand rate relationships in constant rate situations.</p> <p>F. Use arithmetic and geometric sequences. *Identify applications as arithmetic sequences *Find the sum of arithmetic sequences intuitively</p>	<p>*Solve equations involving Distributive, variables on both sides, etc.</p> <p>DDD. Understand the basic algebraic structure of number systems. *Show understanding of distributive and commutative properties</p> <p>E. Understand rate relationships in constant rate situations. *Identify the rate of change for problems or relationships.</p> <p>F. Use arithmetic and geometric sequences. *Find the sum of an arithmetic sequence with common sense approach</p>	<p>CCC. Define & use variables, parameters, constants, & unknowns in work with both functions & equations; solve equations both symbolically and graphically, especially linear, quadratic, and exponential equations; use equations to represent curves, lines, circles, ellipses, parabolas, and hyperbolas. *Solve equations with Rational numbers involving multiple operations, distributive property, absolute values & variables on both sides *Solve quadratic equations algebraically &</p>	<p>equations to represent curves, lines, circles, ellipses, parabolas, and hyperbolas.</p> <p>DDD. Understand the basic algebraic structure of number systems.</p> <p>E. Understand rate relationships in constant rate situations.</p> <p>F. Use arithmetic and geometric sequences. *Identify arithmetic and geometric models</p>	<p>especially linear, quadratic, and exponential equations; use equations to represent curves, lines, circles, ellipses, parabolas, and hyperbolas. *Solve exponential, square root, power, cube, and cube root functions algebraically and graphically</p> <p>DDD. Understand the basic algebraic structure of number systems.</p> <p>E. Understand rate relationships in constant rate situations.</p>

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MATHEMATICAL UNDERSTANDING

Function and Algebra Concepts

7.8 Students use function and algebra concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>E. Understand rate relationships in constant rate situations.</p> <p>F. Use arithmetic and geometric sequences. *Use vocabulary "arithmetic" correctly</p>			<p>DDD. Understand the basic algebraic structure of number systems. *Show understanding of distributive, commutative, associative, identity, and inverse properties</p> <p>E. Understand rate relationships in constant rate situations. *Link the rate of change to a linear graph, equation, or problem</p> <p>F. Use arithmetic and geometric sequences. *Find the sum of an arithmetic sequence with common sense approach *Derive & use formula for nth term of arithmetic sequence</p>		<p>F. Use arithmetic and geometric sequences. *Derive & use formula for nth term of arithmetic series *Derive & use formula for nth term of geometric sequence *Derive & use formula for nth term of geometric series</p>

Washington West Supervisory Union
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MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Ninth

AAA. Explore questions of experimental design, use of control groups, and reliability.

BBB. Work with normal distribution in some of its basic uses.

CCC. Analyze single-variable data using frequency distributions, histograms, and summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.

DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.

Tenth

AAA. Explore questions of experimental design, use of control groups, and reliability.

BBB. Work with normal distribution in some of its basic uses.

CCC. Analyze single-variable data using frequency distributions, histograms, and summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.

DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.

Eleventh

AAA. Explore questions of experimental design, use of control groups, and reliability.

BBB. Work with normal distribution in some of its basic uses.

CCC. Analyze single-variable data using frequency distributions, histograms, and summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.

DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.

Twelfth

AAA. Explore questions of experimental design, use of control groups, and reliability.

BBB. Work with normal distribution in some of its basic uses.

CCC. Analyze single-variable data using frequency distributions, histograms, and summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.

DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.

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MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Ninth

EE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.

Tenth

EE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.

Eleventh

EE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.

Twelfth

EE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.

**Washington West Supervisory Union
Math Standards and Assessment**

MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>AAA. Explore questions of experimental design, use of control groups, and reliability. *Discuss validity of information presented in a chart or graph</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.</p>	<p>AAA. Explore questions of experimental design, use of control groups, and reliability. *Discuss validity of information presented in a chart or graph</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients. *Use data to generate scatter plots *Draw line of best fit</p>	<p>AAA. Explore questions of experimental design, use of control groups, and reliability. *Discuss validity of information presented in a chart or graph</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients. *Use data to generate scatter plots *Draw line of best fit *Use line of best fit to predict values</p>	<p>AAA. Explore questions of experimental design, use of control groups, and reliability. *Discuss validity of information presented in a chart or graph</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.</p>	<p>AAA. Explore questions of experimental design, use of control groups, and reliability.</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.</p>	<p>AAA. Explore questions of experimental design, use of control groups, and reliability.</p> <p>BBB. Work with normal distribution in some of its basic uses.</p> <p>CCC. Analyze single-variable data using frequency distributions, histograms, & summary statistics; analyze two-variable data using scatter plots, regression lines, and correlation coefficients.</p>

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MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>*Use data to generate scatter plots *Draw line of best fit *Use line of best fit to predict values</p> <p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities. *Use physical representations to create theoretical probabilities</p>	<p>*Use line of best fit to predict values</p> <p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities. *Use physical representations to create theoretical probabilities *Use theoretical models to solve problems</p>	<p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.</p> <p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>	<p>*Draw line of best fit *Use line of best fit to predict values *Write an equation to match the data</p> <p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.</p>	<p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities.</p> <p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>	<p>DDD. Use experimental measures of likelihood based on gathering of data to arrive at relative frequencies of change events; use theoretical probability models to arrive at probabilities for chance events; use simulations to estimate probabilities. *Create theoretical models to measure probability *Demonstrate the connection between models & experimental behavior</p>

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MATHEMATICAL UNDERSTANDING

Statistics and Probability Concepts

7.9 Students use statistics and probability concepts. This is evident when students:

Math I	Applied Math I	Algebra A	Algebra I/B	Geometry	Algebra II and Trigonometry
<p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>	<p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>		<p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>		<p>EEE. Set up and work with appropriate sample spaces; use sampling techniques to draw inferences about large populations.</p>

Washington West Supervisory Union
Math Standards and Assessment

MATHEMATICAL PROBLEM SOLVING AND REASONING

Applications

7.10 Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems. This is evident when students:

Ninth

AA. Formulate and solve meaningful problems in many kinds of situations using grade-related mathematical concepts and reasoning strategies.

BBB. Formulate and carry out detailed solutions to complex problems, using appropriate problem-solving techniques.

CCC. Carry out a systematic analysis of different possibilities in a complex situation; create and test mathematical models of given situations; use basic principles of mathematical proof and reasoning in solving a variety of problems; identify interesting problems in a situation with minimal guidance, and pursue these problems by asking and answering appropriate questions.

Tenth

AA. Formulate and solve meaningful problems in many kinds of situations using grade-related mathematical concepts and reasoning strategies.

BBB. Formulate and carry out detailed solutions to complex problems, using appropriate problem-solving techniques.

CCC. Carry out a systematic analysis of different possibilities in a complex situation; create and test mathematical models of given situations; use basic principles of mathematical proof and reasoning in solving a variety of problems; identify interesting problems in a situation with minimal guidance, and pursue these problems by asking and answering appropriate questions.

Eleventh

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MATHEMATICAL PROBLEM SOLVING AND REASONING

Applications

7.10 Students use concrete, formal, and informal strategies to solve mathematical problems, apply the process of mathematical modeling, and extend and generalize mathematical concepts. Students apply mathematics as they solve scientific and technological problems or work with technological systems. This is evident when students:

Ninth

DDD. Approach a relatively unfamiliar situation and explore its mathematically interesting aspects.

EEE. Work to extend specific results and generalize from them.

F. Make sensible, reasonable estimates.

GG. Gather evidence for conjectures and formulate proofs for them; understand the difference between supportive examples and proof.

Tenth

DDD. Approach a relatively unfamiliar situation and explore its mathematically interesting aspects.

EEE. Work to extend specific results and generalize from them.

F. Make sensible, reasonable estimates.

GG. Gather evidence for conjectures and formulate proofs for them; understand the difference between supportive examples and proof.

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