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# Frameworks for Mathematics

## *Grade 5*



West Virginia DEPARTMENT OF  
EDUCATION



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## Grade 5

Instructional time should focus on three critical areas: (1) developing fluency with addition and subtraction of fractions, and developing understanding of the multiplication of fractions and of division of fractions in limited cases (unit fractions divided by whole numbers and whole numbers divided by unit fractions); (2) extending division to 2-digit divisors, integrating decimal fractions into the place value system and developing understanding of operations with decimals to hundredths, and developing fluency with whole number and decimal operations; (3) developing an understanding of volume; solving problems using the coordinate plane.

### Operations and Algebraic Thinking

Standards	Teacher Understandings	Resources	Student Understandings
<p><b>Write and Interpret numerical expressions.</b></p> <p>M.5.1 Use parentheses, brackets or braces in numerical expressions and evaluate expressions with these symbols.</p> <p>M.5.2 Write simple expressions that record calculations with numbers and interpret numerical expressions without evaluating them. (e.g., Express the calculation “add 8 and 7, then multiply by 2” as <math>2 \times (8 + 7)</math>. Recognize that <math>3 \times (18932 + 921)</math> is three times as large as <math>18932 + 921</math>, without having to calculate the indicated sum or product.)</p>	<p>It is important for teachers to understand that neglecting any grade-level standards will leave gaps in students’ skills and understandings. This will leave students unprepared for the challenges they face in later grades.</p> <p>Students use the <b>Mathematical Habits of Mind</b> to interact with the grade level content standards. The teacher needs to craft instructional tasks that connect the Mathematical Habits of</p>	<p>The following is a list of resources for teachers and students:</p> <p><b>Math TREE Online Education Resources</b> A curated set of aligned, internet resources for WV elementary math teachers</p> <p><a href="#">Quantile Teacher Assistant</a> This tool is aligned to WV standards and is designed to help educators locate resources that can support instruction and</p>	<ul style="list-style-type: none"> <li>Students need to understand that they should work with the innermost grouping symbols first and that some operations are done before others, even if grouping symbols are not included.</li> <li>If students use the mnemonic phrase “Please Excuse My Dear Aunt Sally” to remember the order of operations (<b>P</b>arentheses,</li> </ul>



<p><b>Analyze patterns and relationships</b></p> <p>M.5.3 Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. (e.g., Given the rule “Add 3” and the starting number 0 and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.)</p>	<p>Mind to the content standards.</p> <p>Work from inner to outer grouping symbols.</p> <p>When working with expressions do not insert equal signs. This changes the expression into an equation.</p> <p>The word “of” implies multiplication.</p> <p>Indicate the mnemonic could be read “<b>Please Excuse Dear My Sally Aunt</b>” because <b>D</b>ivision may be performed before <b>M</b>ultiplication if working left to right. Similarly, if all multiplication and division has been performed, <b>S</b>ubtraction might be completed before <b>A</b>ddition in an expression when working left to right.</p> <p>Twice a number indicates to multiply by 2.</p> <p>Students need help and practice remembering the convention that we</p>	<p>identify skills most relevant to standards.</p> <p><b>Illustrative Mathematics</b> <a href="http://www.illustrativemathematics.org">http://www.illustrativemathematics.org</a> This website provides teachers with learning tasks that develop the WV College- and Career-Readiness Standards for Mathematics, supporting the teacher’s content knowledge of mathematics.</p> <p><b>Graham Fletcher Site G Fletchy</b> <a href="http://www.gfletchy.com">http://www.gfletchy.com</a> This website includes learning progression videos related to counting, and 3-Act tasks that may be connected to the WV College- and Career-Readiness Standards for Mathematics.</p> <p><b>Inside Mathematics</b></p>	<p><b>Exponents, Multiplication, Division, Addition, Subtraction</b>) they need to know multiplication is not always performed before division or addition before subtraction. Multiplication and division are done at the same time (<i>in order, from left to right</i>). Addition and subtraction are also done at the same time (<i>in order, from left to right</i>).</p> <ul style="list-style-type: none"> <li>• Students need a lot of experience with writing multiplication in different ways. Multiplication may be indicated with a raised dot (e.g., 4·5), a raised cross symbol (e.g., 4 × 5), or parentheses (e.g.,</li> </ul>
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	<p>typically write <math>a</math> rather than <math>1 \times a</math> or <math>1a</math>, especially in expressions such as <math>a + 3a</math>. (<math>1a = a</math> is an example of the Multiplicative Identity Property.)</p> <p>Numerals are placed in front of a variable and are called coefficients. The accepted notation is “<math>3a</math>”. It is considered incorrect or non-standard to indicate multiplication as “<math>a3</math>”.</p> <p>Generally, in grade five, when a rule is used the relationship between the points is linear.</p>	<p><a href="http://insidemathematics.org">http://insidemathematics.org</a>  Inside Mathematics is a nationally recognized multimedia website for educators around the world. This site includes videos, learning tasks, and performance assessment tasks.</p> <p><b>NCTM Illuminations</b>  <a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a>  Illuminations is a project designed by NCTM. The site includes lessons, activities, and computer applets.</p> <p><b>Math Coach’s Corner</b>  <b>Donna Boucher</b>  <a href="http://www.mathcoachscorner.com">http://www.mathcoachscorner.com</a>  This site is a blog by an elementary mathematics coach. Her blog includes mathematical background on concepts as well as mathematical tasks.</p>	<p><math>4(5)</math> or <math>(4)(5)</math>). Note that the raised cross symbol is not the same as the letter <math>x</math> and may be confused with the variable “<math>x</math>,” so care should be taken when writing or typing this symbol. Students need to be exposed to all three notations and should be challenged to understand that all are useful.</p>
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## Number and Operations in Base Ten

Standards	Teacher Understandings	Resources	Student Understandings
<p><b>Understand the place value system.</b></p> <p>M.5.4 Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.</p> <p>M.5.5 Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.</p> <p>M.5.6 Read, write, and compare decimals to thousandths.           <ol style="list-style-type: none"> <li>Read and write decimals to thousandths using base-ten numerals, number names and expanded form (e.g., <math>347.392 = 3 \times 100 + 4 \times 10 + 7 \times 1 + 3 \times (1/10) + 9 \times (1/100) + 2 \times (1/1000)</math>).</li> <li>Compare two decimals to thousandths based on meanings of the digits in each place, using <math>&gt;</math>, <math>=</math> and <math>&lt;</math></li> </ol> </p>	<p>It is important for teachers to understand that neglecting any grade-level standards will leave gaps in students' skills and understandings. This will leave students unprepared for the challenges they face in later grades.</p> <p>Students use the <b>Mathematical Habits of Mind</b> to interact with the grade level content standards. The teacher needs to craft instructional tasks that connect the Mathematical Habits of Mind to the content standards.</p> <p>When a new concept is introduced, concrete objects help students visualize the meaning. In grade five, students extend their understanding of the base-ten system from whole numbers to decimals, focusing on the relationship</p>	<p>The following is a list of resources for teachers and students:</p> <p><b>Math TREE Online Education Resources</b> A curated set of aligned, internet resources for WV elementary math teachers</p> <p><a href="#">Quantile Teacher Assistant</a> This tool is aligned to WV standards and is designed to help educators locate resources that can support instruction and identify skills most relevant to standards.</p> <p><b>Illustrative Mathematics</b> <a href="http://www.illustrativemathematics.org">http://www.illustrativemathematics.org</a> This website provides teachers with learning tasks that develop the WV College- and Career-Readiness Standards for</p>	<ul style="list-style-type: none"> <li>Students need to understand the size of decimal numbers and relate them to common benchmarks such as 0, 0.5 (0.50 and 0.500), and 1.</li> <li>Working with decimals will be challenging if students are not able to read, write, and represent multi-digit numbers. Teachers can use base-ten blocks and money to provide meaning for decimals. For example, dimes can represent tenths and, pennies represent hundredths.</li> <li>Compare tenths to tenths, hundredths to hundredths, and thousandths to thousandths. (<math>0.57 &gt; 0.567</math>; when both are expressed as</li> </ul>



<p>symbols to record the results of comparisons.</p> <p>M.5.7 Use place value understanding to round decimals to any place.</p> <p><b>Perform operations with multi-digit whole numbers and with decimals to hundredths.</b></p> <p>M.5.8 Fluently multiply multi-digit whole numbers using the standard algorithm.</p> <p>M.5.9 Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.</p> <p>M.5.10 Add, subtract, multiply and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between related operations, relate the strategy to a written method and explain the reasoning used.</p>	<p>between adjacent place values, how numbers compare, and how numbers round for decimals to thousandths. Before considering the relationship of decimal fractions, students reason that in multi-digit whole numbers, a digit in one place represents 10 times what it represents in the place to its right (30 is 10 times greater than 3) and 1/10 of what it represents in the place to its left (7 is 1/10 of 70).</p> <p>Base-ten blocks can be a powerful tool for seeing equivalent representations. For instance, if a “flat” is used to represent 1 (the whole or unit), then a “stick” represents 1/10, and a small “cube” represents 1/100. As shown below, students can be challenged to make sense of a number like 0.23 as being represented by both <math>\frac{2}{10} + \frac{3}{100}</math> and <math>\frac{23}{100}</math>.</p> <p>Previously, students built a conceptual understanding</p>	<p>Mathematics, supporting the teacher’s content knowledge of mathematics.</p> <p><b>Graham Fletcher Site G Fletchy</b> <a href="http://www.gfletchy.com">http://www.gfletchy.com</a> This website includes learning progression videos related to counting, and 3-Act tasks that may be connected to the WV College- and Career-Readiness Standards for Mathematics.</p> <p><b>Inside Mathematics</b> <a href="http://insidemathematics.org">http://insidemathematics.org</a> Inside Mathematics is a nationally recognized multimedia website for educators around the world. This site includes videos, learning tasks, and performance assessment tasks.</p> <p><b>NCTM Illuminations</b> <a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a></p>	<p>thousandths it is easier to see: <math>0.570 &gt; 0.567</math>).</p> <ul style="list-style-type: none"> <li>• Prior work has shown the longer a number, the greater its value, for example, <math>1234 &gt; 567</math>. Decimal notation does not follow this same rule, as in <math>0.1234 &lt; 0.567</math>.</li> <li>• The extension from one-digit divisors to two-digit divisors is a major milestone along the way to reaching fluency with the standard algorithm in grade six.</li> <li>• When adding decimals, students must understand they add tenths to tenths and hundredths to hundredths. When students add in a vertical format (numbers below each other), it is important that they write digits with the same place</li> </ul>
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	<p>of multiplication with whole numbers as they applied multiple strategies to compute and solve problems. Students can continue to use different strategies and methods learned previously—as long as the methods are <b>efficient</b>—but they must <b>also</b> understand and be able to use the standard algorithm.</p> <p>Teachers can begin with simple examples to help students understand the use of place value when dividing with two-digit divisors. For example, having students divide 120 by 30; clearly, the answer is 4, since this is 12 tens divided by 3 tens. However, when dividing 1200 by 30, students need to think of this as 120 tens divided by 3 tens, which is 40. This illustrates why the 4 would go in the tens place of the quotient.</p> <p>Division strategies in grade five extend the methods</p>	<p>illuminations is a project designed by NCTM. The site includes lessons, activities, and computer applets.</p> <p><b>Math Coach's Corner</b>  <b>Donna Boucher</b>  <a href="http://www.mathcoachs-corner.com">http://www.mathcoachs-corner.com</a></p> <p>This site is a blog by an elementary mathematics coach. Her blog includes mathematical background on concepts as well as mathematical tasks.</p>	<p>value below each other.</p>
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	learned in grade four to two-digit divisors. Students continue to break the dividend into base-ten units and find the quotient place by place, starting from the highest place. They illustrate and explain their calculations by using equations, rectangular arrays, and/or area models.		
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## Number and Operations Fractions

Standards	Teacher Understandings	Resources	Student Understandings
<p><b>Use equivalent fractions as a strategy to add and subtract fractions.</b></p> <p>M.5.11 Add and subtract fractions with unlike denominators, including mixed numbers, by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators (e.g., <math>2/3 + 5/4 = 8/12 + 15/12 = 23/12</math>). Instructional Note: In general, <math>a/b + c/d = (ad + bc)/bd</math>.</p> <p>M.5.12 Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of</p>	<p>It is important for teachers to understand that neglecting any grade-level standards will leave gaps in students' skills and understandings. This will leave students unprepared for the challenges they face in later grades.</p> <p>Students use the <b>Mathematical Habits of Mind</b> to interact with the grade level content standards. The teacher needs to craft instructional tasks that connect the Mathematical Habits of</p>	<p>The following is a list of resources for teachers and students:</p> <p><b>Math TREE Online Education Resources</b> A curated set of aligned, internet resources for WV elementary math teachers</p> <p><a href="#">Quantile Teacher Assistant</a> This tool is aligned to WV standards and is designed to help educators locate</p>	<ul style="list-style-type: none"> <li>• Prior to adding and subtracting fractions with unlike denominators, students need to understand the fractional parts must be traded for equivalent units (common denominator).</li> <li>• Students need to understand how to create equivalent fractions with the same</li> </ul>



<p>unlike denominators by using visual fraction models or equations to represent the problem. Use benchmark fractions and number sense of fractions to estimate mentally and assess the reasonableness of answers (e.g., recognize an incorrect result <math>2/5 + 1/2 = 3/7</math>, by observing that <math>3/7 &lt; 1/2</math>).</p> <p><b>Apply and extend previous understandings of multiplication and division to multiply and divide fractions.</b></p> <p>M.5.13 Interpret a fraction as division of the numerator by the denominator (<math>a/b = a \div b</math>). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers by using visual fraction models or equations to represent the problem. (e.g., Interpret <math>3/4</math> as the result of dividing 3 by 4, noting that <math>3/4</math> multiplied by 4 equals 3 and that when 3 wholes are shared equally among 4 people each person has a share of size <math>3/4</math>. If 9 people want to share a 50-pound sack of rice equally by weight, how many pounds of rice should each person get? Between what two whole numbers does your answer lie?)</p> <p>M.5.14 Apply and extend previous understandings of multiplication to multiply a fraction or whole number by</p>	<p>Mind to the content standards.</p> <p>This is the first time students have been exposed to adding and subtracting with unlike denominators. Students need repeated experiences with fraction models to develop the concept you can't add <math>1/4</math> and <math>2/3</math> without an understanding of equivalent fractions. With exposure to fraction models, students know they must first find a common unit (denominator).</p> <p>In grade four, students multiply a fraction by a whole number. In grade five, students build on this understanding.</p> <p>Students apply and extend previous understandings of multiplication to multiply a fraction or whole number by a fraction. They multiply fractions efficiently and accurately and solve problems in both contextual and non-contextual situations. Students reason</p>	<p>resources that can support instruction and identify skills most relevant to standards.</p> <p><b>Illustrative Mathematics</b> <a href="http://www.illustrativemathematics.org">http://www.illustrativemathematics.org</a> This website provides teachers with learning tasks that develop the WV College- and Career-Readiness Standards for Mathematics, supporting the teacher's content knowledge of mathematics.</p> <p><b>Graham Fletcher Site G Fletchy</b> <a href="http://www.gfletchy.com">http://www.gfletchy.com</a> This website includes learning progression videos related to counting, and 3-Act tasks that may be connected to the WV College- and Career-Readiness Standards for Mathematics.</p>	<p>denominators before adding or subtracting, a concept learned in grade four. In general, they understand that for any whole numbers <math>a</math>, <math>b</math>, and <math>n</math>, <math>\frac{a}{b} = \frac{n \times a}{n \times b}</math> (given that <math>n</math> and <math>b</math> are non-zero).</p> <ul style="list-style-type: none"> <li>• Students need to be able to visualize benchmark fractions.</li> <li>• Multiplication does not always result in a larger answer; division in a smaller.</li> </ul>
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<p>a fraction.</p> <p>a. Interpret the product <math>(a/b) \times q</math> as a parts of a partition of <math>q</math> into <math>b</math> equal parts; equivalently, as the result of a sequence of operations <math>a \times q \div b</math>. (e.g., Use a visual fraction model to show <math>(2/3) \times 4 = 8/3</math> and create a story context for this equation. Do the same with <math>(2/3) \times (4/5) = 8/15</math>.) Instructional Note: In general, <math>(a/b) \times (c/d) = ac/bd</math>.</p> <p>b. Find the area of a rectangle with fractional side lengths by tiling it with unit squares of the appropriate unit fraction side lengths and show that the area is the same as would be found by multiplying the side lengths. Multiply fractional side lengths to find areas of rectangles and represent fraction products as rectangular areas.</p> <p>M.5.15 Interpret multiplication as scaling (resizing), by:</p> <p>a. Comparing the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number (recognizing multiplication by whole numbers greater than 1 as a familiar case); explaining why multiplying a given</p>	<p>about how to multiply fractions using fraction strips and number line diagrams. Using an understanding of multiplication by a fraction, students develop an understanding of a general formula for the product of two fractions: <math>\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}</math>.</p> <p>Building on previous understandings of multiplication, students find the area of a rectangle with fractional side lengths and represent fraction products as areas.</p> <p>Students apply their understanding of multiplication of fractions and mixed numbers to solve real-world problems by using visual models or equations.</p> <p>Division of a fraction by a fraction is not a requirement at grade five. Students at this grade level use visual fractions models to show the quotient and to solve related real-world problems. Fraction division</p>	<p><b>Inside Mathematics</b> <a href="http://insidemathematics.org">http://insidemathematics.org</a> Inside Mathematics is a nationally recognized multimedia website for educators around the world. This site includes videos, learning tasks, and performance assessment tasks.</p> <p><b>NCTM Illuminations</b> <a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a> Illuminations is a project designed by NCTM. The site includes lessons, activities, and computer applets.</p> <p><b>Math Coach's Corner</b> <b>Donna Boucher</b> <a href="http://www.mathcoachscorner.com">http://www.mathcoachscorner.com</a> This site is a blog by an elementary mathematics coach. Her blog includes mathematical background on concepts as well as mathematical tasks.</p>	
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<p>number by a fraction less than 1 results in a product smaller than the given number; and relating the principle of fraction equivalence <math>a/b = (n \times a)/(n \times b)</math> to the effect of multiplying <math>a/b</math> by 1.</p> <p>M.5.16 Solve real-world problems involving multiplication of fractions and mixed numbers by using visual fraction models or equations to represent the problem.</p> <p>M.5.17 Apply and extend previous understandings of division to divide unit fractions by whole numbers and whole numbers by unit fractions. Instructional Note: Students able to multiply fractions in general can develop strategies to divide fractions in general, by reasoning about the relationship between multiplication and division, but division of a fraction by a fraction is not a requirement at this grade.</p> <p>a. Interpret division of a unit fraction by a non-zero whole number and compute such quotients. (e.g., Create a story context for <math>(1/3) \div 4</math> and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>(1/3) \div 4 = 1/12</math> because <math>(1/12) \times 4 = 1/3</math>.)</p>	<p>is limited to a whole number divided by a unit fraction and a unit fraction divided by a whole number.</p>		
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<p>b. Interpret division of a whole number by a unit fraction and compute such quotients. (e.g., Create a story context for <math>4 \div (1/5)</math> and use a visual fraction model to show the quotient. Use the relationship between multiplication and division to explain that <math>4 \div (1/5) = 20</math> because <math>20 \times (1/5) = 4</math>.)</p> <p>c. Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions by using visual fraction models and equations to represent the problem. (e.g., How much chocolate will each person get if 3 people share <math>1/2</math> lb. of chocolate equally? How many <math>1/3</math>-cup servings are in 2 cups of raisins?)</p>			
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### Measurement and Data

Standards	Teacher Understandings	Resources	Student Understandings
<p><b>Convert like measurement units within a given measurement system.</b></p> <p>M.5.18 Convert among different-sized standard measurement units within a given measurement system</p>	<p>It is important for teachers to understand that neglecting any grade-level standards will leave gaps in students' skills and understandings. This will leave students unprepared for the challenges they face in later grades.</p>	<p>The following is a list of resources for teachers and students:</p> <p><b>Math TREE Online Education Resources</b> A curated set of aligned, internet resources for WV elementary math teachers</p> <p><a href="#">Quantile Teacher Assistant</a> This tool is aligned to WV standards and is designed to help educators locate</p>	<ul style="list-style-type: none"> <li>• Students need to know the difference between square and cubic units.</li> <li>• Square units have an exponent of 2; this relates to the object being two-dimensional.</li> </ul>



<p>(e.g., convert 5 cm to 0.05 m) and use these conversions in solving multi-step, real-world problems.</p> <p><b>Represent and interpret data.</b></p> <p>M.5.19 Make a line plot to display a data set of measurements in fractions of a unit (<math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{8}</math>). Use operations on fractions for this grade to solve problems involving information presented in line plots. (e.g., Given different measurements of liquid in identical beakers, find the amount of liquid each beaker would contain if the total amount in all the beakers were redistributed equally).</p> <p><b>Geometric measurement: understand concepts of volume and relate volume to multiplication and to</b></p>	<p>Students use the <b>Mathematical Habits of Mind</b> to interact with the grade level content standards. The teacher needs to craft instructional tasks that connect the Mathematical Habits of Mind to the content standards.</p> <p>Volume introduces a third dimension, a significant challenge to some students' spatial structuring and also a complexity in the nature of the materials measured.</p> <p>By relating volume to multiplication and addition, students develop an understanding of volume.</p> <p>It is helpful for students to use concrete manipulatives before moving to pictorial representations. Students can explore the concept of volume by packing containers with cubic units (cubes) to find the volume or by building up stacks of cubes without the containers. Students</p>	<p>resources that can support instruction and identify skills most relevant to standards.</p> <p><b>Illustrative Mathematics</b> <a href="http://www.illustrativemathematics.org">http://www.illustrativemathematics.org</a> This website provides teachers with learning tasks that develop the WV College- and Career-Readiness Standards for Mathematics, supporting the teacher's content knowledge of mathematics.</p> <p><b>Graham Fletcher Site G Fletchy</b> <a href="http://www.gfletchy.com">http://www.gfletchy.com</a> This website includes learning progression videos related to counting, and 3-Act tasks that may be connected to the WV College- and Career- Readiness Standards for Mathematics.</p> <p><b>Inside Mathematics</b> <a href="http://insidemathematics.org">http://insidemathematics.org</a> Inside Mathematics is a nationally recognized multimedia website for educators around the world. This site includes videos, learning tasks, and performance assessment tasks.</p> <p><b>NCTM Illuminations</b> <a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a> Illuminations is a project designed by NCTM. The site includes lessons, activities, and computer applets.</p> <p><b>Math Coach's Corner</b></p>	<ul style="list-style-type: none"> <li>• Cubic units have an exponent of 3; this relates to the object being three-dimensional.</li> <li>• It is easier for students to understand volume when given experiences to build rectangular prisms from cubes and see the layers as they construct the volume.</li> <li>• It is helpful for students to use concrete manipulatives before moving to pictorial representations.</li> </ul>
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<p><b>addition.</b></p> <p>M.5.20 Recognize volume as an attribute of solid figures and understand concepts of volume measurement.</p> <p>a. A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume and can be used to measure volume.</p> <p>b. A solid figure which can be packed without gaps or overlaps using <math>b</math> unit cubes is said to have a volume of <math>b</math> cubic units.</p> <p>M.5.21 Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.</p> <p>M.5.22 Relate volume to the operations of multiplication and addition and solve real-world and mathematical problems involving</p>	<p>may also use drawings or interactive computer software to simulate this packing process.</p> <p>Students use the associative property of multiplication and decomposition of numbers using factors to investigate rectangular prisms with a given number of cubic units.</p>	<p><b>Donna Boucher</b> <a href="http://www.mathcoachscorner.com">http://www.mathcoachscorner.com</a> This site is a blog by an elementary mathematics coach. Her blog includes mathematical background on concepts as well as mathematical tasks.</p>	
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<p>volume.</p> <p>a. Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes (e.g., to represent the associative property of multiplication).</p> <p>b. Apply the formulas <math>V = l \times w \times h</math> and <math>V = b \times h</math> for rectangular prisms to find volumes of right rectangular prisms with whole number edge lengths in the context of solving real-world and mathematical problems.</p> <p>c. Recognize volume as additive and find volumes of solid figures composed of two non-overlapping right rectangular prisms</p>			
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by adding the volumes of the non-overlapping parts, applying this technique to solve real-world problems.			
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## Geometry

Standards	Teacher Understandings	Resources	Student Understandings
<p><b>Graph points on the coordinate plane to solve real-world and mathematical problems.</b></p> <p>M.5.23 Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines, the origin, arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the</p>	<p>It is important for teachers to understand that neglecting any grade-level standards will leave gaps in students' skills and understandings. This will leave students unprepared for the challenges they face in later grades.</p> <p>Students use the <b>Mathematical Habits of Mind</b> to interact with the grade level content standards. The teacher needs to craft instructional tasks that connect the Mathematical Habits of Mind to the content standards.</p> <p>Students build on their previous work with number lines to use two perpendicular number lines</p>	<p>The following is a list of resources for teachers and students:</p> <p><b>Math TREE Online Education Resources</b> A curated set of aligned, internet resources for WV elementary math teachers</p> <p><a href="#">Quantile Teacher Assistant</a> This tool is aligned to WV standards and is designed to help educators locate resources that can support instruction and identify skills most relevant to standards.</p> <p><b>Illustrative Mathematics</b> <a href="http://www.illustrativemathematics.org">http://www.illustrativemathematics.org</a> This website provides teachers with learning tasks that develop the WV College- and Career-Readiness Standards for Mathematics, supporting the teacher's content knowledge of mathematics.</p> <p><b>Graham Fletcher Site G Fletchy</b> <a href="http://www.gfletchy.com">http://www.gfletchy.com</a></p>	<ul style="list-style-type: none"> <li>• Previous work with number lines will help students build on their understanding to graph in two dimensions.</li> <li>• Students need to understand Ordered Pairs have an "order". To graph the coordinate pair (x, y) students move to the right first to graph the x value, then up to graph the y.</li> <li>• Students need to be reminded when plotting coordinates (x, y) the first term "x" of the ordered pair is plotted to the</li> </ul>



<p>direction of one axis and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x-axis and x-coordinate, y-axis and y-coordinate).</p> <p>M.5.24 Represent real-world mathematical problems by graphing points in the first quadrant of the coordinate plane and interpret coordinate values of points in the context of the situation.</p> <p><b>Classify two-dimensional figures into categories based on their properties.</b></p> <p>M.5.25 Understand that attributes belonging to a category of two dimensional figures also belong to all subcategories of that</p>	<p>to define a coordinate system.</p> <p>Students need to understand the two axes have names: the horizontal number line is the x-axis; the vertical number line is the y-axis.</p> <p>Students will graph and interpret points in the first quadrant only. Students will extend graphing to all four quadrants in later grades.</p> <p>A common misconception is the order in plotting a coordinate point is unimportant. To address this misconception, teachers can ask students to plot points with the coordinates switched. For example, referring to a graph about number of tickets sold and amount earned, If 4 tickets each cost \$5 the coordinate (4, \$20) would not be the same as (20, 4). Students might locate points on a</p>	<p>This website includes learning progression videos related to counting, and 3-Act tasks that may be connected to the WV College- and Career- Readiness Standards for Mathematics.</p> <p><b>Inside Mathematics</b> <a href="http://insidemathematics.org">http://insidemathematics.org</a> Inside Mathematics is a nationally recognized multimedia website for educators around the world. This site includes videos, learning tasks, and performance assessment tasks.</p> <p><b>NCTM Illuminations</b> <a href="https://illuminations.nctm.org/">https://illuminations.nctm.org/</a> Illuminations is a project designed by NCTM. The site includes lessons, activities, and computer applets.</p> <p><b>Math Coach’s Corner</b> <b>Donna Boucher</b> <a href="http://www.mathcoachscorner.com">http://www.mathcoachscorner.com</a> This site is a blog by an elementary mathematics coach. Her blog includes mathematical background on concepts as well as mathematical tasks.</p>	<p>right and the second term “y” coordinate is plotted by moving upward.</p> <ul style="list-style-type: none"> <li>• Students need to understand the properties of polygons.</li> <li>• An understanding of parallel lines leads to an understanding of parallelograms.</li> <li>• Rectangles are by definition also parallelograms.</li> <li>• Squares are by definition also rectangles (opposite sides parallel and congruent; 4 right angles).</li> <li>• Perpendicular lines form right angles and many polygons are classified as a result of their angles. Squares and rectangles have 4 right angles.</li> <li>• Squares are by definition also rhombuses (4</li> </ul>
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<p>category (e.g., all rectangles have four right angles and squares are rectangles, so all squares have four right angles).</p> <p>M.5.26 Classify two-dimensional figures in a hierarchy based on properties.</p>	<p>coordinate plane to visually see the difference.</p> <p>Opportunities should be provided for students to realize the importance of direction and distance—for example, by having a student create directions for other students to follow as they plot points.</p> <p>Students should discuss characteristics of polygons and arrive at understandings such as:</p> <ul style="list-style-type: none"> <li>• A square is a rectangle, but a rectangle is not necessarily a square.</li> <li>• Rectangles are parallelograms; however, parallelograms are not necessarily rectangles.</li> <li>• Squares are rhombuses, but rhombuses are not necessarily squares.</li> </ul>		<p>congruent sides and opposite sides parallel).</p>
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