



## Grade 6 - Unit C - Computing with Fractions and Decimals

### Unit Focus

The unit begins with students considering division situations. They consider how the relative sizes of numerator and denominator affect the size of their quotient which is very important as they begin to solve problems dividing fractions. Equal groups and comparison situations are represented by tape diagrams and equations. Students learn to interpret, represent, and describe these situations, using terminology such as “What fraction of 6 is 2?”, “How many 3s are in 12?”, “How many fourths are in 3?”, “is one-third as long as,” “is two-thirds as much as,” and “is one-and-one-half times the size of.” After working with diagrams to represent division with fraction situations, students build on their work from the previous section by considering quotients related to products of numbers and unit fractions, to establish that dividing by a fraction is the same as multiplying by its reciprocal. Students then use their learning of the algorithm for dividing fractions to solve volume measurement problems. This builds upon work begun in Unit A.

The unit then moves to calculating and solving problems with decimals. The algorithms for addition, subtraction, and multiplication, which students used with whole numbers in earlier grades, are extended to decimals of arbitrary length. Students review strategies learned in earlier grades for adding and subtracting and discuss efficient algorithms and their advantages. Multiplication of decimals, begins by asking students to estimate products of a whole number and a decimal, allowing students to be reminded of appropriate magnitudes for results of calculations with decimals. In this section, students extend their use of efficient algorithms for multiplication from whole numbers to decimals. They begin by writing products of decimals as products of fractions, calculating the product of the fractions, then writing the product as a decimal. They discuss the effect of multiplying by powers of 0.1, noting that multiplying by 0.1 has the same effect as dividing by 10. The multiplication algorithms are introduced and students use them, initially supported by area diagrams. Students are formally introduced to the algorithm for long division. They begin with quotients of whole numbers, first representing these quotients with base-ten diagrams, then proceeding to efficient algorithms, initially supporting their use with base-ten diagrams. Students then tackle quotients of whole numbers that result in decimals, quotients of decimals and whole numbers, and finally quotients of decimals.

### Stage 1: Desired Results - Key Understandings

| Standard(s)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Transfer                                                                                                                                                                                                                                                       |                                                                                                                                                                              |
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| <b>Standards</b> <ul style="list-style-type: none"><li>Common Core<ul style="list-style-type: none"><li><i>Mathematics: 6</i></li></ul></li><li>Apply and extend previous understandings of multiplication and division to divide fractions by fractions.</li><li>Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for <math>(2/3) \div (3/4)</math> and use a visual fraction model to show the quotient; use the relationship between multiplication and division to explain that <math>(2/3) \div (3/4) = 8/9</math> because <math>3/4</math> of <math>8/9</math> is <math>2/3</math>. (In general, <math>(a/b) \div (c/d) = ad/bc</math>.) How much chocolate will each person get if 3 people share <math>1/2</math> lb of chocolate equally? How many <math>3/4</math>-cup servings are in <math>2/3</math> of a cup of yogurt? How wide</li></ul> | <i>Students will be able to independently use their learning to...</i><br><b>T1</b> Demonstrate fluency with mathematical computations and definitions.<br><b>T2</b> Identify and generalize patterns and structure in numbers, expressions, data and objects. |                                                                                                                                                                              |
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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Understanding(s)                                                                                                                                                                                                                                               | Essential Question(s)                                                                                                                                                        |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <i>Students will understand that...</i><br><b>U1</b> Mathematicians calculate efficiently and accurately while using appropriate symbols and labels.<br><b>U2</b> Mathematicians see patterns to make generalizations about structures and relationships.      | <i>Students will keep considering...</i><br><b>Q1</b> How do I check my work for accuracy and completeness?<br><b>Q2</b> What generalizations can be made from this pattern? |

## Stage 1: Desired Results - Key Understandings

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| <p>is a rectangular strip of land with length <math>\frac{3}{4}</math> mi and area <math>\frac{1}{2}</math> square mi?.<br/>(CCSS.MATH.CONTENT.6.NS.A.1)</p> <ul style="list-style-type: none"> <li>▪ Compute fluently with multi-digit numbers and find common factors and multiples.</li> <li>▪ Fluently divide multi-digit numbers using the standard algorithm.<br/>(CCSS.MATH.CONTENT.6.NS.B.2)</li> <li>▪ Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (CCSS.MATH.CONTENT.6.NS.B.3)</li> <li>▪ Solve real-world and mathematical problems involving area, surface area, and volume.</li> <li>▪ Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas <math>V = l w h</math> and <math>V = b h</math> to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems. (CCSS.MATH.CONTENT.6.G.A.2)</li> <li>▪ Mathematical Practices</li> <li>▪ Attend to precision. (CCSS.MATH.MP.6)</li> <li>▪ Look for and make use of structure. (CCSS.MATH.MP.7)</li> </ul> <p><b>Madison Public Schools Profile of a Graduate</b><br/>Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2)</p> | Acquisition of Knowledge and Skill                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
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