

Grade 5

Unit 2.3	Unit Title Understanding Multiplication of Fractions	Lesson 1 of 4	Day 1 - 3
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Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
5.NF.5 Interpret multiplication as scaling (resizing), by: a. Comparing the size of the product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.	<ul style="list-style-type: none"> • Relate the size of the product compared to the size of one factor when multiplying fractions. • Relate the size of one product to the factors when multiplying fractions greater than one. • When multiplying two numbers, one factor can be considered in terms of scaling, or resizing, the other. 	SMP2 Reason abstractly and quantitatively. SMP8 Look for and express regularity in repeated reasoning.	<ul style="list-style-type: none"> • How does the size of the product compare to the size of one factor when multiplying fractions? • How does the size of the product compare to the size of one factor when multiplying fractions greater than one?
5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
<ul style="list-style-type: none"> • Model the product of a fraction and a whole number. • Model the product of two fractions. 	Less than Greater than Equal to	<ul style="list-style-type: none"> • Expecting the product to be greater just because you are multiplying. • Magnitude of the product. 	OnCore Lesson 70 & 71 Student pages 139 - 142

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
Teachers will guide students to make sense of the product of multiplication. They will provide the students with opportunities to construct models to compare products. Teachers will model the example at the top of Lesson 70 as they help students relate the size of the product as greater than, less than, or equal to the size of the factor without performing the operation. In Lesson 71 teachers will help students understand that when multiplying two numbers, one factor can be considered in terms of scaling, or resizing, the other. Being sure to cover three cases – multiplying a mixed number by a fraction less than one, the product will reflect a decrease (downward scale), mixed by mixed, the product will reflect an increase (upward scaling), and multiplying a mixed number by 1, the product will equal the mixed number.	Students will have opportunities to construct models that help them understand the magnitude of the product when multiplying fractions and mixed numbers. Using student pages 139 – 142 students will relate the size of the product as greater than, less than or equal to the other factor without doing the calculations. They will practice and understand the results of the product for all 3 cases – multiplying a mixed number by a fraction less than one, greater than one, or equal to one.

Grade 5

Unit 2.3	Unit Title Understanding Multiplication of Fractions	Lesson 2 of 4	Day 4 - 6
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Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
<p>5.NF.5 Interpret multiplication as scaling (sizing), by:</p> <p>b. Explaining why multiplying a given number by a fraction greater than 1 results in a product greater than the given number; explaining why multiplying a given number by a fraction less than 1 results in a product smaller than the given number; and relating the <i>Principle of Fraction Equivalence</i> $a/b = (nxa)/(nxb)$ to the effect of multiplying a/b by 1.</p>	<p>Understand and be able to explain why multiplying a given number by:</p> <ul style="list-style-type: none"> •fraction greater than 1 results in a product greater than the given number, and •fraction less than 1 results in a product smaller than the given number. <p>•Relate the <i>Principle of Fraction Equivalence</i> $a/b = (nxa)/(nxb)$ to multiplying by 1 (n/n).</p>	<p>SMP2 Reason abstractly and quantitatively.</p> <p>SMP8 Look for and express regularity in repeated reasoning.</p>	<ul style="list-style-type: none"> •What happens to the product of a number that is multiplied by a fraction greater than 1? •What happens to the product of a number that is multiplied by a fraction less than 1? •How does the <i>Principle of Fraction Equivalence</i> relate to multiplying by 1?
5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
<ul style="list-style-type: none"> •Multiplication of fractions. •Identity property of multiplication; $a \times 1 = a$. •n/n is equivalent to 1; for example $3/3 = 1$, $5/5 = 1$, $8/8 = 1$ 	<ul style="list-style-type: none"> •Principle of Fraction Equivalence; $a/b = (nxa)/(nxb)$ 	<ul style="list-style-type: none"> •Expecting the product to be greater just because you are multiplying. •Magnitude of the product. 	<p>K-5 Math Resource link: Multiplication and Scale Problems</p>

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
<p>Teachers will build on the instructional practices from Lesson 1 as they continue to guide students in their understanding of fraction multiplication. They may utilize the K-5 Math Resource problem example or develop problems of their own to help students understand what happens to the product of a given number that is multiplied by a fraction greater than 1, less than one or equal to one. Teachers will help students understand that the Principle of Fraction Equivalence results in the same product as multiplying by 1 (n/n).</p>	<p>Students will build on their learning practices from lesson 1 as they continue to work on their understanding of fraction multiplication. They are focusing on the understanding of what happens when you multiply a given number by a fraction greater than 1, less than 1 and equal to 1. They will relate the Principle of Fraction Equivalence formula to multiplying by 1. They have previously learned that fractions in the form $3/3, 5/5, 9/9 = 1$ ($n/n=1$) because $3 \div 3 = 1$ ($n \div n = 1$) and their knowledge of the Identity Property of Multiplication confirms that $n \times 1 = n$ (number n keeps its identity).</p>

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Unit 2.3	Unit Title Understanding Multiplication of Fractions	Lesson 3 of 4	Day 7 - 10
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Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
<p>5.NF.6 Solve real world problems involving multiplication of fractions and mixed numbers, e.g., by using visual fractions models or equations to represent the problem.</p>	<ul style="list-style-type: none"> •Use a visual fraction model to represent real world problems involving multiplication of fractions and mixed numbers. •Use an equation to represent real world problems involving multiplication of fractions and mixed numbers. •Write and interpret equations. •Commutative Property of Multiplication still works! $\frac{3}{4} \times 12 = 12 \times \frac{3}{4}$. Which is read $\frac{3}{4}$ of 12 is the same as 12 of $\frac{3}{4}$ths or 9. 	<p>SMP1 Make sense of problems and persevere in solving them. SMP2 Reason abstractly and quantitatively. SMP3 Construct viable arguments and critique the reasoning of others. SMP4 Model with mathematics.</p>	<ul style="list-style-type: none"> •How can you represent a multiplication problem using a visual fraction model or equation? •What parts of the problem solving task helps you know that you will need to multiply to find the solution?
5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
<ul style="list-style-type: none"> •Multiplication of fractions. •Commutative Property of Multiplication 	<p>Read the symbol for multiplication “x” as “of”. For example, $\frac{3}{4} \times 12$ is read “$\frac{3}{4}$ of 12”.</p>	<ul style="list-style-type: none"> •Misinterpreting what numbers need to be multiplied. •Misinterpreting the whole on the fraction bar. 	<p>Investigations Snap-ins: Sessions 4A.2, 4A.3, 4A.7 Bar Model K-5 Math Resource links: Fraction x Mixed Number Word Problems Whole Number x Mixed Number Models Mixed Number x Fraction Models</p>

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
<p>Teachers will guide students to solve real world problems involving multiplication of fractions and mixed numbers using the Investigations Snap-in and K-5 Math Resources. Session 4A.3 Discussion 2 focus is on how do you know to use multiplication.</p>	<p>Students will use visual fractions models and equations to represent and solve real world problems involving multiplication of fractions and mixed number. They will see that the commutative property still works with fractions and discuss what parts of the problem help you know to multiply in Session 4A.3.</p>

Grade 5

Unit 2.3	Unit Title Understanding Multiplication of Fractions	Lesson 4 of 4	Day 11 - 14
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Lesson Focus

1. Standards Addressed	2. Content to be Learned	3. Mathematical Practices	4. Essential Question
<p>5.NF.3 Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions of mixed numbers, e.g., by using visual fraction models or equations to represent the problem. <i>For example, interpret $\frac{3}{4}$ as the result of dividing 3 by 4, noting that $\frac{3}{4}$ multiplied by 4 equals 3, and that when 3 wholes are shared equally among 4 people each person has a share of size $\frac{3}{4}$. 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?</i></p>	<ul style="list-style-type: none"> •Connect fractions to division. •Interpret a fraction as division of the numerator by the denominator ($a/b = a \div b$). •Fraction bar is a symbol for divide. •Know when to write the remainder as a fraction (or mixed number). 	<p>SMP1 Make sense of problems and persevere in solving them.</p> <p>SMP2 Reason abstractly and quantitatively.</p>	<ul style="list-style-type: none"> •How does a fraction represent division? •When solving a division problem, when do you write the remainder as a fraction?
5. Prerequisite Knowledge	6. Essential Vocabulary	7. Possible Misconceptions	8. Necessary Materials
<ul style="list-style-type: none"> •Divide whole numbers. •Represent a fraction as part of a whole that has been divided into equal parts. 	<p>quotient remainder</p>	<p>Interpreting remainders.</p>	<p>OnCore Lesson 62 & 63 Student pages 123 – 126</p> <p>K-5 Math Resources: Relating Fractions to Division Problems</p>

Instruction

9. Instruction Practices (What are the teachers doing)	10. Learning Practices (What are the students doing)
<p>Teachers will provide opportunities for students to interpret fractions as division. They will help students decide when to write the remainder as a fraction. Teachers will use OnCore lessons 62 & 63 and may use the K-5 Math Resources as tools for practice.</p>	<p>Students will connect fractions to division. They understand that the fraction bar means to divide and a fraction like $\frac{2}{3}$ can be interpreted as 2 parts of a whole that has been divided into 3 equal parts. Students will solve division problems and decide when to write the remainder as a fraction.</p>