

# MTH 1W: Adding and Subtracting Fractions and Mixed Numbers

## LESSON OVERVIEW:

Scope and Sequence – Main Lesson Topics	Prior Knowledge	Vocabulary
<ul style="list-style-type: none"> <li>adding and subtracting fractions and mixed numbers</li> </ul>	<ul style="list-style-type: none"> <li>Negative Fractions</li> <li>Converting from Mixed to Improper</li> </ul>	<ul style="list-style-type: none"> <li>Common denominator</li> <li>Compare</li> </ul>

Learning Objectives	Curriculum Expectations
<p>I will be able to:</p> <ul style="list-style-type: none"> <li>Use unit fractions to help me when adding and subtracting fractions</li> <li>Use my knowledge of integers to help me explain how positive and negative signs effect fractions</li> <li>Solve addition and subtraction problems with positive and negative fractions and mixed numbers</li> <li>Solve problems with various measurement systems (metric, imperial...)</li> </ul>	<ul style="list-style-type: none"> <li>B3.2 apply an understanding of unit fractions and their relationship to other fractional amounts, in various contexts, including the use of measuring tools</li> <li>B3.3 apply an understanding of integers to explain the effects that positive and negative signs have on the values of ratios, rates, fractions, and decimals, in various contexts</li> <li>B3.4 solve problems involving operations with positive and negative fractions and mixed numbers, including problems involving formulas, measurements, and linear relations, using technology when appropriate</li> <li>E1.3 Students will use a variety of measurement systems (from various cultures and communities), so that they can solve problems involving different units within and between measurement systems</li> <li>E1.3 solve problems involving different units within a measurement system and between measurement systems, including those from various cultures or communities, using various representations and technology, when appropriate</li> </ul>

<b>1</b>	<b>Lesson Introduction &amp; Problem String</b> ( <i>see below</i> )	40 minutes	<b>2</b>	<b>Consolidation</b>	10 minutes
<p><b>Introduction:</b> A unit fraction is any fraction with a numerator of 1. Any fraction can be decomposed into its unit fractions. E.g., <math>\frac{3}{4}</math> can be decomposed into 3 one fourth units or <math>\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4}</math></p>			<ul style="list-style-type: none"> <li></li> </ul>		
<b>3</b>	<b>Meaningful Notes</b>	10 minutes	<b>4</b>	<b>Check Your Understanding</b>	15 minutes
<ul style="list-style-type: none"> <li></li> </ul>			<ul style="list-style-type: none"> <li></li> </ul>		

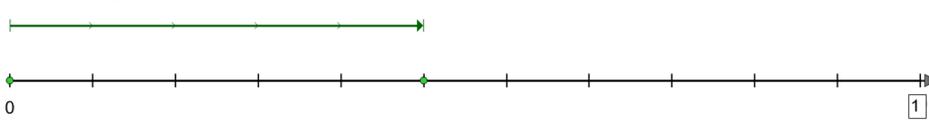
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## LESSON BACKGROUND:

Renaming fractions is often the key to being able to compare them or compute with them. Every fraction can be renamed in an infinite number of ways. Just like when working with whole numbers, we can decompose fractions. A part-whole fraction can be decomposed into unit fractions. The denominator tells us the fractional unit or the number of equi-partitions of the whole. We can think of the denominator as the “unit” just like any other unit (whole numbers, decimals, algebra, measurement...)

For example  $\frac{5}{11}$  can be represented as:

- Model



Or

- Composed by counting “1 one-eleventh, 2 one-elevenths, 3 one-elevenths and so on.

- Written as  $\frac{1}{11} + \frac{1}{11} + \frac{1}{11} + \frac{1}{11} + \frac{1}{11} = \frac{5}{11}$

- Describes as “5 one-elevenths” of “5 times one-eleventh”

*(Paying Attention to Fractions)  
(Making Math Meaningful. Marian Small)*

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PROBLEM	HINTS	EXTENSIONS
$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} =$	<ul style="list-style-type: none"> <li>• What are the fractional units you are working with?</li> <li>• Count each unit fraction that you have: (1 one-fourth, 2 one-fourths, 3 one-fourths). How many are there?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> </ul>	<ul style="list-style-type: none"> <li>• How could <math>\underline{\quad} + \underline{\quad} + \underline{\quad} = \frac{3}{10}</math></li> <li>• Draw a picture to show why <math>\frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5}</math> is the same as <math>4 \times \frac{2}{5}</math>. Explain your picture. Draw a different picture to show the same answer. <i>(Math Makes Sense Gr 8 Addison-Wesley)</i></li> </ul>
$\frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} =$	<ul style="list-style-type: none"> <li>• How is this like the previous question? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Try counting each unit fraction that you have</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this?</li> </ul>	<ul style="list-style-type: none"> <li>• <math>\underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} + \underline{\quad} = 1</math></li> <li>• How many one-sevenths make one whole?</li> <li>• Write this repeated addition question as a multiplication question.</li> <li>• What would you need to change to make this question less than 1? Greater than 1? What do you notice about the repeated addition and multiplication sentences in each case? How do they compare?</li> </ul>
$\frac{6}{11} - \frac{1}{11} - \frac{1}{11} - \frac{1}{11} =$	<ul style="list-style-type: none"> <li>• How is this like the previous question? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Try counting backward from six one-elevenths (6 one-elevenths, 5 one-elevenths...)</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this?</li> </ul>	<ul style="list-style-type: none"> <li>• How is this problem similar to a repeated addition of unit fractions problem? How is it different?</li> </ul>
$1\frac{1}{5} + 2\frac{3}{5}$	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• How many one-fifths are you starting with?</li> <li>• How many one-fifths are you adding?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this?</li> </ul>	<ul style="list-style-type: none"> <li>• Explain why you can add 1 + 2 and THEN add the fractions.</li> <li>• Can you think of a time that this wouldn't work? Why? Why not?</li> <li>• Can you solve this problem a different way?</li> <li>• Write a "story" problem for this fraction addition sentence. Can you create more than one?</li> <li>• Eg. a recipe for punch class for 5 and one-fifth cups of fruit concentrate and 2 and three-fifths cups of water. How many cups of punch will the recipe make?</li> <li>•</li> </ul>

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PROBLEM	HINTS	EXTENSIONS
$2\frac{3}{4} - 1\frac{1}{4}$	<ul style="list-style-type: none"> <li>• How is this like the previous subtraction question? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• How many one-fourths are you starting with?</li> <li>• How many one-fourths are you removing?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this?</li> </ul>	<ul style="list-style-type: none"> <li>• Explain the steps you too to solve this problem and why you solved it that way?</li> <li>• Can you solve this problem in a different way(s)?</li> <li>• Write a “story” problem for this fraction addition sentence? Can you create more than one?</li> </ul>
$\frac{1}{4} + \frac{1}{8} =$	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• How are the denominators in this problem related?</li> <li>• What do you recall about equivalent fractions?</li> <li>• Can you draw a picture? Or use a visual like a bar model or a number line to represent this? Are there any tools that might help you? (Fraction strips)</li> <li>• Can you solve this using a simpler problem? (e.g., <math>\frac{1}{2} + \frac{1}{4}</math>)</li> </ul>	<ul style="list-style-type: none"> <li>• Find <math>\frac{1}{3} + \frac{1}{12}</math>, <math>\frac{1}{10} + \frac{1}{2}</math></li> <li>• How might you add 3 fractions with different denominators? 4 or more different fractions?</li> <li>• What denominators make it easy to add fractions? Which denominators make it more challenging to add fractions?</li> <li>• Find two fractions with the sum of two thirds. Try to do this as many ways as you can. Record each way that you find</li> </ul>
$1\frac{1}{3} + 4\frac{1}{6}$	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• What are the fractional units that you are working with?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• How are the denominators in this problem related?</li> <li>• What do you recall about equivalent fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the steps that you would use to solve this problem? Are there any other ways to solve it?</li> <li>• What makes this problem easy for you? What makes it challenging for you?</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the most important ideas are.</li> </ul>
$5\frac{5}{7} - 3\frac{2}{14}$	<ul style="list-style-type: none"> <li>• How is this like the previous subtraction question? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• How are the denominators in this problem related?</li> <li>• What do you recall about equivalent fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the steps that you took to solve this problem.</li> <li>• Can you find any other ways that you could solve it?</li> <li>• What makes this problem easy for you? What makes this problem challenging for you?</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the important ideas are.</li> </ul>

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PROBLEM	HINTS	EXTENSIONS
$\frac{1}{3} + \frac{1}{4} =$	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• How are the denominators in this problem related?</li> <li>• What do you recall about equivalent fractions?</li> </ul>	$\frac{1}{2} + \frac{2}{5},$ <ul style="list-style-type: none"> <li>• How is one quarter plus one eighth like the problem that we have already solved How is it different?</li> <li>• What steps would you take to solve this problem? Two sevenths added to one fourth</li> </ul> $\frac{2}{7} + \frac{1}{4}$
$2\frac{1}{3} + 1\frac{1}{5}$	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• How are the denominators in this problem related?</li> <li>• What do you recall about equivalent fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Write 2 improper fractions. Add them. Write each improper fraction as a mixed number. Add the mixed numbers. Which method is more efficient for finding the sum of two improper fractions? Why?</li> <li>• So that everyone in your group understands, explain to your group, how you add fractions with mixed numbers and different denominators. Did the members of your group use a different method than you?</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the important ideas are.</li> </ul>
$6\frac{2}{3} - 3\frac{1}{2}$	<ul style="list-style-type: none"> <li>• How is this like the previous subtraction question? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• Look at the denominators in this problem. How are they related? How might that help you solve the problem?</li> <li>• What do you recall about equivalent fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Which fractions or mixed numbers are easy to subtract? Which ones are more difficult? Give examples.</li> <li>• So that everyone in your group understands, explain to your group, how you subtract fractions with mixed numbers and different denominators. Did the members of your group use a different method than you?</li> <li>• Describe something new that you learned about subtracting mixed numbers with different denominators.</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the important ideas are.</li> </ul>

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PROBLEM	HINTS	EXTENSIONS
$2\frac{7}{10} + 4\frac{9}{10}$ <p><b>*tricky*</b></p>	<ul style="list-style-type: none"> <li>• How is this like the previous addition questions? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• What do you recall about improper fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the steps that you might take to solve this problem. Are there any other ways that you could solve it?</li> <li>• What makes this problem easy for you? What makes this problem challenging for you?</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the important ideas are.</li> </ul>
$4\frac{1}{8} - 1\frac{3}{4}$ <p><b>*tricky*</b></p>	<ul style="list-style-type: none"> <li>• How is this like the previous question? How is it different?</li> <li>• Will you have more than one? Less than one? Or exactly one? How do you know?</li> <li>• What are the fractional units that you are working with?</li> <li>• What do you recall about improper fractions?</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the steps that you might take to solve this problem. Are there any other ways that you could solve it?</li> <li>• What makes this problem easy for you? What makes this problem challenging for you?</li> <li>• If you were to write a note to your “future forgetful self” about solving this type of problem, what information would you include? Discuss in your group what you think the important ideas are.</li> </ul>

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Teacher Observations/To Go Back to During Gallery Walk:
