Nasco Education™

LESSON PLAN

Math

Developed with Kristin Ulrich

Fraction Tower® III

Subtracting fractions with like and unlike denominators

Volume 9 | Gr. 1-2

Time: 60 mins.

Objectives

Students will...

- Compare subtraction answers to given benchmark fractions
- Solve subtraction problems of fractions with both like and unlike denominators
- Create pictorial models that represent different subtraction of fractions problems

Materials

- Fraction Tower® Cubes (**TB17368**)
- Worksheet (attached with lesson plan download)

Learning standards

- Represent and solve addition and subtraction of fractions with equal denominators using objects and pictorial models that build up to the number line and properties of operations.
- Evaluate the reasonableness of sums and differences of fractions using benchmark fractions 0, ¼, ½, ¾, and 1, referring to the same whole.

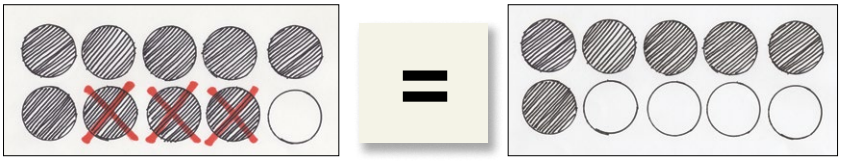
Introduction

Note: This lesson assumes that students are familiar with using Fraction Towers®, as it builds off of concepts learned in the previous two Fraction Towers® lesson plans, MathWorks Vol. 6 and Vol. 8.

1. Have students make a tower that represents ¼, a tower that represents ½, and a tower that represents ¾. Students should have a tower of one yellow piece, a tower of one pink piece, and a tower of three yellow pieces. Have the students line up the three towers in that order: ¼, ½, and ¾, and get them to notice that each tower is taller than the one before it.
2. Introduce the term benchmark fraction to the students, telling them that these are three of the most common fractions they'll see, and therefore they are called benchmarks. They will be using these three fractions to compare to all the other fractions they will be making throughout this lesson. The goal is for students to become expert comparers and to be able to estimate an answer based on the benchmark fractions.

Activity 1

1. Distribute the worksheet, then have students create a tower that represents 9/10. They should use their tenths pieces to do so. The problem states that 3/10 needs to be taken away from the 9/10, so have students take the top three black pieces off their tower. Ask students how many pieces are left in their tower *(6)*. They should write 6/10 as the answer to problem 1 on their worksheet.
2. Have students compare their 6/10 tower to the three benchmark fractions. They should determine which of the three benchmarks 6/10 is closest to and circle it on problem 1 of their worksheet *(¾)*.
3. For drawing the pictorial model, students will not be shading the pieces of one shape, as they did in MathWorks Vol. 8., but will instead be drawing multiple shapes. Have students draw 10 small shapes in the box (circles work well) and explain why they are doing so *(because this represents the denominator)*. Next, ask how many shapes need to be shaded to represent the first fraction in the equation *(9)* and have them do so. To take away 3/10, they will cross out three of the circles to show that subtraction. After they do that, students should write an equals sign, then draw 6/10 by drawing 10 more circles and shading six of them.
4. Work on problem 2 together. Begin by having students use their sixths pieces to create a tower that represents 5/6. To take 4/6 away from 5/6, they will then remove the top four pieces from the tower, leaving one piece. Students should write 1/6 for their answer to problem 2.
5. Have students compare their 1/6 tower to the three benchmark fractions. They should determine that 1/6 is closest to the benchmark fraction of ¼ and circle ¼ on the worksheet for problem 2.
6. For the pictorial model, students should draw six total shapes, shade in five to represent 5/6, then cross out four of them to represent the 4/6 that is taken away in the problem. After writing an equals sign, students should draw another six shapes, then shade in one of them to represent 1/6.



Steps 2 and 3

Practice 1

Students should complete problems 3 and 4 independently. Before letting students work, remind them of the steps they need to follow as they work through the problems. These steps are also covered in the directions on side 1 of the worksheet. For the pictorial model, they can use the ones they drew for the first two problems as a guide.

Check for understanding 1

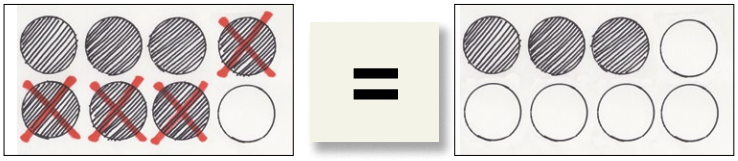
After students have completed problem 3, check for understanding by using the following line of questioning:

1. How many total shapes did you draw to represent 5/8? *(8)*
2. How many of those eight shapes did you shade? *(5)*
3. When you subtracted 1/8, how many did you take away from your tower? *(1)*
4. How many shapes did you cross out in your drawing? *(1)*
5. What is 5/8 – 1/8? *(4/8)*
6. Which benchmark fraction is it closest to? *(½)*
7. What did you notice about 4/8 and ½? *(They're equivalent.)*

Activity 2

Note: This activity will help students work through the rest of the problems on the worksheet. These problems consist of fractions with different denominators.

1. Start by having students make two towers, one representing ⅞ and one representing ½. Remind students that when they were adding fractions (see MathWorks Vol. 8), they had to find the least common multiple (LCM) and put the two towers together. Subtracting fractions starts out the same way, by finding the LCM of the two fractions. Students should know that, since the denominators of the two fractions are 8 and 2, the LCM is 8. Have them write the LCM in problem 5 of their worksheet.
2. Since the LCM is 8, students can leave the ⅞ tower alone. However, they need to make a fraction that's equivalent to ½ but with a denominator of 8. They should come up with ⁴⁄₈, meaning that they now have the subtraction problem of ⅞ – ⁴⁄₈. This can be double-checked by comparing the ⁴⁄₈ tower with the ½ tower. Prompt students to write ⁴⁄₈ above the ½ in the equation for problem 5. Since the denominators are now the same, students can now subtract the numerators to come up with the answer of ³⁄₈.
3. Students should now compare ³⁄₈ to the three benchmark fractions. Since it's right in the middle between ¼ and ½, they can choose to circle either fraction on their worksheet.
4. Students can now draw the pictorial model of the problem. They should first draw eight shapes for the denominator, shade in seven of those to represent ⅞, then cross out four of the shapes to represent ⁴⁄₈. Make sure students understand they are crossing out four shapes because they converted ½ to the equivalent fraction of ⁴⁄₈. Finally, they should write an equals sign, draw eight more shapes, and shade in three of them to represent the answer of ³⁄₈.
5. Work problem 6 together by making a tower that represents ⅚ and another tower that represents ⁷⁄₁₂. See if students know what to do next *(find the LCM of the two fractions)*. With 6 and 12 as the denominators, the LCM is 12, meaning that the ⁷⁄₁₂ tower will remain untouched.
6. To find a fraction with a denominator of 12 that is equivalent to ⅚, students can build a tower with their twelfths pieces that is the same height as their ⅚ tower. They should determine that ¹⁰⁄₁₂ is equivalent to ⅚. Prompt students to write ¹⁰⁄₁₂ on their worksheet above ⅚. Now that the denominators are the same, students should know that the denominator will remain the same and that they can subtract the numerators to get the answer of ³⁄₁₂.
7. Have students make a ³⁄₁₂ tower and compare it to the three benchmark fractions. They should see that ³⁄₁₂ is closest to ¼ and that the two fractions are equivalent. Make sure they circle ¼ on their worksheet.
8. For the pictorial model, they will begin by drawing ¹⁰⁄₁₂, the equivalent fraction to ⅚. Again, they should draw 12 shapes, then shade in 10 of them. To subtract ⁷⁄₁₂, they should cross out seven of the shapes. Finally, they should write an equals sign, draw 12 more shapes, and shade in three of them to represent ³⁄₁₂.



Steps 3 and 4

Practice 2

Students should complete problems 7 and 8 independently. Remind students of the steps they need to go through to complete the problems. These steps are also covered in the directions on side 2 of the worksheet. Be aware that these directions differ from the ones on side 1, as these problems are done differently and have a place to write the LCM. It is important to remind students that after they find an equivalent fraction, they need to write that fraction on their worksheet above the original fraction.

Intervention

1. Only work with fractions that have the same denominator.
2. Students can create problems of their own (with common denominators) to have a friend solve. This will focus the lesson more on understanding benchmark fractions.

Extension

1. Have students put the final answer in lowest terms.
2. Have students explore problems with answers greater than 1.
3. Have students explore with adding three addends (½ + ⅓ + ¼).

Fraction Tower® III: Subtracting fractions with like and unlike denominators — **worksheet part 1**

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Directions: Use your Fraction Towers® to make a tower of the first fraction. Take away what the second fraction tells you to take and record your answer. Circle the benchmark fraction the answer is closest to. Finally, draw a pictorial model that represents the problem in the space provided below.

1. $\frac{9}{10} - \frac{3}{10} =$ _____ ¼ ½ ¾

2. $\frac{5}{6} - \frac{4}{6} =$ _____ ¼ ½ ¾

3. $\frac{5}{8} - \frac{1}{8} =$ _____ ¼ ½ ¾

4. $\frac{11}{12} - \frac{7}{12} =$ _____ ¼ ½ ¾

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Directions: Use your Fraction Towers® to make towers of the fractions in the problem. Figure out the LCM of the two denominators. Find an equivalent fraction with the same denominator and write it above the equivalent fraction in the problem. Solve the problem, then circle the benchmark fraction the answer is closest to. Finally, draw a pictorial model that represents the problem in the space provided below.

5. $\frac{7}{8} - \frac{1}{2} =$ _____ LCM = _____ ¼ ½ ¾

6. $\frac{5}{6} - \frac{7}{12} =$ _____ LCM = _____ ¼ ½ ¾

7. $\frac{9}{10} - \frac{1}{2} =$ _____ LCM = _____ ¼ ½ ¾

8. $\frac{11}{12} - \frac{1}{6} =$ _____ LCM = _____ ¼ ½ ¾

Fraction Tower® III: Subtracting fractions with like and unlike denominators — **answer key**

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Problem	Answer Key	Benchmark
1.	$\frac{6}{10}$ ($\frac{3}{5}$)	$\frac{3}{4}$
2.	$\frac{1}{6}$	$\frac{1}{4}$
3.	$\frac{4}{8}$ ($\frac{1}{2}$)	$\frac{1}{2}$
4.	$\frac{4}{12}$ ($\frac{1}{3}$)	$\frac{1}{4}$
5.	$\frac{3}{8}$	$\frac{1}{4}$ or $\frac{1}{2}$
6.	$\frac{3}{12}$ ($\frac{1}{4}$)	$\frac{1}{4}$
7.	$\frac{4}{10}$ ($\frac{2}{5}$)	$\frac{1}{2}$
8.	$\frac{9}{12}$ ($\frac{3}{4}$)	$\frac{3}{4}$