

Fractions- Add and Subtract w/Mixed Numbers



Grade Level: 5

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Classroom Procedure:

1. Display fraction addition and subtraction problems with like denominators w/o sums or differences and display the same but with unlike denominators. Ask students: What is the same or different about adding/subtracting fractions with like and unlike denominators?
2. Allow for responses and discussion. Ask students if they are aware of any strategies for adding and subtracting fractions with unlike denominators
3. Distribute *Fractions- Add and Subtract w/Mixed Numbers* content pages. Read and review the information with the students. Use the additional resources to enhance understanding.
4. Distribute Activity page. Read and review the instructions. Pair students. Ensure that students must show both examples of adding and subtracting mixed numbers. Encourage adding color to the posters, arrows, and other helpful text to assist viewers in learning how to add/subtract mixed numbers.
5. Once completed, the students may share their posters with the class.
6. Distribute Practice page. Check and review the students' responses.
7. Distribute the Homework page. The next day, check and review the students' responses.
8. In closing, ask students: *Which of the strategies will you use the most when adding and subtracting mixed numbers and fractions? Why? Can you think of another strategy? Share it with the class.*
9. Allow for responses and discussion. Students may meet in pairs to discover a new strategy.

Approximate Grade Level: 5

Objectives:

The students will be able to add and subtract fractions with unlike denominators, including mixed numbers.

Common Core State Standards:

CCSS.MATH.CONTENT.5.NF.A.1

Class Sessions (45 minutes):

At least 2 class sessions.

Teaching Materials/Worksheets:

Fractions- Add and Subtract w/Mixed Numbers content pages (3), Activity page, Practice page, Homework page

Student Supplies:

Colored pencils, poster paper, handouts

Prepare Ahead of Time:

Pair students for activity. Copy handouts.

Options for Lesson:

Students may work alone or in groups for the activity. Students vote for the best poster, most colorful, neatest, etc. Students create addition/subtraction problems of mixed numbers to share with other class members and include answer keys. Use hands-on manipulatives for students to better understand the concept of borrowing or regrouping a whole number.





Teacher Notes

The lesson introduces students to strategies for adding and subtracting fractions with unlike denominators, including mixed numbers. There is more than one strategy to add and subtract fractions, and the students may use the strategy that works best for them. The lesson may be used in conjunction with other lessons related to fractions and mixed numbers.



Additional Resources:

Content:

https://www.georgebrown.ca/uploadedFiles/TLC/_documents/Adding%20and%20Subtracting%20Mixed%20Numbers%20and%20Improper%20Fractions.pdf

https://betterlesson.com/browse/common_core/standard/269/ccss-math-content-5-nf-a-1-add-and-subtract-fractions-with-unlike-denominators-including-mixed-numbers-by-replacing-given-fractions

<https://www.khanacademy.org/commoncore/grade-5-NF> (Interactive)

Worksheets:

<https://www.education.com/common-core/CCSS.MATH.CONTENT.5.NF.A.1/worksheets/>

<https://www.biglearners.com/common-core/worksheets/grade-5/math/number-operations-fractions/5.nf.a.1>

<https://www.mathworksheetsland.com/5/>

Videos:

<https://www.opened.com/search?standard=5.NF.A.1> (Links to...)

https://www.youtube.com/watch?v=__neKZ85nPo (3:45)

<https://www.youtube.com/watch?v=pmJHyJ0zpw4> (15:00)



Adding/Subtracting Fractions

You have previously learned how to add and subtract fractions with like and unlike denominators. When adding and subtracting fractions with unlike denominators, it is important to find common denominators, or often called a lowest common denominator or LCD. Without a common denominator, the numerators of the fractions cannot be added together.

In addition, there is more than one strategy you can use to add and subtract fractions with unlike denominators. Review the following two strategies for adding and subtracting fractions with unlike denominators:

Strategy 1: Find the LCD or lowest common denominator. $\frac{3}{4} + \frac{5}{6}$

The LCD/LCM of 4 and 6 is in bold:

Multiples of 4: 4, 8, **12**, 16, 20, 24

Multiples of 6: 6, **12**, 18, 24, 30

1 Identify the LCD, which is also the lowest common multiple of the two (or more) denominators.

2 Use the LCD to create equivalent fractions.

$$\frac{3}{4} = \frac{9}{12} \qquad \frac{5}{6} = \frac{10}{12}$$

3 Add the two (or more) equivalent fractions and change the sum (or difference) to a mixed number, reduce if necessary.

$$\frac{9}{12} + \frac{10}{12} = \frac{19}{12} = 1 \frac{7}{12}$$

Strategy 2: Cross multiply. $\frac{3}{4} + \frac{5}{6}$

1 Multiply the two denominators (**4 x 6**), which will be the new denominator.

$$\frac{3}{4} + \frac{5}{6} = \frac{\square}{24}$$

2 Cross multiply the numerators and denominators (**3 x 6**) and (**4 x 5**). Add them together for the new numerator.

$$\frac{3}{4} + \frac{5}{6} = \frac{18 + 20}{24} = \frac{38}{24}$$

3 Reduce if necessary and change the sum (or difference) to a mixed number if necessary.

$$\frac{38}{24} = \frac{19}{12} = 1 \frac{7}{12}$$

Use either of the two strategies to add or subtract fractions with unlike denominators. The strategies will also be useful when adding/subtracting fractions with mixed numbers or adding/subtracting mixed numbers with other mixed numbers.



Fractions and Mixed Numbers

As you know a mixed number is simply a fraction that includes a whole number. For example, you may have eaten one whole piece of pie and then later ate one-half of a piece of pie. In all, you would have eaten 1 and $\frac{1}{2}$ pieces of pie which can be expressed as a mixed number: $1\frac{1}{2}$.

Later, during the rest of the week, you eat two and three-quarter pieces of pie, which can be expressed as another mixed number: $2\frac{3}{4}$. How much pie have you eaten all together? You can simply add the two mixed numbers together using one of the following strategies.

Addition Strategy 3: Add whole numbers and fractions. $1\frac{1}{2} + 2\frac{3}{4}$

1 Add the whole numbers ($1+3$) and then add.

$$1 + 2 = 3$$

2 Add the fractions (+) using one of the two strategies from above. (**Strategy 2 from above is used here.**)

$$\frac{1}{2} + \frac{3}{4} = \frac{2}{4} + \frac{3}{4} = \frac{5}{4} = 1\frac{1}{4}$$

3 Add the sum of the two (or more) fractions to the whole number(s) ($3 + 1$).

$$3 + 1 = 4$$

Addition/Subtraction Strategy 4: Subtract whole numbers and fractions. $2\frac{3}{4} - 1\frac{1}{2}$

1 Change the mixed numbers to improper fractions.

$$2\frac{3}{4} = \frac{11}{4} \text{ and } 1\frac{1}{2} = \frac{3}{2}$$

2 Subtract using the new improper fractions using one of the strategies from above.

$$\frac{11}{4} - \frac{3}{2} = \frac{11}{4} - \frac{6}{4} = \frac{5}{4} = 1\frac{1}{4}$$

The same strategy used to subtract two mixed numbers is used for adding mixed numbers as well. Strategy 2 and strategy 4 are the best strategies to use when subtracting mixed numbers and fractions. This is because borrowing or regrouping numbers would not be necessary.

However, when working with larger whole numbers or subtracting a fraction from a whole number, you may want to use one of the following strategies.



Subtraction Strategy 5: Subtract whole numbers and fractions. $15 - 8 \frac{2}{3}$

- 1 Borrow 1 (or regroup) from the whole number (15) by creating a fraction using the same denominator used in the mixed number ($\frac{2}{3}$).

Borrow 1 from 15 and regroup 15 to:
 $\frac{3}{3} = 1$ so $15 = 14 \frac{3}{3}$

- 2 Use the regrouped mixed number for the subtraction problem. It is now a simple subtraction problem now with like denominators.

$$14 \frac{3}{3} - 8 \frac{2}{3} = 6 \frac{2}{3}$$

Subtraction Strategy 6: Subtract mixed numbers and mixed numbers. $150 \frac{1}{2} - 80 \frac{2}{3}$

Since $\frac{2}{3}$ is larger than $\frac{1}{2}$ it cannot be subtracted from $\frac{1}{2}$.

- 1 Borrow 1 (or regroup) from the whole number (150) by creating a fraction using the same denominator used in the fraction ($\frac{2}{3}$).

Borrow 1 from 150 and regroup:
 $\frac{2}{2} = 1$ so $150 = 149 \frac{2}{2} + \frac{1}{2} = 149 \frac{3}{2}$

- 2 Use the regrouped mixed number for the subtraction problem. The new subtraction problem can be solved using Strategy 1 for adding/subtracting fractions.

$$149 \frac{3}{2} - 80 \frac{2}{3}$$

- 3 Find the lowest common denominator (6) and find equivalent fractions and then subtract as usual.

$$\begin{array}{r} 14 \frac{3}{2} = \frac{9}{6} \\ - 80 \frac{2}{3} = \frac{4}{6} \\ \hline 69 \frac{5}{6} \end{array}$$

As you practice adding and subtracting fractions with other fractions or fractions and mixed or whole numbers, you will select one or more strategies to use. Regardless of the strategy, you must carefully follow the steps involved.

Furthermore, in all problems with unlike denominators, you will need to find a common denominator. You must understand the use of multiples and how to find equivalent fractions. Finally, it is important to multiply correctly, so it is vital for you to know your multiplication facts.



Which of the strategies will you use the most when adding and subtracting mixed numbers and fractions? Why? Can you think of another strategy? Share it with the class.





Activity

Name _____ Date _____

Work with your partner to create a poster. One-half of the poster will include a strategy for adding two mixed numbers, and the other half of the poster will include a different strategy for subtracting two mixed numbers with regrouping/borrowing. You must use text, pictures if necessary, arrows, labels, etc. The viewer of the poster should clearly understand how to add and subtract mixed numbers. Use the space below for your rough draft.





Practice

Name _____ Date _____

Solve each using one or more of the strategies you have learned.

$2\frac{1}{2} + 4\frac{3}{5}$	$9 + 2\frac{1}{2}$	$\frac{1}{4} - \frac{1}{8}$
$5\frac{5}{16} - 2\frac{1}{8}$	$4 - 1\frac{1}{2}$	$5\frac{5}{8} + 1\frac{1}{2}$
$8\frac{1}{16} - 4$	$7\frac{1}{4} + 2\frac{3}{4}$	$7\frac{7}{8} - 2\frac{1}{4}$
$9\frac{1}{16} + 3\frac{1}{8}$	$10\frac{1}{3} - 4\frac{5}{6}$	$12 - \frac{7}{10}$
$2\frac{1}{3} - \frac{7}{8}$	$12\frac{3}{4} - 5\frac{1}{2}$	$3\frac{3}{10} + 7\frac{1}{5}$





Homework

Name _____ Date _____

Read, solve, explain.

A baker is making two cakes for a wedding. He will be using 4 cups of flour for one cake and 2 cups of flour for the second cake. His assistant decided that less than 7 cups of flour will be needed for the cakes. Is the assistant correct? Explain using pictures, words, and numbers.

A road construction company is paving a road. During the first week, the company paved 21 miles, and during the second week, they paved about 17 miles? How much more of the road was paved the first week than during the second week? Explain using pictures, words, and numbers.

Solve.

$$4 \frac{3}{8} + 1 \frac{2}{3} + 2 \frac{5}{6}$$

$$2 \frac{1}{5} - 1 + \frac{1}{8}$$

$$5 \frac{1}{5} - 3 \frac{3}{4} - \frac{7}{8}$$





Practice

Name _____ **Answer Key** Date _____

Solve each using one or more of the strategies you have learned.

$2\frac{1}{2} + 4\frac{3}{5}$ $6\frac{14}{15}$	$9 + 2\frac{1}{2}$ $11\frac{1}{5}$	$\frac{1}{4} - \frac{1}{8}$ $\frac{1}{8}$
$5\frac{5}{16} - 2\frac{1}{8}$ $3\frac{3}{16}$	$4 - 1\frac{1}{2}$ $2\frac{1}{2}$	$5\frac{5}{8} + 1\frac{1}{2}$ $7\frac{1}{8}$
$8\frac{1}{16} - 4$ $4\frac{1}{16}$	$7\frac{1}{4} + 2\frac{3}{4}$ $4\frac{1}{2}$	$7\frac{7}{8} - 2\frac{1}{4}$ $5\frac{5}{8}$
$9\frac{1}{16} + 3\frac{1}{8}$ $12\frac{1}{8}$	$10\frac{1}{3} - 4\frac{5}{6}$ $5\frac{1}{2}$	$12 - \frac{7}{10}$ $11\frac{3}{10}$
$2\frac{1}{3} - \frac{7}{8}$ $1\frac{11}{24}$	$12\frac{3}{4} - 5\frac{1}{2}$ $7\frac{1}{4}$	$3\frac{3}{10} + 7\frac{1}{5}$ $10\frac{1}{2}$





Read, solve, explain.

A baker is making two cakes for a wedding. He will be using 4 cups of flour for one cake and 2 cups of flour for the second cake. His assistant decided that less than 7 cups of flour will be needed for the cakes. Is the assistant correct? Explain using pictures, words, and numbers.

Mixed numbers will be added together. The total needed is less than 7 cups or $6\frac{11}{12}$ cups. (Pictures, words, numbers will vary.)

A road construction company is paving a road. During the first week, the company paved 21 miles, and during the second week, they paved about 17 miles? How much more of the road was paved the first week than during the second week? Explain using pictures, words, and numbers.

$21\frac{1}{5} - 17\frac{3}{4} = 3\frac{9}{10}$ more miles of road were paved during the first week than the second week. (Pictures, words, numbers will vary.)

Solve.

$$4\frac{3}{8} + 1\frac{2}{3} + 2\frac{5}{6}$$

$$8\frac{2}{3}$$

$$2\frac{1}{5} - 1 + \frac{1}{8}$$

$$1\frac{3}{40}$$

$$5\frac{1}{5} - 3\frac{3}{4} - \frac{7}{8}$$

$$\frac{23}{40}$$

