BLOCK 2 ~ FRACTIONS AND DECIMALS

ADDING AND SUBTRACTING FRACTIONS

Lesson 8  Estimating Sums and Differences
Lesson 9  Adding and Subtracting Fractions

Explore! Pizza Party!

Lesson 10  Adding and Subtracting Mixed Numbers

Explore! Mixing Paint

Lesson 11  Adding and Subtracting by Renaming
Lesson 12  Perimeter with Fractions

Review  Block 2 ~ Adding and Subtracting Fractions
**Estimation Rap**
Write a rap song about situations where estimating is acceptable and where estimating would cause disasters.

See page 45 for details.

**Measure the Perimeter**
Measure the length and width of several different frames at home or at a store. Find each perimeter.

See page 63 for details.

**Create the Problem**
Write problems using pairs of fractions that add up to a given sum.

See page 59 for details.

**Models**
Create a brochure to teach how to add and subtract fractions using models.

See page 50 for details.

**Find the Sum**
Find the sum of problems of three or more fractions with different denominators.

See page 66 for details.

**Lights, Camera, Action**
Create a skit where characters use addition or subtraction of fractions to solve their problem.

See page 54 for details.

**Triathlon**
Find different distances using Oregon triathlon races.

See page 55 for details.

**Interview**
Interview someone who uses fractions. Report on how that person uses fractions.

See page 45 for details.

**You are the Author**

See page 54 for details.
A teacher needed two boxes of pencils. Hayden said he had $\frac{1}{6}$ of a box at home. Trevor thought he had $\frac{2}{5}$ of a box. Kelsey knew she had $\frac{4}{7}$ of a box at home. Asha thought she had $\frac{5}{6}$ of a box. The students were not sure if they had enough pencils to help the teacher reach two boxes.

Estimating could help these students get a good idea of whether or not they had enough pencils.

**Estimating Sums or Differences Using Fractions**

1. Round to 0, $\frac{1}{2}$ or 1, whichever is closest.
   - If the numerator is very small compared to the denominator, estimate as 0.
   - If the numerator is about half of the denominator, estimate as $\frac{1}{2}$.
   - If the numerator is nearly as big as the denominator, estimate as 1.
2. Add or subtract.

**Example 1**

Hayden had about $\frac{1}{6}$ of a box of pencils. Trevor had about $\frac{2}{5}$ of a box. Kelsey had about $\frac{4}{7}$ of a box and Asha had about $\frac{5}{6}$ of a box. About how many boxes of pencils do they have altogether?

**Solution**

Compare each numerator to its denominator to determine the estimated value.

<table>
<thead>
<tr>
<th></th>
<th>Hayden</th>
<th>Trevor</th>
<th>Kelsey</th>
<th>Asha</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\frac{1}{6}$</td>
<td>$\frac{2}{5}$</td>
<td>$\frac{4}{7}$</td>
<td>$\frac{5}{6}$</td>
</tr>
<tr>
<td></td>
<td>$0$</td>
<td>$\frac{1}{2}$</td>
<td>$\frac{1}{2}$</td>
<td>$1$</td>
</tr>
</tbody>
</table>

The numerator is very small compared to the denominator.

The numerators are about half of their denominators.

The numerator is nearly as big as the denominator.

Add the estimated amounts. $0 + \frac{1}{2} + \frac{1}{2} + 1 = 2$

They have about two boxes of pencils among the four of them.

$\frac{1}{6} + \frac{2}{5} + \frac{4}{7} + \frac{5}{6} \approx 2$

The $\approx$ sign means “about” or “approximately.”
Lesson 8 ~ Estimating Sums And Differences

EXAMPLE 2

Asha found that, instead of \( \frac{5}{6} \) of a box of pencils, she had \( \frac{4}{9} \) of a box. About how much less does she have than she originally thought?

**Solution**

Write the problem. \[ \frac{5}{6} - \frac{4}{9} \approx \]

Round to 0, \( \frac{1}{2} \) or 1.

Subtract. \[ 1 - \frac{1}{2} = \frac{1}{2} \]

Asha has about half of a box less than she thought she had.

Estimating Sums or Differences Using Mixed Numbers

1. Round to the nearest whole number.
2. Add or subtract.

EXAMPLE 3

Estimate the value of \( 2\frac{1}{3} + 5\frac{6}{7} \).

**Solution**

Write the problem. \[ 2\frac{1}{3} + 5\frac{6}{7} \]

Round to the nearest whole number. \[ 2 + 6 \]

Add. \[ 2 + 6 = 8 \]

\[ 2\frac{1}{3} + 5\frac{6}{7} \approx 8 \]

EXAMPLE 4

According to the Guinness Book of World Records, the world’s tallest man, Robert Pershing Wadlow, was \( 8\frac{11}{12} \) feet tall. The world’s shortest woman, Zhu Haizhen, was \( 2\frac{7}{12} \) feet tall. Approximately how much taller was the tallest man than the shortest woman?

**Solution**

Write the problem. \[ 8\frac{11}{12} - 2\frac{7}{12} \approx \]

Round to the nearest whole number. \[ 9 - 3 \]

Subtract. \[ 9 - 3 = 6 \]

\[ 8\frac{11}{12} - 2\frac{7}{12} \approx 6 \]

The tallest man was about six feet taller than the shortest woman.
### EXERCISES

#### Estimate each sum or difference.

1. \( \frac{2}{5} + \frac{2}{11} \)
2. \( \frac{3}{5} + \frac{4}{9} \)
3. \( \frac{9}{10} - \frac{7}{8} \)
4. \( \frac{8}{15} + \frac{6}{7} \)
5. \( \frac{32}{37} + \frac{21}{25} \)
6. \( \frac{7}{9} - \frac{6}{13} \)
7. \( \frac{19}{21} - \frac{1}{9} \)
8. \( \frac{8}{15} - \frac{10}{21} \)
9. \( \frac{9}{19} + \frac{2}{15} \)

10. Melanie exercised for \( \frac{2}{5} \) hour on Saturday. On Sunday she exercised for \( \frac{3}{5} \) hour. About how many hours did Melanie exercise in the two days?

11. Sapphire and Rebekah each brought a pie to a family party. Sapphire cut her pie into 12 pieces. After the party, \( \frac{1}{12} \) of the pie was left. Rebekah cut her pie into 8 pieces. She had \( \frac{5}{8} \) of the pie left after the party. About how much more of Rebekah’s pie was left than Sapphire’s pie?

12. Nigel told his mom he completed \( \frac{1}{10} \) of the family’s chores. His brother, Nick, completed \( \frac{3}{5} \) of the chores. Estimate what fraction of the chores were completed altogether.

#### Estimate each sum or difference.

13. \( 2\frac{2}{7} + 5\frac{8}{9} \)
14. \( 2\frac{1}{5} + 3\frac{3}{7} \)
15. \( 6\frac{8}{13} + 8\frac{3}{4} \)
16. \( 9\frac{1}{2} + 1\frac{1}{3} \)
17. \( 11\frac{2}{5} + 12\frac{7}{8} \)
18. \( 6\frac{13}{14} - 4\frac{4}{8} \)
19. \( 4\frac{8}{9} - 1\frac{3}{5} \)
20. \( 5\frac{3}{5} - 2\frac{6}{11} \)
21. \( 9\frac{2}{9} - 3\frac{7}{8} \)

22. After soccer practice, Jaafan drank \( 1\frac{7}{8} \) cups of water. His friend, Brock, drank \( 1\frac{1}{7} \) cups of water. Approximately how much more water did Jaafan drink than Brock?

23. Trey’s family drove from Redmond to Madras. The map showed that they had traveled \( 26\frac{3}{20} \) miles. They drove on to Warm Springs which was another \( 14\frac{4}{3} \) miles. Estimate the total number of miles they traveled from Redmond to Warm Springs.

24. Lacey made bread. The recipe called for \( 2\frac{3}{8} \) cups of flour at the beginning. She added an additional \( 3\frac{1}{6} \) cups of flour after mixing the first ingredients. Estimate how many total cups of flour Lacey needed to make the bread.
25. When the Jacobsens designed their house, one room was $16 \frac{1}{8}$ feet wide. They changed the design so the width of the room was $1 \frac{3}{4}$ feet shorter than originally planned. Approximately how wide would the new room be with the revised plan?

**REVIEW**

Write each mixed number as an improper fraction.

26. $5 \frac{1}{2}$

27. $3 \frac{2}{3}$

28. $7 \frac{1}{4}$

List the first five non-zero multiples for each number.

29. 5

30. 7

31. 8

**Tic-Tac-Toe ~ Interview**

Interior decorating, engineering, carpet laying, carpentry, architecture, tailoring and plumbing are a few occupations that use fractions regularly. Choose an occupation that uses fractions regularly (it can be one of those above or one approved by your teacher).

**Step 1:** Write interview questions for someone in that job. Consider what they do on a daily basis and how fractions are used.

**Step 2:** Interview someone who works in the occupation you chose. Record their responses to your questions.

**Step 3:** Write a one-page report to inform others about this occupation and how fractions are a necessary aspect of this job. Include the interview questions and the person's responses with your report.

**Tic-Tac-Toe ~ Estimation Rap**

There are times where estimation is accepted and an exact answer is not needed. However, if you always estimate, problems might arise. For example, if you estimate by rounding to the nearest dollar for something that cost $2.15, you may only bring $2.00 with you. This would not be enough money to buy the item.

Make a list of situations where it is acceptable to estimate. Make another list of times where you should not estimate. Create a rap song using the lists.
Lesson 9 ~ Adding And Subtracting Fractions

Sometimes when you add or subtract fractions the denominators are the same. Sometimes you may find that the fractions have different denominators. In this lesson you will learn how to deal with both situations.

EXPLORE!

Janice was ordering pizzas for her friends. The table shows the fractions of the pizzas each person said they could eat.

<table>
<thead>
<tr>
<th></th>
<th>Cheese</th>
<th>Hawaiian</th>
<th>Pepperoni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Janice</td>
<td>( \frac{3}{10} )</td>
<td>( \frac{1}{6} )</td>
<td>( \frac{1}{4} )</td>
</tr>
<tr>
<td>Lakelynn</td>
<td>( \frac{1}{5} )</td>
<td>( \frac{1}{3} )</td>
<td>( \frac{3}{8} )</td>
</tr>
<tr>
<td>Alvaro</td>
<td>( \frac{3}{5} )</td>
<td>( \frac{1}{2} )</td>
<td>( \frac{5}{8} )</td>
</tr>
<tr>
<td>Jory</td>
<td>( \frac{1}{10} )</td>
<td>( \frac{2}{3} )</td>
<td>( \frac{1}{2} )</td>
</tr>
</tbody>
</table>

How much cheese pizza do Lakelynn and Alvaro think they can eat together? Lay out the fraction tiles to represent the amounts of cheese pizza which Lakelynn and Alvaro want. Combine the fraction tiles to find the total. Simplify the fraction, if needed. Draw a picture of the fraction model you used and write the addition equation on paper.

\[
\begin{align*}
\text{How much cheese pizza do Lakelynn and Alvaro think they can eat together?} \\
\text{Step 1:} & \quad \frac{1}{5} + \frac{3}{5} = \frac{4}{5}
\end{align*}
\]

**Step 1:** Follow the process shown above to answer the following questions.

a. How much cheese pizza will Janice and Jory eat together?
b. How much Hawaiian pizza will Jory and Lakelynn eat together?
c. How much pepperoni pizza will Lakelynn and Alvaro eat together?

**Step 2:** Look at the equations. What do you notice about the denominators of the fractions being added and the denominator of the answer? What about the numerators? How might you add fractions with common denominators without using fraction tiles?
Lesson 9 ~ Adding And Subtracting Fractions

How much Hawaiian pizza will Jory and Alvaro eat? Lay out fraction tiles to represent the amount of Hawaiian pizza Jory and Alvaro eat.

\[
\begin{array}{c}
\text{How much Hawaiian pizza will Jory and Alvaro eat? Lay out fraction tiles to represent the amount of Hawaiian pizza Jory and Alvaro eat.}
\end{array}
\]

\[
\frac{2}{3} + \frac{1}{2} = ?
\]

Find the least common denominator for the two fractions.

2: 2, 4, 6, 8

\[
\text{LCD} = 6
\]

3: 3, 6, 9, 12

Replace the original fraction tiles with equivalent fractions using the LCD. Combine the tiles to find the answer.

\[
\frac{4}{6} + \frac{3}{6} = \frac{7}{6}
\]

Simplify the fraction, if needed. All improper fractions should be written as mixed numbers.

\[
\frac{7}{6} = 1\frac{1}{6}
\]

Step 3: Follow the process shown above to answer the following questions. Draw pictures of the fraction tiles used in the process. Write the addition equation on your paper.

a. How much cheese pizza will Janice and Lakelynn eat?

b. How much Hawaiian pizza will Lakelynn and Alvaro eat?

c. How much Hawaiian pizza will Janice and Jory eat?

d. How much pepperoni pizza will Janice and Alvaro eat?

e. How much pepperoni pizza will Janice and Jory eat?

f. How much pepperoni pizza will Alvaro and Jory eat?

Step 4: How might you add fractions with unlike denominators without using fraction tiles?

---

**ADD OR SUBTRACT FRACTIONS WITH COMMON DENOMINATORS**

1. Add or subtract the numerators.
2. Write the sum or difference over the common denominator.
3. Simplify the fraction.

---

**ADD OR SUBTRACT FRACTIONS WITH UNLIKE DENOMINATORS**

1. Rewrite the fractions using the least common denominator (LCD).
2. Add or subtract the numerators.
3. Write the sum or difference over the common denominator.
4. Simplify the fraction.

---

After adding, subtracting, multiplying or dividing fractions, you must simplify the fraction. This means writing the fraction in simplest form, then changing improper fractions to mixed numbers if necessary.
EXAMPLE 1

Kiley practiced $\frac{1}{8}$ of her piano music in the morning. That afternoon she practiced $\frac{3}{8}$ of her music. What fraction of her piano music did she practice?

**Solution**

Write the problem. $\frac{1}{8} + \frac{3}{8}$

Add the numerators and write the sum over the common denominator.

Simplify the fraction. $\frac{4}{8} = \frac{1}{2}$

Kiley practiced $\frac{1}{2}$ of her piano music.

EXAMPLE 2

Find the value of $\frac{5}{6} - \frac{1}{6}$.

**Solution**

Subtract the numerators. $\frac{5 - 1}{6} = \frac{4}{6}$

Write the difference over the common denominator.

Simplify the fraction. $\frac{4}{6} = \frac{2}{3}$

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

EXAMPLE 3

Mallory made $\frac{3}{4}$ gallon of ice cream. Logan made $\frac{1}{2}$ gallon. How many total gallons of ice cream do they have together?

**Solution**

Write the problem. $\frac{3}{4} + \frac{1}{2}$

Find the least common denominator for the set of fractions.

Rewrite the fractions using the LCD.

Add the numerators.

Change the improper fraction to a mixed number.

Mallory and Logan made a total of $1 \frac{1}{4}$ gallons of ice cream.
Lesson 9 ~ Adding And Subtracting Fractions

EXAMPLE 4

Find the value of \( \frac{2}{3} - \frac{1}{4} \).

Solution

Find the LCD.

\[
\begin{align*}
3: & \quad 3, 6, 9, 12 \\
4: & \quad 4, 8, 12, 16
\end{align*}
\]

Rewrite the fraction using the LCD.

\[
\begin{align*}
\frac{2}{3} & = \frac{8}{12} \\
\frac{1}{4} & = \frac{3}{12}
\end{align*}
\]

Subtract the numerators.

\[
\frac{8}{12} - \frac{3}{12} = \frac{8 - 3}{12} = \frac{5}{12}
\]

\[
\frac{2}{3} - \frac{1}{4} = \frac{5}{12}
\]

EXERCISES

Find each sum or difference. Write in simplest form.

1. \( \frac{1}{4} + \frac{1}{4} \)
2. \( \frac{3}{5} + \frac{1}{5} \)
3. \( \frac{1}{8} + \frac{5}{8} \)

4. \( \frac{1}{10} + \frac{5}{10} \)
5. \( \frac{7}{9} + \frac{5}{9} \)
6. \( \frac{5}{6} - \frac{3}{6} \)

7. \( \frac{7}{8} - \frac{5}{8} \)
8. \( \frac{9}{15} - \frac{4}{15} \)
9. \( \frac{9}{11} - \frac{3}{11} \)

10. Isaiah surveyed his class to see whether they thought the American beaver was appropriate as the animal symbol for Oregon. Four-eighths of the class thought it was a good choice. Three-eighths of the class thought another animal should be chosen as the Oregon animal symbol. One-eighth of his class did not want to answer the survey. What fraction of his class answered the survey?

11. Jace ran \( \frac{3}{10} \) mile on Monday. On Tuesday he ran \( \frac{5}{10} \) mile. How much further did he run on Tuesday than Monday?
Find each sum or difference. Write in simplest form.

12. \( \frac{1}{8} + \frac{1}{2} \)  
13. \( \frac{5}{12} + \frac{4}{6} \)  
14. \( \frac{3}{10} + \frac{2}{5} \)

15. \( \frac{1}{2} + \frac{2}{6} \)  
16. \( \frac{3}{4} + \frac{2}{3} \)  
17. \( \frac{2}{3} - \frac{1}{2} \)

18. \( \frac{5}{6} - \frac{2}{8} \)  
19. \( \frac{5}{9} - \frac{1}{3} \)  
20. \( \frac{11}{12} - \frac{3}{4} \)

21. Natasha's desk measured \( \frac{3}{4} \) meter wide. Neil's desk was \( \frac{2}{3} \) meter wide. How much wider was Natasha's desk than Neil's desk?

22. Lara ate \( \frac{1}{2} \) of a sub sandwich. Lucas ate \( \frac{3}{4} \) of a sub sandwich. How much did they eat altogether?

23. One-third of the students Ms. Jarrett teaches are sixth graders. Five-twelfths of the students she teaches are seventh graders. The rest are eighth graders.
   a. What fraction of her students are 6\(^{th}\) and 7\(^{th}\) graders?
   b. What fraction of her students are 8\(^{th}\) graders?

24. Aaron rode his bike off a jump \( \frac{7}{12} \) yard tall. The next day he rode his bike off a jump \( \frac{8}{9} \) yard tall. How much taller was the second jump than the first jump?

**REVIEW**

Draw a line with the given measure.

25. \( 2\frac{1}{8} \) in  
26. \( 4\frac{3}{4} \) in  
27. \( 1\frac{1}{2} \) in

Estimate each difference.

28. \( \frac{9}{10} - \frac{3}{8} \)  
29. \( \frac{11}{12} - \frac{1}{5} \)  
30. \( 5\frac{1}{8} - 2\frac{1}{4} \)

**Tic-Tac-Toe ~ Models**

Write directions about how to add and subtract fractions using fraction tiles.

Have a parent or classmate follow your directions to see if they work. Make any needed changes to your directions so they are clear and useful.

Create a brochure using your directions to teach students how to use fraction tiles to show addition or subtraction of fractions.
Mixed numbers are used in many real-world situations. Measurements are often given as mixed numbers. Amounts of each ingredient in recipes are also in mixed number form. You will need to add or subtract mixed numbers to solve problems in many situations.

**EXPLORE!**

Kazi painted his bedroom. He mixed different colors of paint together to make new and exciting shades.

**Step 1:** Kazi purchased two small cans of paint for the ceiling. The can of red paint contained \(2 \frac{3}{4}\) pints. The can of blue paint contained \(1 \frac{5}{8}\) pints. He mixed the two cans of paint together. How much paint does he have for the ceiling?

- a. Write the problem as a mathematical expression.
- b. Write each mixed number as an improper fraction.
- c. Rewrite the fractions using the least common denominator.
- d. Find the sum or difference. Simplify your answer and convert it to a mixed number, if needed.

**Step 2:** Kazi bought \(1 \frac{1}{6}\) gallons of yellow and \(4 \frac{1}{3}\) gallons of green paint for the walls. He mixed the two colors of paint together. How much paint does he have available for the walls?

- a. Write the problem as a mathematical expression.
- b. Write each mixed number as an improper fraction.
- c. Rewrite the fractions using the least common denominator.
- d. Find the sum or difference. Simplify your answer and convert it to a mixed number, if needed.

**Step 3:** Kazi bought \(2 \frac{1}{5}\) pints of white paint for the trim. When he finished painting he still had \(\frac{7}{10}\) pint of white paint left. How much white paint did Kazi use?

- a. Write the problem as a mathematical expression.
- b. Write each mixed number as an improper fraction.
- c. Rewrite the fractions using the least common denominator.
- d. Find the sum or difference. Simplify your answer and convert it to a mixed number, if needed.

**Step 4:** Explain in your own words how to add or subtract mixed numbers using the method in this Explore!
**Adding or Subtracting Mixed Numbers Using Improper Fractions**

1. Write the mixed numbers as improper fractions.
2. If the denominators are different, rewrite the fractions using the least common denominator (LCD).
3. Add or subtract the numerators.
4. Write the sum or difference over the common denominator.
5. Simplify the fraction.

---

**Example 1**

Find the value of $3 \frac{1}{4} + 1 \frac{2}{3}$.

**Solution**

Change each mixed number to an improper fraction.

\[
3 \frac{1}{4} = \frac{13}{4} \quad \text{and} \quad 1 \frac{2}{3} = \frac{5}{3}
\]

Write equivalent fractions with the least common denominator, 12.

\[
\begin{align*}
\times 3 & : & \frac{13}{4} = \frac{39}{12} & \text{and} & \times 4 & : & \frac{5}{3} = \frac{20}{12}
\end{align*}
\]

Add the numerators.

\[
\frac{39}{12} + \frac{20}{12} = \frac{39 + 20}{12} = \frac{59}{12}
\]

Write as a mixed number.

\[
\frac{59}{12} = 4 \frac{11}{12}
\]

\[
3 \frac{1}{4} + 1 \frac{2}{3} = 4 \frac{11}{12}
\]

---

**Example 2**

Seth ran a mile around the track. It took him $6 \frac{5}{6}$ minutes to run a mile. His friend, Tremaine, also ran a mile on the track. It took Tremaine $7 \frac{1}{3}$ minutes to run the mile. How much faster did Seth run than Tremaine?

**Solution**

Write the problem.

\[
7 \frac{1}{3} - 6 \frac{5}{6}
\]

Write the mixed numbers as improper fractions.

\[
7 \frac{1}{3} = \frac{22}{3} \quad \text{and} \quad 6 \frac{5}{6} = \frac{41}{6}
\]

Write equivalent fractions with the LCD of 6.

\[
\times 3 \quad \frac{22}{3} = \frac{44}{6}
\]

Subtract the numerators.

\[
\frac{44}{6} - \frac{41}{6} = \frac{44 - 41}{6} = \frac{3}{6}
\]

Write the fraction in simplest form.

\[
\frac{3}{6} = \frac{1}{2}
\]

Seth ran the mile $\frac{1}{2}$ minute faster than Tremaine.
EXERCISES

Find each sum. Write in simplest form.

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

10. Silas went to the grocery store with his parents. They bought two kilograms of carrots. One kilogram is about $2 \frac{1}{5}$ pounds. Silas wanted to find the number of pounds in two kilograms so he added $2 \frac{1}{5} + 2 \frac{1}{5}$. How many pounds are equal to two kilograms of carrots?

11. Cory nailed two boards together. The first one was $1 \frac{5}{6}$ inches thick. The second one was $3 \frac{1}{2}$ inches thick. How thick were the two boards together?

12. Natalie poured $7 \frac{3}{8}$ ounces of club soda in a glass. She added $2 \frac{1}{4}$ ounces of raspberry flavoring to the club soda. How much liquid was in the glass?

Find each difference. Write in simplest form.

13. $3 \frac{7}{8} - 2 \frac{3}{8}$
14. $2 \frac{1}{6} - 1 \frac{1}{3}$
15. $3 \frac{3}{4} - \frac{1}{4}$
16. $4 \frac{3}{7} - 1 \frac{3}{14}$
17. $2 \frac{4}{5} - 1 \frac{1}{15}$
18. $5 \frac{3}{4} - 1 \frac{11}{12}$
19. $5 \frac{5}{6} - 3 \frac{1}{5}$
20. $4 \frac{1}{3} - 2 \frac{1}{6}$
21. $3 \frac{5}{12} - 2 \frac{3}{4}$

22. Nate made $2 \frac{3}{2}$ quarts of salsa last year. This year he made $6 \frac{5}{6}$ quarts of salsa. How much more salsa did he make this year?

23. Consuela spent $2 \frac{1}{2}$ hours babysitting for her neighbor on Saturday. The next week she babysat for $3 \frac{1}{4}$ hours. How much longer did she babysit the second week?

24. Sari stood $5 \frac{1}{3}$ ft tall. Her mom stood $4 \frac{5}{6}$ ft tall. How much taller was Sari than her mom?

25. The Asian elephants at the Oregon Zoo weigh different amounts. Packy weighs $6 \frac{5}{8}$ tons. His son, Rama, weighs $3 \frac{17}{40}$ tons. How much more does Packy weigh than Rama?
Find each sum or difference. Write in simplest form.

26. $\frac{1}{2} + \frac{3}{8}$

27. $\frac{3}{4} + \frac{1}{5}$

28. $\frac{5}{6} + \frac{3}{5}$

29. $\frac{9}{10} - \frac{3}{5}$

30. $\frac{2}{3} - \frac{1}{4}$

31. $\frac{11}{12} - \frac{1}{5}$

 Tic-Tac-Toe ~ You are the Author

There are many children’s books which include fractions, such as:

- The Wishing Club: A Story about Fractions by Donna Jo Napoli
- Give Me Half! by Stuart J. Murphy
- Fraction Fun by David A. Adler & Nancy Tobin
- Working With Fractions by David A. Adler & Edward Miller
- Fraction Action by Loreen Leedy
- Hershey’s Fractions by Jerry Pallotta & Robert C. Bolster
- Apple Fractions by Jerry Pallotta & Rob Bolster

**Step 1:** Read at least two of the books cited.

**Step 2:** Create a children’s book which includes the concept of fractions. The story should be appropriate for children. Create a cover and illustrations for your story.

 Tic-Tac-Toe ~ Lights, Camera, Action

Adding and subtracting fractions occurs everyday.

**Step 1:** Make a list of situations where adding or subtracting fractions are used. Include problems that can be solved using addition or subtraction of fractions.

**Step 2:** Write a skit with two or more characters. The plot should have a problem and a solution using addition or subtraction of fractions.

*Script Example:* Reid: *write what he says.*

Kellene: *write what she says.*

Include any actions they are to take in parentheses, like (walk across stage) or (face each other).
**A triathlon is an endurance event that consists of swimming, cycling and running. The length of each segment varies depending on the triathlon. In 2008 there were many triathlons around the state of Oregon. Answer the questions below about participants in different triathlons.**

1. **Pacific Crest Olympic Triathlon – Sunriver, Oregon**
   - **Swim:** $15\frac{15}{16}$ miles
   - **Cycle:** 28 miles
   - **Run:** $6\frac{1}{2}$ miles
   
   **a.** How long is the entire triathlon?
   **b.** Marita has $2\frac{1}{8}$ miles left in the running segment. How far has she traveled so far?

2. **Lincoln City Sprint Triathlon – Lincoln City, Oregon**
   - **Swim:** $15\frac{32}{100}$ miles
   - **Cycle:** $9\frac{3}{5}$ miles
   - **Run:** $3\frac{1}{10}$ miles
   
   **a.** How long is the entire triathlon?
   **b.** Quan has finished the swimming segment and has biked 6 miles. How far does he still need to go to finish the triathlon?

3. **Granite Man Triathlon – Jacksonville, Oregon**
   - **Swim:** $\frac{3}{5}$ mile
   - **Cycle:** 13 miles
   - **Run:** $3\frac{1}{10}$ miles
   
   **a.** How long is the entire triathlon?
   **b.** Jerome has $2\frac{1}{8}$ miles left in the cycling segment. How many miles is he from the finish line?

4. **Solstice Triathlon – La Grande, Oregon**
   - **Swim:** $\frac{3}{5}$ mile
   - **Cycle:** $15\frac{1}{2}$ miles
   - **Run:** $6\frac{1}{2}$ miles
   
   **a.** How long is the entire triathlon?
   **b.** LeAnne has $1\frac{1}{4}$ miles left in the cycling segment. How far has she traveled from the starting line of the triathlon?

5. **Canby Telcoms Gator Grinder Triathlon – Canby, Oregon**
   - **Swim:** $25\frac{7}{88}$ mile
   - **Cycle:** 12 miles
   - **Run:** $3\frac{1}{10}$ miles
   
   **a.** How long is the entire triathlon?
   **b.** Carlos has almost finished the swimming segment. He had completed $21\frac{11}{88}$ mile so far. How far does he still need to go to finish the swimming segment?
   **c.** How far does Carlos need to go to finish the triathlon?
You learned one method for adding and subtracting mixed numbers in Lesson 10. You converted each mixed number into an improper fraction and followed the process for adding or subtracting two fractions. Another method for adding or subtracting mixed numbers is called renaming. Renaming can also be called borrowing or regrouping.

Paula bought a turkey for a family dinner. It weighed $10\frac{3}{4}$ pounds. Her mother did not realize Paula had bought a turkey. Her mother also bought a turkey that weighed $12\frac{2}{3}$ pounds. How many total pounds of turkey did they have for the family dinner?

Write the problem. \[10\frac{3}{4} + 12\frac{2}{3}\]

Rewrite the fractions using the LCD, 12. \[10\frac{9}{12} + 12\frac{8}{12}\]

Add each part of the mixed numbers. \[\begin{align*}
10\frac{9}{12} & + 12\frac{8}{12} \\
& \quad \frac{22}{12}
\end{align*}\]

Rename the improper fraction as a mixed number. \[\frac{17}{12} = 1\frac{5}{12}\]

Add the sum of the whole numbers to the renamed fraction. \[22 + 1\frac{5}{12} = 23\frac{5}{12}\]

Paula’s family had a total of $23\frac{5}{12}$ pounds of turkey for dinner.

How much larger was the turkey Paula’s mother bought than the one Paula had purchased?

Write the problem. \[12\frac{2}{3} - 10\frac{3}{4}\]

Rewrite the fractions using the LCD, 12. \[12\frac{8}{12} - 10\frac{9}{12}\]

Rename $12\frac{8}{12}$ as $11\frac{12}{12} + \frac{8}{12}$ which is $11\frac{20}{12}$. \[\begin{align*}
& 11\frac{20}{12} \\
– & 10\frac{9}{12} \\
& \quad \frac{11}{12}
\end{align*}\]

Subtract each part of the mixed numbers. The turkey Paula’s mother bought was $1\frac{11}{12}$ pounds larger than Paula’s turkey.
There are two situations where renaming mixed numbers to find the sum or difference is needed.

- Rename when subtracting if the fraction in the first number is smaller than the fraction in the second number.
- Rename when adding if the two fractions add to more than 1.

**Example 1**

Find the value of $4\frac{3}{5} + 2\frac{7}{10}$.

**Solution**

Rewrite the fractions using the LCD, 10.

Add the fractions and the whole numbers.

Rename the improper fraction.

$4\frac{3}{5} + 2\frac{7}{10} = 7\frac{3}{10}$

**Example 2**

Mahavir biked $1\frac{4}{5}$ miles on Saturday. He biked $18\frac{1}{4}$ miles on Sunday. How much further did he bike on Sunday?

**Solution**

Write the problem.

Rewrite using the LCD, 12.

Rename the first fraction because $\frac{3}{12}$ is smaller than $\frac{10}{12}$.

Mahavir rode $3\frac{5}{12}$ miles further on Sunday.
**Example 3**

The longest python on record was 33 feet long. The average male python grows to be 18 1/6 feet long. What is the difference between the average male python and the world's longest python?

**Solution**

Write the problem. 

\[ 33 - 18 \frac{1}{6} \]

Rename 33 as 32 5/6.

\[ 32 \frac{5}{6} - 18 \frac{1}{6} \]

\[ 14 \frac{5}{6} \]

The world's longest python was 14 5/6 feet longer than the average male python.

**Exercises**

1. Explain one type of problem when renaming should be used to add or subtract mixed numbers.

2. Copy and complete each set of equivalent mixed numbers.
   a. \[ 4 \frac{1}{4} = \frac{5}{4} \]
   b. \[ 2 \frac{2}{3} = 1 \frac{1}{6} \]
   c. \[ 6 \frac{7}{4} = \frac{3}{4} \]

Find each sum or difference. Write in simplest form.

3. \[ 2 \frac{3}{5} + 4 \frac{4}{5} \]
4. \[ 6 \frac{2}{3} + 5 \frac{3}{5} \]
5. \[ 9 \frac{7}{8} - 1 \frac{3}{8} \]
6. \[ 10 \frac{3}{7} - 7 \frac{5}{9} \]
7. \[ 8 \frac{1}{2} + 3 \frac{3}{4} \]
8. \[ 15 \frac{1}{3} - 10 \frac{1}{6} \]
9. \[ 3 - 1 \frac{3}{10} \]
10. \[ 4 \frac{11}{12} + 1 \frac{1}{3} \]
11. \[ 8 \frac{2}{3} - 7 \frac{5}{6} \]
12. \[ 22 \frac{1}{2} + 10 \frac{5}{7} \]
13. \[ 7 - 3 \frac{5}{8} \]
14. \[ 6 \frac{3}{5} - 1 \frac{1}{6} \]

15. A junior-sized football is 10 3/8 inches long and 5 7/8 inches wide. What is the difference between the football’s length and width?

16. Kirk caught a fish that weighed 2 9/16 pounds. His little brother caught a fish that weighed 3 3/4 pounds. What was the total weight of the fish the boys caught?

17. Owen walked 1 4/5 miles on Tuesday and 3 1/2 miles on Wednesday. How far did he walk in the two days combined?

18. A bag contained 2 cups of raisins. Five-eighths of a cup of raisins was used in a recipe. How many cups of raisins remain in the bag?
19. Alberto and Marco wrote songs for their band. Alberto’s song was \(2\frac{1}{2}\) minutes long. Marco’s song was \(4\frac{1}{6}\) minutes long. How much longer was Marco’s song than Alberto’s song?

20. How do you know when you need to rename one of the numbers when subtracting mixed numbers?

21. The rim on a basketball hoop is 10 feet off the ground. Ron jumped and reached \(8\frac{5}{8}\) feet off the ground. How much higher would Ron need to jump to touch the rim?

**REVIEW**

Write two equivalent fractions for each fraction.

22. \(\frac{6}{8}\)  
23. \(\frac{1}{3}\)  
24. \(\frac{10}{10}\)

Find each sum or difference. Write in simplest form.

25. \(\frac{4}{9} - \frac{1}{3}\)  
26. \(\frac{1}{5} + \frac{9}{10}\)  
27. \(\frac{3}{4} - \frac{1}{6}\)

28. \(\frac{7}{10} - \frac{3}{20}\)  
29. \(\frac{1}{8} + \frac{1}{3}\)  
30. \(\frac{5}{21} + \frac{6}{7}\)

**Tic-Tac-Toe ~ Create the Problem**

Instead of finding the sum of an addition problem, you must find two addends that equal a given sum.

Write two addition problems that equal the given sum. At least one problem in each set must have two addends with unlike denominators.

*Example:* \(? + ? = \frac{1}{2}\)

\[
\frac{1}{8} + \frac{3}{8} = \frac{4}{8} = \frac{1}{2} \quad \text{OR} \quad \frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}
\]

The sums are:

1. \(\frac{1}{4}\)  2. \(\frac{1}{3}\)  3. \(\frac{3}{7}\)  4. \(\frac{5}{18}\)  5. \(\frac{3}{4}\)  6. \(\frac{7}{8}\)

7. \(\frac{11}{14}\)  8. \(\frac{6}{13}\)  9. \(\frac{7}{15}\)  10. \(\frac{5}{6}\)  11. \(\frac{7}{12}\)  12. \(\frac{2}{5}\)

Lesson 11 ~ Adding And Subtracting By Renaming  59
If you walk around a football field or a city block, you have traveled the perimeter of something. Perimeter is the distance around a closed figure. When you walk all the way around a football field, you have walked its perimeter. When you travel down each side of a city block and back to your starting point, you have traveled the perimeter of the block.

A polygon is a closed figure formed by three or more line segments. To find the perimeter of any given polygon you add the lengths of all sides.

**EXAMPLE 1**

Measure each side of the rectangle in inches. Find the perimeter of the rectangle.

**SOLUTION**

Use a ruler to measure each side of the shape to the nearest sixteenth of an inch.

Length = $\frac{3}{4}$ in

Width = $\frac{1}{4}$ in

Add all four sides of the rectangle together.

$\frac{3}{4} + \frac{1}{4} + \frac{3}{4} + \frac{1}{4} = \frac{8}{4}$

Simplify.

$\frac{8}{4} = 2$

The perimeter of the rectangle is 2 inches.
Use the given measurements to find the perimeter of the polygon.

\[1 \frac{1}{8} \text{ in} + \frac{5}{16} \text{ in} + 5 \frac{1}{16} \text{ in} + 1 \frac{1}{8} \text{ in} + 5 \frac{1}{16} \text{ in} + 5 \frac{1}{16} \text{ in}\]

Solution

Add the lengths of all sides together.

\[1 \frac{1}{8} + \frac{5}{16} + 5 \frac{1}{16} + 1 \frac{1}{8} + 5 \frac{1}{16} + 5 \frac{1}{16} \]

Change the mixed numbers to improper fractions. 

\[1 \frac{1}{8} = \frac{9}{8}\]

Use the LCD to rename the fractions. 

The LCD is 16.

\[\frac{9}{8} = \frac{18}{16}\]

Add the sides of the polygon.

\[\frac{18}{16} + \frac{5}{16} + \frac{5}{16} + \frac{18}{16} + \frac{5}{16} + \frac{5}{16} = \frac{56}{16}\]

Simplify.

\[\frac{56}{16} = 3 \frac{1}{2} \text{ or } \frac{56}{16} = 3 \frac{8}{16} = 3 \frac{1}{2}\]

The perimeter of the polygon is 3 \(\frac{1}{2}\) inches.

Example 3

Brayden went for a walk in Portland. He walked in a rectangular pattern around a city block. First he walked 66 \(\frac{2}{3}\) yards. He turned right and walked 76 \(\frac{1}{6}\) yards. He turned right two more times and ended up where he started. What was the perimeter of the city block?

\[66 \frac{2}{3} \text{ yd} + 76 \frac{1}{6} \text{ yd} + 66 \frac{2}{3} \text{ yd} + 76 \frac{1}{6} \text{ yd}\]

Solution

Brayden walked in a rectangular pattern. 

\[66 \frac{2}{3} + 76 \frac{1}{6} + 66 \frac{2}{3} + 76 \frac{1}{6} = ? \text{ yards}\]

Add the four sides.

Use the LCD to rename the fractions. 

The LCD is 6.

\[66 \frac{2}{3} = 66 \frac{4}{6}\]

Add the sides of the city block. 

\[66 \frac{4}{6} + 76 \frac{1}{6} + 66 \frac{4}{6} + 76 \frac{1}{6} = 284 \frac{10}{6} \text{ yards}\]

Simplify.

\[\frac{10}{6} = 1 \frac{4}{6} \rightarrow 284 + 1 + \frac{4}{6} = 285 \frac{4}{6} = 285 \frac{2}{3}\]

The perimeter of the city block Brayden walked was 285 \(\frac{2}{3}\) yards.
**EXAMPLE 4**  
Use the given measurement to find the perimeter of the square.

**Solution**  
Add all four sides of the square together.  
\[1 \frac{1}{2} + 1 \frac{1}{2} + 1 \frac{1}{2} + 1 \frac{1}{2} = 4 \frac{1}{2}\]  
Simplify.  
\[4 \frac{1}{2} = 4 + 2 = 6\]  
The perimeter of the square is 6 inches.

**EXERCISES**

Use the given measurements to find the perimeter of each rectangle. Write in simplest form.

1. \[\frac{5}{8} \text{ in} \quad \frac{1}{8} \text{ in} \]  
2. \[\frac{7}{16} \text{ in} \quad \frac{13}{16} \text{ in} \]  
3. \[\frac{1}{4} \text{ in} \quad \frac{1}{4} \text{ in} \]  
4. \[\frac{3}{4} \text{ in} \quad \frac{7}{8} \text{ in} \]  
5. \[\frac{1}{2} \text{ in} \quad 2 \frac{3}{8} \text{ in} \]  
6. \[\frac{1}{8} \text{ in} \quad 1 \frac{7}{8} \text{ in} \]  
7. Measure and record the lengths of the sides of your desk or a table to the nearest quarter inch. Find the perimeter.
8. Measure and record the lengths of the sides of a piece of notebook paper to the nearest sixteenth inch. Find the perimeter.

Use the given measurement to find the perimeter of each square. Write in simplest form.

9. \[\frac{11}{16} \text{ in} \]  
10. \[\frac{7}{8} \text{ in} \]  
11. \[\frac{1}{16} \text{ in} \]  

Measure one side of each square to the nearest sixteenth of an inch using a customary ruler. Find each perimeter. Write in simplest form.

12. \[\text{Orange square} \]  
13. \[\text{Blue square} \]  
14. \[\text{Gray square} \]
Find the perimeter of each polygon. Write in simplest form.

15. \[
\begin{array}{c}
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{11}{16} \text{ in} \\
\frac{11}{16} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in}
\end{array}
\]

16. \[
\begin{array}{c}
\frac{1}{2} \text{ in} \\
\frac{2}{4} \text{ in} \\
\frac{2}{4} \text{ in} \\
\frac{2}{4} \text{ in} \\
\frac{1}{2} \text{ in}
\end{array}
\]

17. \[
\begin{array}{c}
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{7}{8} \text{ in} \\
\frac{1}{2} \text{ in}
\end{array}
\]

18. Jenna’s room was a perfect square. The length of one wall measured \(15\frac{1}{6}\) feet. What is the perimeter of Jenna’s room?

19. Thi walked \(20\frac{1}{8}\) yards toward the office. She turned right and walked \(35\frac{3}{4}\) yards toward the parking lot. She walked in a rectangle until she was back where she started. What is the perimeter of the area Thi walked?

**REVIEW**

Find each sum or difference. Write in simplest form.

20. \(9\frac{1}{4} - 3\frac{3}{4}\) 
21. \(15\frac{1}{6} - 9\frac{5}{6}\) 
22. \(40\frac{1}{2} - 22\frac{2}{3}\)

23. \(2\frac{1}{3} + 3\frac{3}{4}\) 
24. \(9\frac{4}{5} + 3\frac{1}{6}\) 
25. \(2\frac{1}{6} + 8\frac{5}{8}\)

Simplify each fraction. Write as a mixed number.

26. \(\frac{26}{10}\) 
27. \(\frac{84}{9}\) 
28. \(\frac{420}{105}\)

**Tic-Tac-Toe ~ Measure the Perimeter**

Picture frames come in many sizes.

**Step 1:** Find ten or more different sized frames at home or at a store (they do not all have to be rectangular).

**Step 2:** Use a customary ruler or measuring tape to measure the lengths of the sides of each frame to the nearest sixteenth of an inch.

**Step 3:** Draw a sketch of the shape of each frame. Record the lengths of the sides you measured.

**Step 4:** Calculate the perimeter of each frame.
Lesson 8 ~ Estimating Sums and Differences

Estimate each sum or difference. Round to 0, ½ or 1 before adding or subtracting.

1. \( \frac{1}{8} + \frac{2}{3} \)
2. \( \frac{4}{10} + \frac{7}{8} \)
3. \( \frac{8}{9} - \frac{2}{5} \)
4. \( \frac{4}{7} - \frac{1}{9} \)
5. \( \frac{9}{10} + \frac{1}{6} \)
6. \( \frac{11}{20} - \frac{8}{15} \)

Estimate each sum or difference. Round to the nearest whole number before adding or subtracting.

7. \( 1\frac{7}{8} + 2\frac{8}{9} \)
8. \( 6\frac{3}{5} + 2\frac{1}{8} \)
9. \( 3\frac{2}{3} - 1\frac{6}{7} \)
10. \( 4\frac{5}{13} - 2\frac{1}{6} \)
11. \( 10\frac{1}{5} + 4\frac{1}{9} \)
12. \( 12\frac{4}{5} - 1\frac{1}{6} \)

Lesson 9 ~ Adding and Subtracting Fractions

Find each sum or difference. Write in simplest form.

13. \( \frac{3}{8} + \frac{2}{8} \)
14. \( \frac{6}{7} + \frac{6}{7} \)
15. \( \frac{8}{9} - \frac{2}{9} \)
16. \( \frac{5}{6} - \frac{1}{6} \)
17. \( \frac{7}{10} + \frac{2}{5} \)
18. \( \frac{1}{6} + \frac{3}{4} \)
19. \(\frac{7}{9} - \frac{2}{3}\)  
20. \(\frac{11}{12} - \frac{1}{4}\)  
21. \(\frac{1}{9} + \frac{1}{2}\)  

22. Corrie had \(\frac{1}{2}\) cup of brown sugar. She borrowed \(\frac{1}{4}\) cup of brown sugar in order to have enough for her chocolate chip cookie recipe. How much brown sugar did the recipe call for?

23. Tonda’s sunflower plant was \(\frac{7}{8}\) yard tall. Jasmine’s sunflower plant was \(\frac{2}{3}\) yard tall. How much taller was Tonda’s sunflower plant than Jasmine’s sunflower plant?

Lesson 10 ~ Adding and Subtracting Mixed Numbers

Find each sum or difference. Write in simplest form.

24. \(1 \frac{1}{5} + 2 \frac{4}{5}\)  
25. \(2 \frac{3}{4} + 1 \frac{1}{2}\)  
26. \(3 \frac{5}{8} - 1 \frac{1}{8}\)  
27. \(5 \frac{7}{8} - 2 \frac{5}{8}\)  
28. \(5 \frac{1}{8} + 2 \frac{3}{4}\)  
29. \(4 \frac{5}{6} + 2 \frac{2}{3}\)  
30. \(2 \frac{2}{3} - 1 \frac{3}{4}\)  
31. \(5 \frac{1}{2} - 3 \frac{5}{9}\)  
32. \(4 \frac{2}{3} - 1 \frac{1}{2}\)  
33. Travis used \(4 \frac{3}{4}\) quarts of oil when he changed his car’s oil. A week later he checked his oil. He had to put \(1 \frac{1}{3}\) quarts of oil in the car because there was a leak. How much oil did Travis use in all?

34. Quinn’s dad is \(6 \frac{1}{2}\) feet tall. Quinn is \(5 \frac{1}{4}\) feet tall. How much taller is Quinn’s dad than Quinn?

Lesson 11 ~ Adding and Subtracting by Renaming

Find each sum or difference using renaming. Write in simplest form.

35. \(3 \frac{2}{7} + 1 \frac{6}{7}\)  
36. \(10 - 4 \frac{8}{9}\)  
37. \(13 \frac{2}{5} - 9 \frac{1}{2}\)  
38. \(7 \frac{5}{6} + 3 \frac{3}{4}\)  
39. \(5 - 3 \frac{1}{3}\)  
40. \(2 \frac{4}{5} + 1 \frac{7}{10}\)  

41. Rory made \(8 \frac{1}{2}\) quarts of punch for a birthday party. When the punch ran out, Rory had to make \(2 \frac{5}{8}\) more quarts. How much punch did Rory make altogether?

42. Thurston bought 50 pounds of grain for his cows. At the end of the week he had \(7 \frac{7}{8}\) pounds of grain left. How many pounds of grain did the cows eat?
Lesson 12 ~ Perimeter with Fractions

Use the given measurements to find the perimeter of each polygon. Write in simplest form.

43. SQUARE $2 \frac{3}{4}$ in

44. Triangle: $3 \frac{1}{4}$ in, $3 \frac{1}{4}$ in, $3 \frac{1}{4}$ in

45. RECTANGLE $2 \frac{1}{4}$ in

Use a customary ruler to measure one side of each square to the nearest sixteenth of an inch. Find each perimeter. Write in simplest form.

46. 

47. 

48. 

49. Omid ran around the perimeter of a basketball court. The width of the court was $50 \frac{1}{4}$ ft and the length was $90 \frac{1}{2}$ ft. He ended where he began. What is the distance that Omid ran?

**Tic-Tac-Toe ~ Find the Sum**

There are times where you will be finding the sum of more than two fractions or mixed numbers. You will have to change all mixed numbers to improper fractions to add the multiple fractions. Then find the least common denominator (LCD) of the entire set of fractions.

*Example:* $1 \frac{1}{2} + \frac{1}{4} + \frac{3}{8}$

Rewrite $1 \frac{1}{2}$ as $\frac{3}{2}$

The LCD of $\frac{3}{2}$, $\frac{1}{4}$ and $\frac{3}{8}$ is 8.

Use the LCD for the set of fractions. Rewrite each fraction.

$\frac{3}{2} = \frac{12}{8}$, $\frac{1}{4} = \frac{2}{8}$, $\frac{3}{8}$ remains $\frac{3}{8}$

Add the numerators over the common denominator.

$\frac{12}{8} + \frac{2}{8} + \frac{3}{8} = \frac{12 + 2 + 3}{8} = \frac{17}{8}$

Simplify. Write improper fractions as mixed numbers.

$\frac{17}{8} = 2 \frac{1}{8}$

Write 20 different simplified fractions or mixed numbers on 3x5 cards. Draw three cards from the stack and write an addition equation using the three fractions. Use the process above to find the sum. Do this for at least ten problems.
I am a deputy sheriff. I patrol roads, highways and business areas and enforce traffic and criminal laws. When there are accidents on our roads, I investigate them and make reports. I also conduct investigations and gather evidence from crime scenes. Part of conducting an investigation means taking statements from witnesses, as well as talking to people suspected of crimes. If needed, I even sometimes have to arrest and transport people suspected of crimes to jail or court. Most importantly, I inform the public about the law and answer questions about rules and regulations.

When investigating a crime, it is very important that the most accurate information is recorded. Math helps me to do this. During accident reconstructions I have to determine how fast people were going and in which angles they were headed. These mathematical values can reveal important information about what actually happened. I also use math in estimating my arrival time when I get called. I have to estimate how far away from a call I am and then calculate how long it will take me to get there if I travel at a certain speed. I also use simple math every morning when I test my RADAR for accuracy.

To become a deputy sheriff requires a high school diploma and at least two years of college. Usually people take classes in law enforcement, though sometimes experience in the field can substitute for coursework.

In the county where I am employed, starting salaries for deputy sheriffs range from $3,172 to $4,420 per month. Salaries vary depending upon where a person works and how much experience they have.

What I like most about being a deputy sheriff is helping people and trying to keep them safe. I really enjoy meeting people and presenting an image that results in a positive perception of my chosen profession.