1. Draw a number bond and write the number sentence to match each tape diagram. The first one is done for you.

   a. \[1 = \frac{1}{3} + \frac{1}{3} + \frac{1}{3}\]

   b. 

   c. 

   d. 

   e. 

   f. 

   g. 

   h. 

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Lesson 1 Problem Set

2. Draw and label tape diagrams to model each decomposition.

a. \(1 = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}\)

b. \(\frac{4}{5} = \frac{1}{5} + \frac{2}{5} + \frac{1}{5}\)

c. \(\frac{7}{8} = \frac{3}{8} + \frac{3}{8} + \frac{1}{8}\)

d. \(\frac{11}{8} = \frac{7}{8} + \frac{1}{8} + \frac{3}{8}\)

e. \(\frac{12}{10} = \frac{6}{10} + \frac{4}{10} + \frac{2}{10}\)

f. \(\frac{15}{12} = \frac{8}{12} + \frac{3}{12} + \frac{4}{12}\)

g. \(\frac{2}{3} = 1 + \frac{2}{3}\)

h. \(1\frac{5}{8} = 1 + \frac{1}{8} + \frac{1}{8} + \frac{3}{8}\)
1. Draw a number bond and write the number sentence to match the tape diagram.
   a. 
   
   ![Tape Diagram](image)

2. Draw and label tape diagrams to model each number sentence.
   a. \(1 = \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5} + \frac{1}{5}\)

   b. \(\frac{5}{6} = \frac{2}{6} + \frac{2}{6} + \frac{1}{6}\)
1. Draw a number bond and write the number sentence to match each tape diagram. The first one is done for you.

a. \( \frac{2}{3} = \frac{1}{3} + \frac{1}{3} \)

b. 

c. 

d. 

e. 

f. 

g. 

h. 

Name ________________________________ Date ________________
2. Draw and label tape diagrams to match each number sentence.
   a. \( \frac{5}{8} = \frac{2}{8} + \frac{2}{8} + \frac{1}{8} \)
   
   b. \( \frac{12}{8} = \frac{6}{8} + \frac{2}{8} + \frac{4}{8} \)
   
   c. \( \frac{11}{10} = \frac{5}{10} + \frac{5}{10} + \frac{1}{10} \)
   
   d. \( \frac{13}{12} = \frac{7}{12} + \frac{1}{12} + \frac{5}{12} \)
   
   e. \( 1 \frac{1}{4} = 1 + \frac{1}{4} \)
   
   f. \( 1 \frac{2}{7} = 1 + \frac{2}{7} \)
1. Step 1: Draw and shade a tape diagram of the given fraction.
   Step 2: Record the decomposition as a sum of unit fractions.
   Step 3: Record the decomposition of the fraction two more ways.
   (The first one has been done for you.)

   a. \( \frac{5}{8} \)

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

   b. \( \frac{9}{10} \)

   c. \( \frac{3}{2} \)
2. Step 1: Draw and shade a tape diagram of the given fraction.
   Step 2: Record the decomposition of the fraction in three different ways using number sentences.

   a. \( \frac{7}{8} \)

   b. \( \frac{5}{3} \)

   c. \( \frac{7}{5} \)

   d. \( 1 \frac{1}{3} \)
1. Step 1: Draw and shade a tape diagram of the given fraction.
   Step 2: Record the decomposition of the fraction in three different ways using number sentences.

\[
\frac{4}{7}
\]
Lesson 2: Decompose fractions as a sum of unit fractions using tape diagrams.

Name _____________________________ Date ______________________

1. Step 1: Draw and shade a tape diagram of the given fraction.
   Step 2: Record the decomposition as a sum of unit fractions.
   Step 3: Record the decomposition of the fraction two more ways.
   (The first one has been done for you.)

   a. \( \frac{5}{6} \)

   \[
   \frac{5}{6} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6} + \frac{1}{6}
   \]

   b. \( \frac{6}{8} \)

   \[
   \frac{6}{8} = \frac{2}{8} + \frac{2}{8} + \frac{1}{8}
   \]

   c. \( \frac{7}{10} \)
Lesson 2 Homework

2. Step 1: Draw and shade a tape diagram of the given fraction.
   Step 2: Record the decomposition of the fraction in three different ways using number sentences.

   a. \( \frac{10}{12} \)

   b. \( \frac{5}{4} \)

   c. \( \frac{6}{5} \)

   d. \( 1 \frac{1}{4} \)
1. Decompose each fraction modeled by a tape diagram as a sum of unit fractions. Write the equivalent multiplication sentence. The first one has been done for you.

   a. \[
   \begin{array}{c}
   \text{1} \\
   \frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{3}{4} = 3 \times \frac{1}{4}
   \end{array}
   \]

   b. 

   c. 

   d. 

   e. 


2. Write the following fractions greater than 1 as the sum of two products.

a. \[
\begin{array}{c}
\hline
\text{1} \\
\hline
\end{array}
\]

b. \[
\begin{array}{c}
\hline
\text{1} \\
\hline
\end{array}
\]

3. Draw a tape diagram and record the given fraction’s decomposition into unit fractions as a multiplication sentence.

a. \[
\frac{4}{5}
\]

b. \[
\frac{5}{8}
\]

c. \[
\frac{7}{9}
\]

d. \[
\frac{7}{4}
\]

e. \[
\frac{7}{6}
\]
1. Decompose each fraction modeled by a tape diagram as a sum of unit fractions. Write the equivalent multiplication sentence.
   a. 
   ![Tape Diagram A]
   
   b. 
   ![Tape Diagram B]

2. Draw a tape diagram and record the given fraction’s decomposition into unit fractions as a multiplication sentence.
   a. \( \frac{6}{9} \)
1. Decompose each fraction modeled by a tape diagram as a sum of unit fractions. Write the equivalent multiplication sentence. The first one has been done for you.

a. \[
\begin{array}{c}
\text{1} \\
\end{array}
\]
\[
\frac{2}{3} = \frac{1}{3} + \frac{1}{3} \quad \frac{2}{3} = 2 \times \frac{1}{3}
\]

b. \[
\begin{array}{c}
\text{1} \\
\end{array}
\]


c. \[
\begin{array}{c}
\text{1} \\
\end{array}
\]


d. \[
\begin{array}{c}
\text{1} \\
\end{array}
\]
2. Write the following fractions greater than 1 as the sum of two products.

a. \[ \frac{1}{15} \]

b. \[ \frac{1}{15} \]

3. Draw a tape diagram and record the given fraction’s decomposition into unit fractions as a multiplication sentence.
   a. \( \frac{3}{5} \)
   b. \( \frac{3}{8} \)
   c. \( \frac{5}{9} \)
   d. \( \frac{8}{5} \)
   e. \( \frac{12}{4} \)
Name ___________________________ Date __________________

1. The total length of each tape diagram represents 1 whole. Decompose the shaded unit fractions as the sum of smaller unit fractions in at least two different ways. The first one has been done for you.

   a. \( \frac{1}{2} = \frac{1}{4} + \frac{1}{4} \)
   
   b. \( \frac{1}{3} \)
   
   c. 
   
   d. 

2. The total length of each tape diagram represents 1 whole. Decompose the shaded fractions as the sum of smaller unit fractions in at least two different ways.

   a. 
   
   b. 

5.A.43

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3. Draw and label tape diagrams to prove the following statements. The first one has been done for you.

a. \( \frac{2}{5} = \frac{4}{10} \)

![Tape Diagram](image)

b. \( \frac{2}{6} = \frac{4}{12} \)

c. \( \frac{3}{4} = \frac{6}{8} \)

d. \( \frac{3}{4} = \frac{9}{12} \)

4. Show that \( \frac{1}{2} \) is equivalent to \( \frac{4}{8} \) using a tape diagram and a number sentence.

5. Show that \( \frac{2}{3} \) is equivalent to \( \frac{6}{9} \) using a tape diagram and a number sentence.

6. Show that \( \frac{4}{6} \) is equivalent to \( \frac{8}{12} \) using a tape diagram and a number sentence.
1. The total length of the tape diagram represents 1 whole. Decompose the shaded unit fraction as the sum of smaller unit fractions in at least two different ways.

   

2. Draw a tape diagram to prove the following statement.

   \[
   \frac{2}{3} = \frac{4}{6}
   \]
Lesson 4 Homework

1. The total length of each tape diagram represents 1 whole. Decompose the shaded unit fractions as the sum of smaller unit fractions in at least two different ways. The first one has been done for you.

a. 
\[ \frac{1}{2} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6} \]

b. 
\[ \frac{1}{4} = \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} \]

2. The total length of each tape diagram represents 1 whole. Decompose the shaded fractions as the sum of smaller unit fractions in at least two different ways.

a. 
\[ \frac{2}{3} = \frac{1}{3} + \frac{1}{3} \]

b. 
\[ \frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} \]

c. 
\[ \frac{1}{5} = \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10} \]
3. Draw tape diagrams to prove the following statements. The first one has been done for you.

a. \( \frac{2}{5} = \frac{4}{10} \)

\[ \begin{array}{c}
\text{\includegraphics[width=0.5\textwidth]{tape_diagram_4_5}} \\
\end{array} \]

b. \( \frac{3}{6} = \frac{6}{12} \)

c. \( \frac{2}{6} = \frac{6}{18} \)

d. \( \frac{3}{4} = \frac{12}{16} \)

4. Show that \( \frac{1}{2} \) is equivalent to \( \frac{6}{12} \) using a tape diagram and a number sentence.

5. Show that \( \frac{2}{3} \) is equivalent to \( \frac{8}{12} \) using a tape diagram and a number sentence.

6. Show that \( \frac{4}{5} \) is equivalent to \( \frac{12}{15} \) using a tape diagram and a number sentence.
Lesson 5: Decompose unit fractions using area models to show equivalence.

Date: 1/7/14

1. Draw horizontal lines to decompose each rectangle into the number of rows as indicated. Use the model to give the shaded area as both a sum of unit fractions and as a multiplication sentence.

   a. 2 rows
   
   \[
   \frac{1}{4} = \frac{2}{8}
   \]
   
   \[
   \frac{1}{4} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8}
   \]
   
   \[
   \frac{1}{4} = 2 \times \frac{1}{8} = \frac{2}{8}
   \]

   b. 2 rows

   c. 4 rows
2. Draw area models to show the decompositions represented by the number sentences below. Represent the decomposition as a sum of unit fractions and as a multiplication sentence.

a. \( \frac{1}{2} = \frac{3}{6} \)  
b. \( \frac{1}{2} = \frac{4}{8} \)

c. \( \frac{1}{3} = \frac{5}{10} \)  
d. \( \frac{1}{3} = \frac{2}{6} \)

e. \( \frac{1}{3} = \frac{4}{12} \)  
f. \( \frac{1}{4} = \frac{3}{12} \)

3. Explain why \( \frac{1}{12} + \frac{1}{12} + \frac{1}{12} \) is the same as \( \frac{1}{4} \).
1. Draw horizontal lines to decompose each rectangle into the number of rows as indicated. Use the model to give the shaded area as both a sum of unit fractions and as a multiplication sentence.

   a. 2 rows

   ![Diagram of a rectangle decomposed into 2 rows]

   \[
   \frac{3}{5} = \frac{6}{10}
   \]

   b. 3 rows

   ![Diagram of a rectangle decomposed into 3 rows]

2. Draw an area model to show the decomposition represented by the number sentence below. Represent the decomposition as a sum of unit fractions and as a multiplication sentence.

   \[
   \frac{3}{5} = \frac{6}{10}
   \]
1. Draw horizontal lines to decompose each rectangle into the number of rows as indicated. Use the model to give the shaded area as both a sum of unit fractions and as a multiplication sentence.

a. 3 rows

\[
\begin{align*}
\frac{1}{2} &= \frac{3}{6} \\
\frac{1}{2} &= \frac{1}{6} + \frac{1}{6} = \frac{3}{6} \\
\frac{1}{2} &= 3 \times \frac{1}{6}
\end{align*}
\]

b. 2 rows

c. 4 rows
2. Draw area models to show the decompositions represented by the number sentences below. Represent the decomposition as a sum of unit fractions and as a multiplication sentence.

a. \( \frac{1}{3} = \frac{2}{6} \)  

b. \( \frac{1}{3} = \frac{3}{9} \)  

c. \( \frac{1}{3} = \frac{4}{12} \)  

d. \( \frac{1}{3} = \frac{5}{15} \)  

\[ \text{e. } \frac{1}{5} = \frac{2}{10} \]  
\[ \text{f. } \frac{1}{5} = \frac{3}{15} \]  

3. Explain why \( \frac{1}{12} + \frac{1}{12} + \frac{1}{12} + \frac{1}{12} \) is the same as \( \frac{1}{3} \).
Lesson 6 Problem Set

1. Each rectangle represents 1 whole. Draw horizontal lines to decompose each rectangle into the number of units as indicated. Use the model to give the shaded area as a sum and as a product of unit fractions. Use parentheses to show the relationship between the number sentences. The first one has been partially done for you.

   a. Sixths

   ![Sixths diagram]

   \[
   \frac{2}{3} = 4 \times \frac{1}{3}
   \]

   \[
   \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = \left(\frac{1}{6} + \frac{1}{6}\right) + \left(\frac{1}{6} + \frac{1}{6}\right) = \frac{4}{6}
   \]

   \[
   \left(\frac{1}{6} + \frac{1}{6}\right) + \left(\frac{1}{6} + \frac{1}{6}\right) = \left(2 \times \frac{1}{6}\right) + \left(2 \times \frac{1}{6}\right) = \frac{4}{6}
   \]

   \[
   \frac{2}{3} = 4 \times \frac{1}{3} = \frac{4}{6}
   \]

   b. Tenths

   ![Tenths diagram]

   c. Twelfths

   ![Twelfths diagram]
2. Draw area models to show the decompositions represented by the number sentences below. Express each as a sum and product of unit fractions. Use parentheses to show the relationship between the number sentences.

   a. \( \frac{3}{5} = \frac{6}{10} \)

   b. \( \frac{3}{4} = \frac{6}{8} \)

3. Step 1: Draw an area model for a fraction with the denominator of 3, 4, or 5.
   Step 2: Shade in more than one fractional unit.
   Step 3: Partition the area model again to find an equivalent fraction.
   Step 4: Write the equivalent fractions as a number sentence. (If you’ve written a number sentence already on this Problem Set, start over.)
1. The rectangle below represents 1 whole. Draw horizontal lines to decompose the rectangle into eighths. Use the model to give the shaded area as a sum and as a product of unit fractions. Use parentheses to show the relationship between the number sentences.

![Rectangle diagram]

2. Draw an area model to show the decomposition represented by the number sentence below.

\[
\frac{4}{5} = \frac{8}{10}
\]
Lesson 6 Homework

Name ___________________________ Date ______________________

1. Each rectangle represents 1 whole. Draw horizontal lines to decompose each rectangle into the number of units as indicated. Use the model to give the shaded area as a sum and as a product of unit fractions. Use parentheses to show the relationship between the number sentences. The first one has been partially done for you.

a. Tenths

\[
\frac{2}{5} = \frac{4}{10} \\
\frac{2}{5} + \frac{2}{5} = \left(\frac{1}{10} + \frac{1}{10}\right) + \left(\frac{1}{10} + \frac{1}{10}\right) = \frac{4}{10} \\
\left(\frac{1}{10} + \frac{1}{10}\right) + \left(\frac{1}{10} + \frac{1}{10}\right) = \left(2 \times \frac{1}{10}\right) + \left(2 \times \frac{1}{10}\right) = \frac{4}{10} \\
\frac{2}{5} = 4 \times \frac{1}{5} = \frac{4}{5}
\]

b. Eighths


c. Fifteenths

Decompose fractions using area models to show equivalence.
2. Draw area models to show the decompositions represented by the number sentences below. Express each as a sum and product of unit fractions. Use parentheses to show the relationship between the number sentences.

a. \( \frac{2}{3} = \frac{4}{6} \)

b. \( \frac{4}{5} = \frac{8}{10} \)

3. Step 1: Draw an area model for a fraction with the denominator of 3, 4, or 5.

   Step 2: Shade in more than one fractional unit.

   Step 3: Partition the area model again to find an equivalent fraction.

   Step 4: Write the equivalent fractions as a number sentence. (If you have written a number sentence like this one already in this homework, start over.)
Lesson 7 Problem Set

Name ________________________________ Date ____________________

Each rectangle represents 1 whole.

1. The shaded unit fractions have been decomposed into smaller units. Express the equivalent fractions in a number sentence using multiplication. The first one has been done for you.

   a. 
   
   ![](image1.png)
   
   \[
   \frac{1}{2} = \frac{1 \times 2}{2 \times 2} = \frac{2}{4}
   \]

   b. 
   
   ![](image2.png)

   c. 
   
   ![](image3.png)

   d. 
   
   ![](image4.png)

2. Decompose the shaded fractions into smaller units using the area models. Express the equivalent fractions in a number sentence using multiplication.

   a. 
   
   ![](image5.png)

   b. 
   
   ![](image6.png)

   c. 
   
   ![](image7.png)

   d. 
   
   ![](image8.png)
Lesson 7 Problem Set

Lesson 7:

Use the area model and multiplication to show the equivalence of two fractions.

Date: 1/7/14

e. What happened to the size of the fractional units when you decomposed the fraction?

f. What happened to the total number of units in the whole when you decomposed the fraction?

3. Draw three different area models to represent 1 third by shading. Decompose the shaded fraction into (a) sixths, (b) ninths, and (c) twelfths. Use multiplication to show how each fraction is equivalent to 1 third.

a. 

b. 

c. 
Lesson 7 Exit Ticket

Name _____________________________________________ Date ______________________

1. Draw two different area models to represent 1 fourth by shading. Decompose the shaded fraction into (a) eighths and (b) twelfths. Use multiplication to show how each fraction is equivalent to 1 fourth.

   a. _________________________________

   b. _________________________________
Lesson 7 Homework

Name ____________________________ Date ________________

Each rectangle represents 1 whole.

1. The shaded unit fractions have been decomposed into smaller units. Express the equivalent fractions in a number sentence using multiplication. The first one has been done for you.
   a. 
   b. 
   
   c. 
   d. 

2. Decompose the shaded fractions into smaller units using the area models. Express the equivalent fractions in a number sentence using multiplication.
   a. 
   b. 
   c. 
   d. 

Use the area model and multiplication to show the equivalence of two fractions.

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3. Draw three different area models to represent $\frac{1}{4}$ by shading. Decompose the shaded fraction into (a) eighths, (b) twelfths, and (c) sixteenths. Use multiplication to show how each fraction is equivalent to $\frac{1}{4}$.

a. 

b. 

c. 

Lesson 8 Problem Set

Each rectangle represents 1 whole.

1. The shaded fractions have been decomposed into smaller units. Express the equivalent fractions in a number sentence using multiplication. The first one has been done for you.

   a. 
      \[
      \frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6}
      \]

   b. 

   c. 

   d. 

2. Decompose the shaded fractions into smaller units, as given below. Express the equivalent fractions in a number sentence using multiplication.

   a. Decompose into tenths.

   b. Decompose into fifteenths.
3. Draw area models to prove that the following number sentences are true.

   a. \( \frac{2}{5} = \frac{4}{10} \)  
   b. \( \frac{2}{3} = \frac{8}{12} \)

   c. \( \frac{3}{6} = \frac{6}{12} \)  
   d. \( \frac{4}{6} = \frac{8}{12} \)

4. Use multiplication to rename each fraction below.

   a. \( \frac{3}{4} \)  
   b. \( \frac{4}{5} \)

   c. \( \frac{7}{6} \)  
   d. \( \frac{12}{7} \)

5. Determine which of the following are true number sentences. Correct those that are false by changing the right-hand side of the number sentence.

   a. \( \frac{4}{3} = \frac{8}{9} \)  
   b. \( \frac{5}{4} = \frac{10}{8} \)

   c. \( \frac{4}{5} = \frac{12}{10} \)  
   d. \( \frac{4}{6} = \frac{12}{18} \)
1. Use multiplication to create an equivalent fraction for the fraction below.

\[ \frac{2}{5} \]

2. Determine if the following is a true number sentence. If needed, correct the statement by changing the right-hand side of the number sentence.

\[ \frac{3}{4} = \frac{9}{8} \]
Lesson 8 Homework

1. The shaded fractions have been decomposed into smaller units. Express the equivalent fractions in a number sentence using multiplication. The first one has been done for you.

   a. \[ \frac{2}{3} = \frac{2 \times 2}{3 \times 2} = \frac{4}{6} \]
   
   b. [Diagram]

   c. [Diagram]
   
   d. [Diagram]

2. Decompose both shaded fractions into twelfths. Express the equivalent fractions in a number sentence using multiplication.

   a. [Diagram]
   
   b. [Diagram]
3. Draw area models to prove that the following number sentences are true.
   a. \( \frac{1}{3} = \frac{2}{6} \)  
   b. \( \frac{2}{5} = \frac{4}{10} \)  
   c. \( \frac{5}{7} = \frac{10}{14} \)  
   d. \( \frac{3}{6} = \frac{9}{18} \)  

4. Use multiplication to create an equivalent fraction for each fraction below.
   a. \( \frac{2}{3} \)  
   b. \( \frac{5}{6} \)  
   c. \( \frac{6}{5} \)  
   d. \( \frac{10}{8} \)  

5. Determine which of the following are true number sentences. Correct those that are false by changing the right-hand side of the number sentence.
   a. \( \frac{2}{3} = \frac{4}{9} \)  
   b. \( \frac{5}{6} = \frac{10}{12} \)  
   c. \( \frac{3}{5} = \frac{6}{15} \)  
   d. \( \frac{7}{4} = \frac{21}{12} \)
Lesson 9 Problem Set

Name _____________________________ Date ______________________

Each rectangle represents 1 whole.

1. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division. The first one has been done for you.

a. 

\[
\frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}
\]

b. 

2. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division.

a. 

b. 

2

4

= 2

\div

2

4

\div

2

= 1

2


3. 

4. 

5. 

6.
Lesson 9: Use the area model and division to show the equivalence of two fractions.

Date: 1/15/14

5.B.33

3. a. In the first area model, show 2 sixths. In the second area model, show 3 ninths. Show how both fractions can be renamed as the same unit fraction.

[Area model images]

b. Express the equivalent fractions in a number sentence using division.

4. a. In the first area model below, show 2 eighths. In the second area model, show 3 twelfths. Show how both fractions can be composed, or renamed, as the same unit fraction.

[Area model images]

b. Express the equivalent fractions in a number sentence using division.
1. a. In the first area model, show 2 sixths. In the second area model, show 4 twelfths. Show how both fractions can be composed, or renamed, as the same unit fraction.

   [Two blank rectangular boxes]

   [Two blank rectangular boxes]

   b. Express the equivalent fractions in a number sentence using division.
Lesson 9: Use the area model and division to show the equivalence of two fractions.

Name ____________________________ Date _________________

Each rectangle represents one whole.

1. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division. The first one has been done for you.
   
   a. \[
   \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}
   \]

   b. 

   c. 

   d. 

2. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division.
   
   a. 

   b. 

   c. 

   d.
e. What happened to the size of the fractional units when you renamed the fraction?

f. What happened to the total number of units in the whole when you renamed the fraction?

3. In the first area model, show 4 eighths. In the second area model, show 6 twelfths. Show how both fractions can be composed, or renamed, as the same unit fraction.

b. Express the equivalent fractions in a number sentence using division.

4. In the first area model below, show 4 eighths. In the second area model, show 8 sixteenths. Show how both fractions can be composed, or renamed, as the same unit fraction.

b. Express the equivalent fractions in a number sentence using division.
Lesson 10 Problem Set

Each rectangle represents 1 whole.

1. Compose the shaded fraction into larger fractional units. Express the equivalent fractions in a number sentence using division. The first one has been done for you.

   a.  

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

   b.  

   c.  

   d.  

2. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division.

   a.  

   b.  

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3. Draw an area model to represent each number sentence below.

\[
\begin{align*}
\text{a. } & \quad \frac{4}{10} = \frac{4 \div 2}{10 \div 2} = \frac{2}{5} \\
\text{b. } & \quad \frac{6}{9} = \frac{6 \div 3}{9 \div 3} = \frac{2}{3}
\end{align*}
\]

4. Use division to rename each fraction given below. Draw a model if that helps you. See if you can use the largest common factor.

\[
\begin{align*}
\text{a. } & \quad \frac{4}{8} \\
\text{b. } & \quad \frac{8}{12} \\
\text{c. } & \quad \frac{9}{12} \\
\text{d. } & \quad \frac{10}{15}
\end{align*}
\]
1. Draw an area model to show why the fractions are equivalent.
   Show the equivalence in a number sentence using division.

\[
\frac{4}{10} = \frac{2}{5}
\]
Each rectangle represents one whole.

1. Compose the shaded fraction into larger fractional units. Express the equivalent fractions in a number sentence using division. The first one has been done for you.
   
   a. 
   
   b. 
   
   \[
   \frac{4}{6} = \frac{4 \div 2}{6 \div 2} = \frac{2}{3}
   \]

   c. 
   
   d. 

2. Compose the shaded fractions into larger fractional units. Express the equivalent fractions in a number sentence using division.

   a. 
   
   b. 

3. Draw an area model to represent each number sentence below.

   a. \( \frac{12}{16} = \frac{12 + 4}{16 + 4} = \frac{3}{4} \)

   b. \( \frac{6}{18} = \frac{6 + 3}{18 + 3} = \frac{2}{6} \)

4. Use division to rename each fraction given below. Draw a model if that helps you. See if you can use the largest common factor.

   a. \( \frac{6}{9} \)

   b. \( \frac{4}{12} \)

   c. \( \frac{10}{15} \)

   d. \( \frac{12}{16} \)
1. Label each number line with the fractions shown on the tape diagram. Circle the fraction that labels the point on the number line that also names the selected part of the tape diagram.

   a. \[ \frac{1}{2} \]

   b. \[ \frac{1}{3} \]

   c. \[ \frac{2}{3} \]

2. Write number sentences using multiplication to show
   a. the fraction represented in 1(a) is equivalent to the fraction represented in 1(b).

   b. the fraction represented in 1(a) is equivalent to the fraction represented in 1(c).
3. Use each shaded tape diagram below as a ruler to draw a number line. Mark each number line with the unit fractions shown on the tape diagram, and circle the fraction that labels the point on the number line that also names the selected part of the tape diagram.

   a. 
     \[
     \begin{array}{c}
     1 \\
     \end{array}
     \]
     \[
     \begin{array}{cccc}
     & & & \\
     & & & \\
     \end{array}
     \]

   b. 
     \[
     \begin{array}{c}
     1 \\
     \end{array}
     \]
     \[
     \begin{array}{cccc}
     & & & \\
     & & & \\
     \end{array}
     \]

   c. 
     \[
     \begin{array}{c}
     1 \\
     \end{array}
     \]
     \[
     \begin{array}{cccc}
     & & & \\
     & & & \\
     \end{array}
     \]

4. Write number sentences using division to show
   a. the fraction represented in 3(a) is equivalent to the fraction represented in 3(b).
   b. the fraction represented in 3(a) is equivalent to the fraction represented in 3(c).

5. a. Partition a number line from 0 to 1 into fifths. Decompose \(\frac{2}{5}\) into 4 equal lengths
   b. Write a number sentence using multiplication to show what fraction represented on the number line is equivalent to \(\frac{2}{5}\).
   c. Write a number sentence using division to show what fraction represented on the number line is equivalent to \(\frac{2}{5}\).
1. a. Partition a number line from 0 to 1 into sixths. Decompose $\frac{2}{6}$ into 4 equal lengths.

   b. Write a number sentence using multiplication to show what fraction represented on the number line is equivalent to $\frac{2}{6}$.

   c. Write a number sentence using division to show what fraction represented on the number line is equivalent to $\frac{2}{6}$. 
Lesson 11: Explain fraction equivalence using a tape diagram and the number line, and relate that to the use of multiplication and division.

Name ________________________________ Date ________________

1. Label each number line with the fractions shown on the tape diagram. Circle the fraction that labels the point on the number line that also names the selected part of the tape diagram.
   a. 
      ![Tape Diagram A](image)

   b. 
      ![Tape Diagram B](image)

   c. 
      ![Tape Diagram C](image)

2. Write number sentences using multiplication to show
   a. the fraction represented in 1(a) is equivalent to the fraction represented in 1(b).

   b. the fraction represented in 1(a) is equivalent to the fraction represented in 1(c).
3. Use each shaded tape diagram below as a ruler to draw a number line. Mark each number line with the unit fractions shown on the tape diagram, and circle the fraction that labels the point on the number line that also names the selected part of the tape diagram.

   a. 
   
   b. 
   
   c. 

4. Write number sentences using division to show
   a. the fraction represented in 3(a) is equivalent to the fraction represented in 3(b).
   b. the fraction represented in 3(a) is equivalent to the fraction represented in 3(b).

5. a. Partition a number line from 0 to 1 into fourths. Decompose $\frac{3}{4}$ into 6 equal lengths.
   b. Write a number sentence using multiplication to show what fraction represented on the number line is equivalent to $\frac{3}{4}$.
   c. Write a number sentence using division to show what fraction represented on the number line is equivalent to $\frac{3}{4}$. 
Lesson 12 Problem Set

Name ________________________________ Date ______________

1. a. Plot the following points on the number line without measuring.
   i. \( \frac{1}{3} \)   ii. \( \frac{5}{6} \)   iii. \( \frac{7}{12} \)

   ![Number Line]

   b. Use the number line in Part (a) to compare the fractions by writing >, <, or = on the lines:
   i. \( \frac{7}{12} \) _____ \( \frac{1}{2} \)
   ii. \( \frac{7}{12} \) _____ \( \frac{5}{6} \)

2. a. Plot the following points on the number line without measuring.
   i. \( \frac{11}{12} \)   ii. \( \frac{1}{4} \)   iii. \( \frac{3}{8} \)

   ![Number Line]

   b. Select two fractions from Part (a), and use the given number line to compare them by writing >, <, or =.

   c. Explain how you plotted the points in Part (a).
3. Compare the fractions given below by writing > or < on the lines. Give a brief explanation for each answer referring to benchmark fractions 0, $\frac{1}{2}$, and 1.

a. $\frac{1}{2}$ ________ $\frac{3}{4}$  
b. $\frac{1}{2}$ ________ $\frac{7}{8}$

c. $\frac{2}{3}$ ________ $\frac{2}{5}$  
d. $\frac{9}{10}$ ________ $\frac{3}{5}$

e. $\frac{2}{3}$ ________ $\frac{7}{8}$  
f. $\frac{1}{3}$ ________ $\frac{2}{4}$

g. $\frac{2}{3}$ ________ $\frac{5}{10}$  
h. $\frac{11}{12}$ ________ $\frac{2}{5}$

i. $\frac{49}{100}$ ________ $\frac{51}{100}$  
j. $\frac{7}{16}$ ________ $\frac{51}{100}$
Name ____________________________ Date ____________________

1. Plot the following points on the number line without measuring.

   a. \(\frac{8}{10}\)
   b. \(\frac{3}{5}\)
   c. \(\frac{1}{4}\)

2. Use the number line in Problem 1 to compare the fractions by writing >, <, or = on the lines:

   a. \(\frac{1}{4}\) ________ \(\frac{1}{2}\)

   b. \(\frac{8}{10}\) ________ \(\frac{3}{5}\)

   c. \(\frac{1}{2}\) ________ \(\frac{3}{5}\)

   d. \(\frac{1}{4}\) ________ \(\frac{8}{10}\)
Lesson 12 Homework

1. a. Plot the following points on the number line without measuring.
   
   i. \[ \frac{2}{3} \]
   
   ii. \[ \frac{1}{6} \]
   
   iii. \[ \frac{4}{10} \]

   

   b. Use the number line in Part (a) to compare the fractions by writing >, <, or = on the lines:

   i. \[ \frac{2}{3} \quad \frac{1}{2} \]

   ii. \[ \frac{4}{10} \quad \frac{1}{6} \]

2. a. Plot the following points on the number line without measuring.

   i. \[ \frac{5}{12} \]

   ii. \[ \frac{3}{4} \]

   iii. \[ \frac{2}{6} \]

   

   b. Select two fractions from Part (a), and use the given number line to compare them by writing >, <, or =.

   c. Explain how you plotted the points in Part (a).
3. Compare the fractions given below by writing > or < on the lines.
   Give a brief explanation for each answer referring to benchmark fractions of 0, \(\frac{1}{2}\), and 1.

   a. \(\frac{1}{2} \quad \frac{1}{4}\)
   b. \(\frac{6}{8} \quad \frac{1}{2}\)

   c. \(\frac{3}{4} \quad \frac{3}{5}\)
   d. \(\frac{4}{6} \quad \frac{9}{12}\)

   e. \(\frac{2}{3} \quad \frac{1}{4}\)
   f. \(\frac{4}{5} \quad \frac{8}{12}\)

   g. \(\frac{1}{3} \quad \frac{3}{6}\)
   h. \(\frac{7}{8} \quad \frac{3}{5}\)

   i. \(\frac{51}{100} \quad \frac{5}{10}\)
   j. \(\frac{8}{14} \quad \frac{49}{100}\)
Lesson 13 Problem Set

Name ___________________________  Date __________________________

1. Place the following fractions on the number line given.
   a. \( \frac{4}{3} \)  
   b. \( \frac{11}{6} \)  
   c. \( \frac{17}{12} \)

\[ \begin{array}{cc}
1 & 1\frac{1}{2} \\
\hline
\text{Number Line} & 2
\end{array} \]

2. Use the number line in Problem 1 to compare the fractions by writing >, <, or = on the lines.
   a. \( 1\frac{5}{6} \) _______ \( 1\frac{3}{12} \)
   b. \( 1\frac{1}{3} \) _______ \( 1\frac{5}{12} \)

3. Place the following fractions on the number line given.
   a. \( \frac{11}{8} \)  
   b. \( \frac{7}{4} \)  
   c. \( \frac{15}{12} \)

\[ \begin{array}{cc}
1 & 1\frac{1}{2} \\
\hline
\text{Number Line} & 2
\end{array} \]

4. Use the number line in Problem 3 to explain the reasoning you used when determining whether \( \frac{11}{8} \) or \( \frac{15}{12} \) is greater.
5. Compare the fractions given below by writing > or < on the lines.
Give a brief explanation for each answer referring to benchmark fractions.

a. \( \frac{3}{8} \) \( \bigg\text{__________}\) \( \frac{7}{12} \)

b. \( \frac{5}{12} \) \( \bigg\text{__________}\) \( \frac{7}{8} \)

c. \( \frac{8}{6} \) \( \bigg\text{__________}\) \( \frac{11}{12} \)

d. \( \frac{5}{12} \) \( \bigg\text{__________}\) \( \frac{1}{3} \)

e. \( \frac{7}{5} \) \( \bigg\text{__________}\) \( \frac{11}{10} \)

f. \( \frac{5}{4} \) \( \bigg\text{__________}\) \( \frac{7}{8} \)

g. \( \frac{13}{12} \) \( \bigg\text{__________}\) \( \frac{9}{10} \)

h. \( \frac{6}{8} \) \( \bigg\text{__________}\) \( \frac{5}{4} \)

i. \( \frac{8}{12} \) \( \bigg\text{__________}\) \( \frac{8}{4} \)

j. \( \frac{7}{5} \) \( \bigg\text{__________}\) \( \frac{16}{10} \)
1. Place the following fractions on the number line given.
   a. \( \frac{5}{4} \)  
   b. \( \frac{10}{7} \)  
   c. \( \frac{16}{9} \)

2. Compare the three fractions using >, <, or =. 
   \( \frac{5}{4} \), \( \frac{10}{7} \), \( \frac{16}{9} \)
1. Place the following fractions on the number line given.
   a. \( \frac{3}{2} \)  
   b. \( \frac{9}{5} \)  
   c. \( \frac{14}{10} \)

   

2. Use the number line in Problem 1 to compare the fractions by writing >, <, or = on the lines:
   a. \( \frac{1\frac{1}{6}}{1\frac{4}{12}} \)  
   b. \( \frac{1\frac{1}{2}}{1\frac{4}{5}} \)

3. Place the following fractions on the number line given.
   a. \( \frac{12}{9} \)  
   b. \( \frac{6}{5} \)  
   c. \( \frac{18}{15} \)

4. Use the number line in Problem 3 to explain the reasoning you used when determining whether \( \frac{12}{9} \) or \( \frac{18}{15} \) was greater.
5. Compare the fractions given below by writing > or < on the lines. Give a brief explanation for each answer referring to benchmark fractions.

a. \( \frac{2}{5} \) ________ \( \frac{6}{8} \)  
b. \( \frac{6}{10} \) ________ \( \frac{5}{6} \)  

c. \( \frac{6}{4} \) ________ \( \frac{7}{8} \)  
d. \( \frac{1}{4} \) ________ \( \frac{8}{12} \)  

e. \( \frac{14}{12} \) ________ \( \frac{11}{6} \)  
f. \( \frac{8}{9} \) ________ \( \frac{3}{7} \)  

g. \( \frac{7}{8} \) ________ \( \frac{11}{10} \)  
h. \( \frac{3}{4} \) ________ \( \frac{4}{3} \)  

i. \( \frac{3}{8} \) ________ \( \frac{3}{2} \)  
j. \( \frac{9}{6} \) ________ \( \frac{16}{12} \)
Lesson 14: Problem Set

NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 14 Problem Set

Name _____________________________________________ Date ______________________

1. Compare the pairs of fractions by reasoning about the size of the units. Use >, <, or =.

   a. 1 fourth _____ 1 fifth
   b. 3 fourths _____ 3 fifths
   c. 1 tenth _____ 1 twelfth
   d. 7 tenths _____ 7 twelfths

2. Compare by reasoning about the following pairs of fractions with the same or related numerators. Use >, <, or =. Explain your thinking using words, pictures, or numbers. Problem 2(b) has been done for you.

   a. \(\frac{3}{5} _____ \frac{3}{4}\)
   b. \(\frac{2}{5} < \frac{4}{9}\)

   because \(\frac{2}{5} = \frac{4}{10}\)
   4 tenths is less than 4 ninths because tenths are smaller than ninths.

   c. \(\frac{7}{11} \underline{_______} \frac{7}{13}\)
   d. \(\frac{6}{7} \underline{_______} \frac{12}{15}\)
3. Draw two tape diagrams to model each pair of the following fractions with related denominators. Use >, <, or = to compare.

a. \( \frac{2}{3} \) \( \frac{5}{6} \)

b. \( \frac{3}{4} \) \( \frac{7}{8} \)

c. \( 1\frac{3}{4} \) \( 1\frac{7}{12} \)
4. Draw one number line to model each pair of fractions with related denominators. Use >, <, or = to compare.

   a. \(\frac{2}{3} \quad \frac{5}{6}\)  
   b. \(\frac{3}{8} \quad \frac{1}{4}\)  
   c. \(\frac{2}{6} \quad \frac{5}{12}\)  
   d. \(\frac{8}{9} \quad \frac{2}{3}\)

5. Compare each pair of fractions using >, <, or =. Draw a model if you choose to.

   a. \(\frac{3}{4} \quad \frac{3}{7}\)  
   b. \(\frac{4}{5} \quad \frac{8}{12}\)  
   c. \(\frac{7}{10} \quad \frac{3}{5}\)  
   d. \(\frac{2}{3} \quad \frac{11}{15}\)  
   e. \(\frac{3}{4} \quad \frac{11}{12}\)  
   f. \(\frac{7}{3} \quad \frac{7}{4}\)  
   g. \(1\frac{1}{3} \quad 1\frac{2}{9}\)  
   h. \(1\frac{2}{3} \quad 1\frac{4}{7}\)

6. Timmy drew the picture to the right and claimed that \(\frac{2}{3}\) is less than \(\frac{7}{12}\). Evan says he thinks \(\frac{2}{3}\) is greater than \(\frac{7}{12}\). Who is correct? Support your answer with a picture.
1. Draw tape diagrams to compare the following fractions:

\[ \frac{2}{5} \quad \frac{3}{10} \]

2. Use a number line to compare the following fractions:

\[ \frac{4}{3} \quad \frac{7}{6} \]
Lesson 14 Homework

NYS COMMON CORE MATHEMATICS CURRICULUM 4•5

Name ____________________________ Date ______________

1. Compare the pairs of fractions by reasoning about the size of the units. Use >, <, or =.
   a. 1 third _____ 1 sixth
   b. 2 halves _____ 2 thirds
   c. 2 fourths _____ 2 sixths
   d. 5 eighths _____ 5 tenths

2. Compare by reasoning about the following pairs of fractions with the same or related numerators. Use >, <, or =. Explain your thinking using words, pictures, or numbers. Problem 2(b) has been done for you.
   a. \(\frac{3}{6} _____ \frac{3}{7}\)
   b. \(\frac{2}{5} < \frac{4}{9}\) because \(\frac{2}{5} = \frac{4}{10}\) tenths is less than 4 ninths because tenths are smaller than ninths.
   c. \(\frac{3}{11} _____ \frac{3}{13}\)
   d. \(\frac{5}{7} _____ \frac{10}{13}\)

3. Draw two tape diagrams to model each pair of the following fractions with related denominators. Use >, <, or = to compare.
   a. \(\frac{3}{4} _____ \frac{7}{12}\)
   b. \(\frac{2}{4} _____ \frac{1}{8}\)
   c. \(\frac{1\frac{4}{10}}{1\frac{3}{5}}\)

Find common units or number of units to compare two fractions.

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4. Draw one number line to model each pair of fractions with related denominators. Use >, <, or = to compare.

   a. $\frac{3}{4}$ __________ $\frac{5}{8}$

   b. $\frac{11}{12}$ __________ $\frac{3}{4}$

   c. $\frac{4}{5}$ __________ $\frac{7}{10}$

   d. $\frac{8}{9}$ __________ $\frac{2}{3}$

5. Compare each pair of fractions using >, <, or =. Draw a model if you choose to.

   a. $\frac{1}{7}$ __________ $\frac{2}{7}$

   b. $\frac{5}{7}$ __________ $\frac{11}{14}$

   c. $\frac{7}{10}$ __________ $\frac{3}{5}$

   d. $\frac{2}{3}$ __________ $\frac{9}{15}$

   e. $\frac{3}{4}$ __________ $\frac{9}{12}$

   f. $\frac{5}{3}$ __________ $\frac{5}{2}$

   g. $\frac{4}{3}$ __________ $1\frac{2}{9}$

   h. $1\frac{1}{3}$ __________ $\frac{9}{7}$

6. Simon claims $\frac{4}{9}$ is greater than $\frac{1}{3}$. Ted thinks $\frac{4}{9}$ is less than $\frac{1}{3}$. Who is correct? Support your answer with a picture.
1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing a >, <, or = symbol on the line. The first two have been partly done for you. Each rectangle represents one whole.

<table>
<thead>
<tr>
<th>a. ( \frac{1}{2} ) ______ &lt; ______ ( \frac{2}{3} )</th>
<th>b. ( \frac{4}{5} ) ______ ( \frac{3}{4} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{1 \times 3}{2 	imes 3} )</td>
<td>( \frac{3}{6} )</td>
</tr>
<tr>
<td>( \frac{2 \times 2}{3 \times 2} )</td>
<td>( \frac{4}{6} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. ( \frac{3}{5} ) ______ ( \frac{4}{7} )</th>
<th>d. ( \frac{3}{7} ) ______ ( \frac{2}{6} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{6}{7} )</td>
<td>( \frac{6}{7} )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>e. ( \frac{5}{8} ) ______ ( \frac{6}{9} )</th>
<th>f. ( \frac{2}{3} ) ______ ( \frac{3}{4} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \frac{5}{8} )</td>
<td>( \frac{6}{9} )</td>
</tr>
</tbody>
</table>
Lesson 15 Problem Set

2. Rename the fractions, as needed, using multiplication in order to compare the two fractions in each pair by writing a $>$, $<$, or $=\,$.
   
   a. $\frac{3}{5} \underline{\quad} \frac{5}{6}$
   
   b. $\frac{2}{6} \underline{\quad} \frac{3}{8}$
   
   c. $\frac{7}{5} \underline{\quad} \frac{10}{8}$
   
   d. $\frac{4}{3} \underline{\quad} \frac{6}{5}$

3. Use any method to compare the fractions. Record your answer using $>$, $<$, or $=\,$.
   
   a. $\frac{3}{4} \underline{\quad} \frac{7}{8}$
   
   b. $\frac{6}{8} \underline{\quad} \frac{3}{5}$
   
   c. $\frac{6}{4} \underline{\quad} \frac{8}{6}$
   
   d. $\frac{8}{5} \underline{\quad} \frac{9}{6}$

4. Explain two ways you have learned to compare fractions. Provide evidence using words, pictures, and numbers.
Lesson 15: Exit Ticket

Name ____________________________________________ Date ________________

1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing a >, <, or = symbol on the line.

   a. \( \frac{3}{4} \) ________ \( \frac{4}{5} \)

   b. \( \frac{2}{6} \) ________ \( \frac{3}{5} \)
1. Draw an area model for each pair of fractions, and use it to compare the two fractions by writing a >, <, or = symbol on the line. The first two have been partly done for you. Each rectangle represents one whole.

a. \( \frac{1}{2} \ < \ \frac{3}{5} \)

\[
\begin{align*}
\frac{1 \times 5}{2 \times 5} &= \frac{5}{10} \\
\frac{3 \times 2}{5 \times 2} &= \frac{6}{10}
\end{align*}
\]

\[
\frac{5}{10} \ < \ \frac{6}{10} \quad \text{so} \quad \frac{1}{2} \ < \ \frac{3}{5}
\]

b. \( \frac{2}{3} \ > \ \frac{3}{4} \)


c. \( \frac{4}{6} \ < \ \frac{5}{8} \)

d. \( \frac{2}{7} \ > \ \frac{3}{5} \)

e. \( \frac{4}{6} \ > \ \frac{6}{9} \)

f. \( \frac{4}{5} \ < \ \frac{5}{6} \)
2. Rename the fractions as needed using multiplication in order to compare the two fractions in each pair by writing a $>$, $<$, or $=.$

   a. \[ \frac{2}{3} \underline{\hspace{2cm}} \frac{2}{4} \]
   b. \[ \frac{4}{7} \underline{\hspace{2cm}} \frac{1}{2} \]
   c. \[ \frac{5}{4} \underline{\hspace{2cm}} \frac{9}{8} \]
   d. \[ \frac{8}{12} \underline{\hspace{2cm}} \frac{5}{8} \]

3. Use any method to compare the fractions. Record your answer using $>$, $<$, or $=.$

   a. \[ \frac{8}{9} \underline{\hspace{2cm}} \frac{2}{3} \]
   b. \[ \frac{4}{7} \underline{\hspace{2cm}} \frac{4}{5} \]
   c. \[ \frac{3}{2} \underline{\hspace{2cm}} \frac{9}{6} \]
   d. \[ \frac{11}{7} \underline{\hspace{2cm}} \frac{5}{3} \]

4. Explain which method you prefer to compare fractions. Provide an example using words, pictures, and numbers.
Lesson 16 Problem Set

Name ________________________________ Date ____________________

1. Solve.
   a. 3 fifths – 1 fifth = _______________  
   b. 5 fifths – 3 fifths = _______________
   c. 3 halves – 2 halves = _______________  
   d. 6 fourths – 3 fourths = _______________

2. Solve.
   a. $\frac{5}{6} - \frac{3}{6}$  
   b. $\frac{6}{8} - \frac{4}{8}$
   c. $\frac{3}{10} - \frac{3}{10}$  
   d. $\frac{5}{5} - \frac{4}{5}$
   e. $\frac{5}{4} - \frac{4}{4}$  
   f. $\frac{5}{4} - \frac{3}{4}$

3. Solve. Use a number bond to show how to convert the difference to a mixed number. Problem (a) has been completed for you.
   a. $\frac{12}{8} - \frac{3}{8} = \frac{9}{8} = 1\frac{1}{8}$
   b. $\frac{12}{6} - \frac{5}{6}$
   c. $\frac{9}{5} - \frac{3}{5}$  
   d. $\frac{14}{8} - \frac{3}{8}$
   e. $\frac{8}{4} - \frac{2}{4}$  
   f. $\frac{15}{10} - \frac{3}{10}$
Lesson 16: Use visual models to add and subtract two fractions with the same units.

Date: 1/15/14

4. Solve. Write the sum in unit form.
   a. \( \frac{2}{4} + \frac{1}{4} = \) _______________
   b. \( \frac{4}{5} + \frac{3}{5} = \) _______________

5. Solve.
   a. \( \frac{2}{8} + \frac{5}{8} \)
   b. \( \frac{4}{12} + \frac{5}{12} \)

6. Solve. Use a number bond to decompose the sum. Record your final answer as a mixed number.
   Problem (a) has been completed for you.
   a. \( \frac{3}{5} + \frac{4}{5} = \frac{7}{5} = 1\frac{2}{5} \)
   b. \( \frac{4}{4} + \frac{3}{4} \)
   
   c. \( \frac{6}{9} + \frac{6}{9} \)
   d. \( \frac{7}{10} + \frac{6}{10} \)
   
   e. \( \frac{5}{6} + \frac{7}{6} \)
   f. \( \frac{9}{8} + \frac{5}{8} \)

7. Solve. Then use a number line to model your answer.
   a. \( \frac{7}{4} - \frac{5}{4} \)
   b. \( \frac{5}{4} + \frac{2}{4} \)
1. Solve. Use a number bond to decompose the difference. Record your final answer as a mixed number.

\[ \frac{16}{9} - \frac{5}{9} \]

2. Solve. Use a number bond to decompose the sum. Record your final answer as a mixed number.

\[ \frac{5}{12} + \frac{10}{12} \]
Lesson 16 Homework

Name ____________________________ Date __________________

1. Solve.
   a. 3 sixths – 2 sixths = _______________
   b. 5 tenths – 3 tenths = _______________
   c. 3 fourths – 2 fourths = _______________
   d. 5 thirds – 2 thirds = _______________

2. Solve.
   a. \( \frac{3}{5} - \frac{2}{5} \)
   b. \( \frac{7}{9} - \frac{3}{9} \)
   c. \( \frac{7}{12} - \frac{3}{12} \)
   d. \( \frac{6}{6} - \frac{4}{6} \)
   e. \( \frac{5}{3} - \frac{2}{3} \)
   f. \( \frac{7}{4} - \frac{5}{4} \)

3. Solve. Use a number bond to decompose the difference. Record your final answer as a mixed number. Problem (a) has been completed for you.
   a. \( \frac{12}{6} - \frac{3}{6} = \frac{9}{6} = 1\frac{3}{6} \)
   b. \( \frac{17}{8} - \frac{6}{8} \)
   c. \( \frac{9}{5} - \frac{3}{5} \)
   d. \( \frac{11}{4} - \frac{6}{4} \)
   e. \( \frac{10}{7} - \frac{2}{7} \)
   f. \( \frac{21}{10} - \frac{9}{10} \)
4. Solve. Write the sum in unit form.
   a. \( \frac{4}{5} + \frac{2}{5} = \) _______________
   b. \( \frac{5}{8} + \frac{2}{8} = \) _______________

5. Solve.
   a. \( \frac{3}{11} + \frac{6}{11} \)
   b. \( \frac{3}{10} + \frac{6}{10} \)

6. Solve. Use a number bond to decompose the sum. Record your final answer as a mixed number.
   a. \( \frac{3}{4} + \frac{3}{4} \)
   b. \( \frac{8}{12} + \frac{6}{12} \)
   c. \( \frac{5}{8} + \frac{7}{8} \)
   d. \( \frac{8}{10} + \frac{5}{10} \)
   e. \( \frac{3}{5} + \frac{6}{5} \)
   f. \( \frac{4}{3} + \frac{2}{3} \)

7. Solve. Then use a number line to model your answer.
   a. \( \frac{11}{9} - \frac{5}{9} \)
   b. \( \frac{13}{12} + \frac{4}{12} \)
1. Use the following three fractions to write two subtraction and two addition number sentences.

   a. \( \frac{8}{5}, \frac{2}{5}, \frac{10}{5} \)  
   b. \( \frac{15}{8}, \frac{7}{8}, \frac{8}{8} \)

2. Solve. Model each subtraction problem with a number line, and solve by both counting up and subtracting. Part (a) has been solved for you.

   a. \( 1 - \frac{3}{4} \)

   b. \( 1 - \frac{8}{10} \)

   c. \( 1 - \frac{3}{5} \)

   d. \( 1 - \frac{5}{8} \)

   e. \( 1\frac{2}{10} - \frac{7}{10} \)

   f. \( 1\frac{1}{5} - \frac{3}{5} \)
3. Find the difference in two ways. Use number bonds to decompose the whole. Part (a) has been completed for you.

a. \( \frac{2}{5} - \frac{4}{5} \)

\[
\begin{align*}
\frac{2}{5} & \quad \frac{2}{5} \\
\frac{5}{5} & \quad \frac{5}{5} \\
\frac{7}{5} & \quad \frac{3}{5}
\end{align*}
\]

\( \frac{5}{5} + \frac{2}{5} = \frac{7}{5} \)

\( \frac{5}{5} - \frac{4}{5} = \frac{1}{5} \)

b. \( 1\frac{3}{6} - \frac{4}{6} \)

c. \( 1\frac{6}{8} - \frac{7}{8} \)

d. \( 1\frac{1}{10} - \frac{7}{10} \)

e. \( 1\frac{3}{12} - \frac{6}{12} \)
1. Solve. Model the problem with a number line, and solve by both counting up and subtracting.

\[ 1 - \frac{2}{5} \]

2. Find the difference in two ways. Use a number bond to show the decomposition.

\[ 1 \frac{2}{7} - \frac{5}{7} \]
Lesson 17 Homework

1. Use the following three fractions to write two subtraction and two addition number sentences.

   a. \( \frac{5}{6}, \frac{4}{6}, \frac{9}{6} \)  
   b. \( \frac{5}{9}, \frac{13}{9}, \frac{8}{9} \)

2. Solve. Model each subtraction problem with a number line, and solve by both counting up and subtracting.

   a. \( 1 - \frac{5}{8} \)  
   b. \( 1 - \frac{2}{5} \)

   c. \( 1\frac{3}{6} - \frac{5}{6} \)  
   d. \( 1 - \frac{1}{4} \)

   e. \( 1\frac{1}{3} - \frac{2}{3} \)  
   f. \( 1\frac{1}{5} - \frac{2}{5} \)
3. Find the difference in two ways. Use number bonds to decompose the whole. Part (a) has been completed for you.

a. \( \frac{2}{5} - \frac{4}{5} \)

\[
\begin{array}{c}
\frac{2}{5} + \frac{3}{5} = \frac{5}{5} \\
\frac{5}{5} - \frac{4}{5} = \frac{1}{5} \\
\end{array}
\]

b. \( 1\frac{2}{8} - \frac{7}{8} \)

c. \( 1\frac{1}{4} - \frac{3}{4} \)

d. \( 1\frac{2}{7} - \frac{5}{7} \)

e. \( 1\frac{3}{10} - \frac{7}{10} \)
Name _______________________________ Date ________________

1. Show one way to solve each problem. Express sums and differences as a mixed number when possible. Use number bonds when it helps you. Part (a) is partially completed.

<table>
<thead>
<tr>
<th>a. $\frac{2}{5} + \frac{3}{5} + \frac{1}{5}$</th>
<th>b. $\frac{3}{6} + \frac{1}{6} + \frac{3}{6}$</th>
<th>c. $\frac{5}{7} + \frac{7}{7} + \frac{2}{7}$</th>
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<td>$= \frac{5}{5} + \frac{1}{5}$</td>
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<td>$= \frac{12}{12}$</td>
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</tbody>
</table>

<table>
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<tr>
<th>d. $\frac{7}{8} - \frac{3}{8} - \frac{1}{8}$</th>
<th>e. $\frac{7}{9} + \frac{1}{9} + \frac{4}{9}$</th>
<th>f. $\frac{4}{10} + \frac{11}{10} + \frac{5}{10}$</th>
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<tr>
<th>g. $1 - \frac{3}{12} - \frac{4}{12}$</th>
<th>h. $1\frac{2}{3} - \frac{1}{3} - \frac{1}{3}$</th>
<th>i. $\frac{10}{12} + \frac{5}{12} + \frac{2}{12} + \frac{7}{12}$</th>
</tr>
</thead>
</table>
2. Monica and Stuart used different strategies to solve \( \frac{5}{8} + \frac{2}{8} + \frac{5}{8} \).

**Monica’s Way**

\[
\frac{5}{8} + \frac{2}{8} + \frac{5}{8} = \frac{7}{8} + \frac{5}{8} = \frac{8}{8} + \frac{4}{8} = 1 \frac{4}{8}
\]

\[
\frac{1}{8} \quad \frac{4}{8}
\]

**Stuart’s Way**

\[
\frac{5}{8} + \frac{2}{8} + \frac{5}{8} = \frac{12}{8} = 1 + \frac{4}{8} = 1 \frac{4}{8}
\]

\[
\frac{8}{8} \quad \frac{4}{8}
\]

Whose strategy do you like best? Why?

3. You gave one solution for each part of Problem 1. Now, for each problem indicated below, give a different solution method.

1(c) \( \frac{5}{7} + \frac{7}{7} + \frac{2}{7} \)

1(f) \( \frac{4}{10} + \frac{11}{10} + \frac{5}{10} \)

1(g) \( 1 - \frac{3}{12} - \frac{4}{12} \)
1. Solve the following problems. Use number bonds to help you.

   a. \( \frac{5}{9} + \frac{2}{9} + \frac{4}{9} \)

   b. \( 1 - \frac{5}{8} - \frac{1}{8} \)
1. Show one way to solve each problem. Express sums and differences as a mixed number when possible. Use number bonds when it helps you. Part (a) is partially completed.

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<thead>
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<tbody>
<tr>
<td>a. $\frac{1}{3} + \frac{2}{3} + \frac{1}{3}$</td>
<td>b. $\frac{5}{8} + \frac{5}{8} + \frac{3}{8}$</td>
<td>c. $\frac{4}{6} + \frac{6}{6} + \frac{1}{6}$</td>
</tr>
<tr>
<td></td>
<td>$\frac{3}{3} + \frac{1}{3} = 1 + \frac{1}{3}$</td>
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<td>$\frac{1}{3}$</td>
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<tr>
<td>d. $1\frac{2}{12} - \frac{2}{12} - \frac{1}{12}$</td>
<td>e. $\frac{5}{7} + \frac{1}{7} + \frac{4}{7}$</td>
<td>f. $\frac{4}{10} + \frac{7}{10} + \frac{9}{10}$</td>
</tr>
<tr>
<td>g. $1 - \frac{3}{10} - \frac{1}{10}$</td>
<td>h. $\frac{3}{5} - \frac{4}{5} - \frac{1}{5}$</td>
<td>i. $\frac{10}{15} + \frac{7}{15} + \frac{12}{15} + \frac{1}{15}$</td>
</tr>
</tbody>
</table>
2. Bonnie used two different strategies to solve \( \frac{5}{8} + \frac{2}{8} + \frac{5}{8} \).

**Bonnie’s First Strategy**

\[
\frac{5}{8} + \frac{2}{8} + \frac{5}{8} = \frac{7}{8} + \frac{5}{8} = \frac{8}{8} + \frac{4}{8} = 1 \frac{4}{8}
\]

\[
\frac{1}{8} \quad \frac{4}{8}
\]

**Bonnie’s Second Strategy**

\[
\frac{5}{8} + \frac{2}{8} + \frac{5}{8} = \frac{12}{8} = 1 + \frac{4}{8} = 1 \frac{4}{8}
\]

\[
\frac{8}{8} \quad \frac{4}{8}
\]

Whose strategy do you like best? Why?

3. You gave one solution for each part of Problem 1. Now, for each problem indicated below, give a different solution method.

1(b) \( \frac{5}{8} + \frac{5}{8} + \frac{3}{8} \)

1(e) \( \frac{5}{7} + \frac{1}{7} + \frac{4}{7} \)

1(h) \( 1\frac{3}{5} - \frac{4}{5} - \frac{1}{5} \)
Lesson 19 Problem Set

Use the RDW process to solve.

1. Sue ran \( \frac{9}{10} \) mile on Monday and \( \frac{7}{10} \) mile on Tuesday. How many miles did Sue run in the 2 days?

2. Mr. Salazar cut his son’s birthday cake into 8 equal pieces. Mr. Salazar, Mrs. Salazar, and the birthday boy each ate 1 piece of cake. What fraction of the cake was left?

3. Maria spent \( \frac{4}{7} \) of her money on a book and saved the rest. What fraction of her money did Maria save?
4. Mrs. Jones had $1\frac{4}{8}$ pizzas left after a party. After giving some to Gary, she had $\frac{7}{8}$ pizza left. What fraction of a pizza did she give Gary?

5. A baker had 2 pans of corn bread. He served $1\frac{1}{4}$ pans. What fraction of a pan was left?

6. Marius combined $\frac{4}{8}$ gallon of lemonade, $\frac{3}{8}$ gallon of cranberry juice, and $\frac{6}{8}$ gallon of soda water to make a punch for a party. How many gallons of punch did he make in all?
Lesson 19: Solve word problems involving addition and subtraction of fractions.

Date: 1/7/14

Name ___________________________________________ Date ______________

Use the RDW process to solve.

1. Mrs. Smith took her bird to the vet. Tweety weighed $1 \frac{3}{10}$ pounds. The vet said that Tweety weighed $\frac{4}{10}$ pound more last year. How much did Tweety weigh last year?

2. Hudson picked $1 \frac{1}{4}$ baskets of apples. Suzy picked 2 baskets of apples. How many more baskets of apples did Suzy pick than Hudson?
Use the RDW process to solve.

1. Isla walked $\frac{3}{4}$ mile each way to and from school on Wednesday. How many miles did Isla walk that day?

2. Zach spent $\frac{2}{3}$ hour reading on Friday and $1\frac{1}{3}$ hours reading on Saturday. How much more time did he read on Saturday than on Friday?

3. Mrs. Cashmore bought a large melon. She cut a piece that weighed $1\frac{1}{8}$ pounds and gave it to her neighbor. The remaining piece of melon weighed $\frac{6}{8}$ pound. How much did the whole melon weigh?
4. Ally’s little sister wanted to help her make some oatmeal cookies. First, she put \( \frac{5}{8} \) cup of oatmeal in the bowl. Next, she added another \( \frac{5}{8} \) cup of oatmeal. Finally, she added another \( \frac{5}{8} \) cup of oatmeal. How much oatmeal did she put in the bowl?

5. Marcia baked 2 pans of brownies. Her family ate \( 1 \frac{5}{6} \) pans. What fraction of a pan of brownies was left?

6. Joanie wrote a letter that was \( 1 \frac{1}{4} \) pages long. Katie wrote a letter that was \( \frac{3}{4} \) page shorter than Joanie’s letter. How long was Katie’s letter?
Lesson 20 Problem Set

Name _______________________________  Date _______________

1. Use a tape diagram to represent each addend. Decompose one of the tape diagrams to make like units. Then write the complete number sentence. Part (a) is partially completed.

   a. \( \frac{1}{4} + \frac{1}{8} \)  
   
   b. \( \frac{1}{4} + \frac{1}{12} \)  
   
   \[
   \frac{1}{8} + \frac{1}{8} = \frac{2}{8} = \frac{1}{4}
   \]

   c. \( \frac{2}{6} + \frac{1}{3} \)  
   
   d. \( \frac{1}{2} + \frac{3}{8} \)  

   e. \( \frac{3}{10} + \frac{3}{5} \)  
   
   f. \( \frac{2}{3} + \frac{2}{9} \)
Lesson 20 Problem Set

2. Estimate to determine if the sum is between 0 and 1 or 1 and 2. Draw a number line to model the addition. Then write a complete number sentence. Part (a) has been completed for you.

   a. \( \frac{1}{2} + \frac{1}{4} \)

   b. \( \frac{1}{2} + \frac{4}{10} \)

   ![Number Line Model]

   c. \( \frac{6}{10} + \frac{1}{2} \)

   d. \( \frac{2}{3} + \frac{3}{6} \)

   e. \( \frac{3}{4} + \frac{6}{8} \)

   f. \( \frac{4}{10} + \frac{6}{5} \)

3. Solve the following addition problem without drawing a model. Show your work.

\[ \frac{2}{3} + \frac{4}{6} \]
1. Draw a number line to model the addition. Solve and then write a complete number sentence.
   \[
   \frac{5}{8} + \frac{2}{4}
   \]

2. Solve without drawing a model.
   \[
   \frac{3}{4} + \frac{1}{2}
   \]
Lesson 20
Homework

NYS COMMON CORE MATHEMATICS CURRICULUM

Lesson 20: Use visual models to add two fractions with related units using the denominators 2, 3, 4, 5, 6, 8, 10, and 12.

Name ___________________________ Date ___________________

1. Use a tape diagram to represent each addend. Decompose one of the tape diagrams to make like units. Then write the complete number sentence.

   a. \( \frac{1}{3} + \frac{1}{6} \) 
   b. \( \frac{1}{2} + \frac{1}{4} \)

   c. \( \frac{3}{4} + \frac{1}{8} \) 
   d. \( \frac{1}{4} + \frac{5}{12} \)

   e. \( \frac{3}{8} + \frac{1}{2} \) 
   f. \( \frac{3}{5} + \frac{3}{10} \)
2. Estimate to determine if the sum is between 0 and 1 or 1 and 2. Draw a number line to model the addition. Then write a complete number sentence. The first one has been completed for you.

a. \( \frac{1}{3} + \frac{1}{6} \quad \frac{2}{6} + \frac{1}{6} = \frac{3}{6} \)

b. \( \frac{3}{5} + \frac{7}{10} \)

\[ \begin{array}{c}
0 \quad \frac{1}{3} \quad \frac{1}{3} \quad \frac{2}{6} \\
\end{array} \]

\[ \begin{array}{c}
\frac{3}{6} \quad 1 \\
\end{array} \]

c. \( \frac{5}{12} + \frac{1}{4} \)

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

e. \( \frac{7}{8} + \frac{3}{4} \)

f. \( \frac{1}{6} + \frac{5}{3} \)

3. Solve the following addition problem without drawing a model. Show your work.

\[ \frac{5}{6} + \frac{1}{3} \]
Lesson 21 Problem Set

Name ___________________________________________ Date _______________________

1. Draw a tape diagram to represent each addend. Decompose one of the tape diagrams to make like units. Then write a complete number sentence. Use a number bond to write each sum as a mixed number.

   a. \(\frac{3}{4} + \frac{1}{2}\)
   b. \(\frac{2}{3} + \frac{3}{6}\)

   c. \(\frac{5}{6} + \frac{1}{3}\)
   d. \(\frac{4}{5} + \frac{7}{10}\)

2. Draw a number line to model the addition. Then write a complete number sentence. Use a number bond to write each sum as a mixed number.

   a. \(\frac{1}{2} + \frac{3}{4}\)
   b. \(\frac{1}{2} + \frac{6}{8}\)
3. Solve. Write the sum as a mixed number. Draw a model if needed.

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

b. \( \frac{4}{6} + \frac{1}{2} \)  

c. \( \frac{4}{6} + \frac{2}{3} \)  

d. \( \frac{8}{10} + \frac{3}{5} \)  

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

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

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

h. \( \frac{3}{10} + \frac{4}{5} \)
1. Solve. Write a complete number sentence. Use a number bond to write each sum as a mixed number. Use a model if needed.

a. \( \frac{1}{4} + \frac{7}{8} \)

b. \( \frac{2}{3} + \frac{7}{12} \)
Lesson 21 Homework

Name ___________________________ Date __________________

1. Draw a tape diagram to represent each addend. Decompose one of the tape diagrams to make like units. Then write a complete number sentence. Use a number bond to write each sum as a mixed number.

   a. $\frac{7}{8} + \frac{1}{4}$
   
   b. $\frac{4}{8} + \frac{2}{4}$

   c. $\frac{4}{6} + \frac{1}{2}$
   
   d. $\frac{3}{5} + \frac{8}{10}$

2. Draw a number line to model the addition. Then write a complete number sentence. Use a number bond to write each sum as a mixed number.

   a. $\frac{1}{2} + \frac{5}{8}$
   
   b. $\frac{3}{4} + \frac{3}{8}$
Lesson 21: Use visual models to add two fractions with related units using the denominators 2, 3, 4, 5, 6, 8, 10, and 12.

Date: 1/7/14

3. Solve. Write the sum as a mixed number. Draw a model if needed.

a. $\frac{1}{2} + \frac{6}{8}$

b. $\frac{7}{8} + \frac{3}{4}$

c. $\frac{5}{6} + \frac{1}{3}$

d. $\frac{9}{10} + \frac{2}{5}$

e. $\frac{4}{12} + \frac{3}{4}$

f. $\frac{1}{2} + \frac{5}{6}$

g. $\frac{3}{12} + \frac{5}{6}$

h. $\frac{7}{10} + \frac{4}{5}$
Lesson 22 Problem Set

NYS COMMON CORE MATHEMATICS CURRICULUM

Name ___________________________ Date __________________

1. Draw a tape diagram to match each number sentence. Then complete the number sentence.
   
   a. \(3 + \frac{1}{3} = \) ________
   
   b. \(4 + \frac{3}{4} = \) ________
   
   c. \(3 - \frac{1}{4} = \) ________
   
   d. \(5 - \frac{2}{5} = \) ________

2. Use the following three numbers to write two subtraction and two addition number sentences.
   
   a. \(6, 6\frac{3}{8}, \frac{3}{8}\)
   
   b. \(\frac{4}{7}, 9, 8\frac{3}{7}\)

3. Solve using a number bond. Draw a number line to represent each number sentence. The first one has been done for you.
   
   a. \(4 - \frac{1}{3} = \) \(3\frac{2}{3}\)
   
   b. \(5 - \frac{2}{3} = \) ________
c. \(7 - \frac{3}{8} = \) 

d. \(10 - \frac{4}{10} = \) 

4. Complete the subtraction sentences using number bonds.

a. \(3 - \frac{1}{10} = \) 

b. \(5 - \frac{3}{4} = \) 

c. \(6 - \frac{5}{8} = \) 

d. \(7 - \frac{3}{9} = \) 

e. \(8 - \frac{6}{10} = \) 

f. \(29 - \frac{9}{12} = \)
Lesson 22 Exit Ticket

Name ___________________________________________ Date ___________________

Complete the subtraction sentences using number bonds. Draw a model if needed.

1. $6 - \frac{1}{5} = \underline{\hspace{1cm}}$

2. $8 - \frac{5}{6} = \underline{\hspace{1cm}}$

3. $7 - \frac{3}{8} = \underline{\hspace{1cm}}$
1. Draw a tape diagram to match each number sentence. Then complete the number sentence.
   
   a. \(2 + \frac{1}{4} = \) \[\text{blank}\]
   b. \(3 + \frac{2}{3} = \) \[\text{blank}\]
   c. \(2 - \frac{1}{5} = \) \[\text{blank}\]
   d. \(3 - \frac{1}{4} = \) \[\text{blank}\]

2. Use the following three numbers to write two subtraction and two addition number sentences.
   
   a. \(4, \frac{5}{8}, \frac{5}{8}\)
   b. \(\frac{2}{7}, 5 \frac{5}{7}, 6\)

3. Solve using a number bond. Draw a number line to represent each number sentence. The first one has been done for you.
   
   a. \(4 - \frac{1}{3} = \) \(3\frac{2}{3}\)
   b. \(8 - \frac{5}{6} = \) \[\text{blank}\]
c. $7 - \frac{4}{5} = \underline{\hspace{1cm}}$

d. $3 - \frac{3}{10} = \underline{\hspace{1cm}}$

4. Complete the subtraction sentences using number bonds.

a. $6 - \frac{1}{4} = \underline{\hspace{1cm}}$

b. $7 - \frac{2}{10} = \underline{\hspace{1cm}}$

c. $5 - \frac{5}{6} = \underline{\hspace{1cm}}$

d. $6 - \frac{6}{8} = \underline{\hspace{1cm}}$

e. $3 - \frac{7}{8} = \underline{\hspace{1cm}}$

f. $26 - \frac{7}{10} = \underline{\hspace{1cm}}$
Lesson 23 Problem Set

Name ____________________________ Date ________________

1. Circle any fractions that are equivalent to a whole number. Record the whole number below the fraction.
   
   a. Count by 1 thirds. Start at 0 thirds. End at 6 thirds.
      
      \[ \frac{0}{3}, \frac{1}{3} \]
      
      0
   
   b. Count by 1 halves. Start at 0 halves. End at 8 halves.

2. Use parentheses to show how to make ones in the following number sentence.

   \[ \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = 3 \]

3. Multiply, as shown below. Draw a number line to support your answer.
   
   a. \(6 \times \frac{1}{3}\)
      
      \[ \text{Number line} \]
      
      \[6 \times \frac{1}{3} = 2 \times \frac{3}{3} = 2\]

   b. \(6 \times \frac{1}{2}\)

   c. \(12 \times \frac{1}{4}\)
Lesson 23: Add and multiply unit fractions to build fractions greater than 1 using visual models.

Date: 1/15/14

4. Multiply, as shown below. Write the product as a mixed number. Draw a number line to support your answer.
   a. 7 copies of 1 third
      \[ 7 \times \frac{1}{3} = \left( 2 \times \frac{3}{3} \right) + \frac{1}{3} = 2 \frac{1}{3} \]
   b. 7 copies of 1 half
      \[ 7 \times \frac{1}{2} = \left( 3 \times \frac{2}{2} \right) + \frac{1}{2} = 3 \frac{1}{2} \]
   c. 10 \times \frac{1}{4}
   d. 14 \times \frac{1}{3}
Lesson 23 Exit Ticket

Name ______________________________ Date __________________

1. Multiply and write the product as a mixed number. Draw a number line to support your answer.
   a. $8 \times \frac{1}{2}$
   
b. 7 copies of 1 fourth
   
c. $13 \times \frac{1}{3}$
Name ____________________________ Date __________________

1. Circle any fractions that are equivalent to a whole number. Record the whole number below the fraction.
   a. Count by 1 fourths. Start at 0 fourths. Stop at 6 fourths.

   \[
   \begin{array}{c}
   \frac{0}{4} \\
   \frac{1}{4} \\
   \end{array}
   \]

   0

   b. Count by 1 sixths. Start at 0 sixths. Stop at 14 sixths.

2. Use parentheses to show how to make ones in the following number sentence.

   \[
   \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} + \frac{1}{3} = 4
   \]

3. Multiply, as shown below. Draw a number line to support your answer.
   a. \(6 \times \frac{1}{3}\)

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

   b. \(10 \times \frac{1}{2}\)

   c. \(8 \times \frac{1}{4}\)
4. Multiply, as shown below. Write the product as a mixed number. Draw a number line to support your answer.
   a. 7 copies of $\frac{1}{3}$

   \[ \begin{align*}
   3 \times \frac{1}{3} & = \frac{3}{3} = 1 \\
   3 \times \frac{1}{3} & = \frac{3}{3} = 1 \\
   \frac{1}{3} & = \frac{1}{3}
   \end{align*} \]

   \[ 7 \times \frac{1}{3} = \left( 2 \times \frac{3}{3} \right) + \frac{1}{3} = 2 + \frac{1}{3} = 2 \frac{1}{3} \]

   b. 7 copies of $\frac{1}{4}$

   c. 11 groups of $\frac{1}{5}$

   d. $7 \times \frac{1}{2}$

   e. $9 \times \frac{1}{5}$
Lesson 24 Problem Set

1. Rename each fraction as a mixed number by decomposing it into two parts as shown below. Model the decomposition with a number line and a number bond.

   a. \( \frac{11}{3} \)

   \[
   \frac{11}{3} = \frac{9}{3} + \frac{2}{3} = 3 + \frac{2}{3} = 3\frac{2}{3}
   \]

   b. \( \frac{12}{5} \)

   c. \( \frac{13}{2} \)

   d. \( \frac{15}{4} \)
2. Convert each fraction to a mixed number. Show your work as in the example. Model with a number line.

   \[
   \frac{11}{3} = \frac{3 \times 3}{3} + \frac{2}{3} = 3 + \frac{2}{3} = 3\frac{2}{3}
   \]

   a. \( \frac{11}{3} \)

   b. \( \frac{9}{2} \)

   c. \( \frac{17}{4} \)

3. Convert each fraction to a mixed number.

   a. \( \frac{9}{4} = \)

   b. \( \frac{17}{5} = \)

   c. \( \frac{25}{6} = \)

   d. \( \frac{30}{7} = \)

   e. \( \frac{38}{8} = \)

   f. \( \frac{48}{9} = \)

   g. \( \frac{63}{10} = \)

   h. \( \frac{84}{10} = \)

   i. \( \frac{37}{12} = \)
1. Rename the fraction as a mixed number by decomposing it into two parts. Model the decomposition with a number line and a number bond.

   \[ \frac{17}{5} \]

2. Convert the fraction to a mixed number. Model with a number line.

   \[ \frac{19}{3} \]

3. Convert the fraction to a mixed number.

   \[ \frac{15}{4} \]
Lesson 24 Homework

1. Rename each fraction as a mixed number by decomposing it into two parts as shown below. Model the decomposition with a number line and a number bond.

   a. \( \frac{11}{3} \)
      
      \[
      \frac{11}{3} = \frac{9}{3} + \frac{2}{3} = 3 + \frac{2}{3} = 3\frac{2}{3}
      \]

   b. \( \frac{13}{4} \)

   c. \( \frac{16}{5} \)

   d. \( \frac{15}{2} \)

   e. \( \frac{17}{3} \)
2. Convert each fraction to a mixed number. Show your work as in the example. Model with a number line.
   a. \( \frac{11}{3} \)
      \[
      \frac{11}{3} = \frac{3 \times 3}{3} + \frac{2}{3} = 3 + \frac{2}{3} = 3 \frac{2}{3}
      \]
   b. \( \frac{13}{2} \)
   c. \( \frac{18}{4} \)

3. Convert each fraction to a mixed number.
   a. \( \frac{14}{3} = \)
   b. \( \frac{17}{4} = \)
   c. \( \frac{27}{5} = \)
   d. \( \frac{28}{6} = \)
   e. \( \frac{23}{7} = \)
   f. \( \frac{38}{8} = \)
   g. \( \frac{51}{9} = \)
   h. \( \frac{74}{10} = \)
   i. \( \frac{45}{12} = \)
1. Convert each mixed number to a fraction greater than 1. Draw a number line to model your work.
   a. $3\frac{1}{4}$
   \[3\frac{1}{4} = 3 + \frac{1}{4} = \frac{12}{4} + \frac{1}{4} = \frac{13}{4}\]
   b. $2\frac{4}{5}$
   c. $3\frac{5}{8}$
   d. $4\frac{4}{10}$
   e. $4\frac{7}{9}$
2. Convert each mixed number to a fraction greater than 1. Show your work as in the example.

(Note: \(3 \times \frac{4}{4} = \frac{3 \times 4}{4}\))

a. \(3 \frac{3}{4}\)

\[3 \frac{3}{4} = 3 + \frac{3}{4} = \left(3 \times \frac{4}{4}\right) + \frac{3}{4} = \frac{12}{4} + \frac{3}{4} = \frac{15}{4}\]

b. \(4 \frac{1}{3}\)

c. \(4 \frac{3}{5}\)

d. \(4 \frac{6}{8}\)

3. Convert each mixed number to a fraction greater than 1.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>2 (\frac{3}{4})</td>
<td>b. 2 (\frac{2}{5})</td>
</tr>
<tr>
<td>d.</td>
<td>3 (\frac{3}{8})</td>
<td>e. 3 (\frac{1}{10})</td>
</tr>
<tr>
<td>g.</td>
<td>5 (\frac{2}{3})</td>
<td>h. 6 (\frac{1}{2})</td>
</tr>
</tbody>
</table>
Lesson 25: Decompose and compose fractions greater than 1 to express them in various forms.

Date: 1/15/14

1. Convert each mixed number to a fraction greater than 1.
   a. \(3 \frac{1}{4}\)
   b. \(2 \frac{3}{5}\)
   c. \(4 \frac{2}{9}\)
1. Convert each mixed number to a fraction greater than 1. Draw a number line to model your work.

a. \[3 \frac{1}{4} = 3 + \frac{1}{4} = \frac{12}{4} + \frac{1}{4} = \frac{13}{4}\]

b. \[4 \frac{2}{5}

c. \[5 \frac{3}{8}

d. \[3 \frac{7}{10}

e. \[6 \frac{2}{9}

2. Convert each mixed number to a fraction greater than 1. Show your work as in the example.
   a. \(3 \frac{3}{4}\)
      \[
      3 \frac{3}{4} = 3 + \frac{3}{4} = \left(3 \times \frac{4}{4}\right) + \frac{3}{4} = \frac{12}{4} + \frac{3}{4} = \frac{15}{4}
      \]
   b. \(5 \frac{2}{3}\)
   c. \(4 \frac{1}{5}\)
   d. \(3 \frac{7}{8}\)

3. Convert each mixed number to a fraction greater than 1.

| a. 2 \(\frac{1}{3}\) | b. 2 \(\frac{3}{4}\) | c. 3 \(\frac{2}{5}\) |
| d. 3 \(\frac{1}{6}\) | e. 4 \(\frac{5}{12}\) | f. 4 \(\frac{2}{5}\) |
| g. 4 \(\frac{1}{10}\) | h. 5 \(\frac{1}{5}\) | i. 5 \(\frac{5}{6}\) |
| j. 6 \(\frac{1}{4}\) | k. 7 \(\frac{1}{2}\) | l. 7 \(\frac{11}{12}\) |
Lesson 26 Problem Set

1. a. Plot the following points on the number line without measuring.
   i. \(2 \frac{7}{8}\)
   ii. \(3 \frac{1}{6}\)
   iii. \(\frac{29}{12}\)

   ![Number Line]

   b. Use the number line in Problem 1(a) to compare the fractions by writing >, <, or =.
   i. \(\frac{29}{12} \quad 2 \frac{7}{8}\)
   ii. \(\frac{29}{12} \quad 3 \frac{1}{6}\)

2. a. Plot the following points on the number line without measuring.
   i. \(\frac{70}{9}\)
   ii. \(\frac{8}{4}\)
   iii. \(\frac{25}{3}\)

   ![Number Line]

   b. Compare the following by writing >, <, or =.
   \[\frac{2}{4} \quad \frac{25}{3}\]
   \[\frac{70}{9} \quad \frac{8}{4}\]

   c. Explain how you plotted the points in Problem 2(a).
3. Compare the fractions given below by writing >, <, or =. Give a brief explanation for each answer, referring to benchmark fractions.

a. \( \frac{5}{3} \) \( \frac{3}{4} \)  
   b. \( \frac{12}{5} \) \( \frac{25}{12} \)

\[ \frac{18}{7} \] \( \frac{17}{5} \)  
   d. \( \frac{5}{2} \) \( \frac{5}{8} \)

\[ \frac{6}{3} \] \( \frac{3}{7} \)  
   f. \( \frac{31}{7} \) \( \frac{32}{8} \)

\[ \frac{31}{10} \] \( \frac{25}{8} \)  
   h. \( \frac{39}{12} \) \( \frac{19}{6} \)

\[ \frac{49}{50} \] \( \frac{3}{100} \)  
   j. \( \frac{5}{12} \) \( \frac{51}{100} \)
Name __________________________________________ Date ________________

Compare the fractions given below by writing >, <, or =.

Give a brief explanation for each answer, referring to benchmark fractions.

a. \( \frac{3}{3} \quad \frac{4}{6} \)

b. \( \frac{12}{3} \quad \frac{27}{7} \)

c. \( \frac{10}{6} \quad \frac{5}{4} \)

d. \( \frac{3}{5} \quad \frac{3}{10} \)
Lesson 26 Homework

Name ________________________________________ Date __________________

1. a. Plot the following points on the number line without measuring.
   i. \(2 \frac{1}{6}\)  
   ii. \(3 \frac{3}{4}\)  
   iii. \(\frac{33}{9}\)

   
   
   2
   3
   4

   b. Use the number line in Problem 1(a) to compare the fractions by writing >, <, or =.
   i. \(\frac{33}{9}\) ________ \(2 \frac{1}{6}\)  
   ii. \(\frac{33}{9}\) ________ \(3 \frac{3}{4}\)

2. a. Plot the following points on the number line without measuring.
   i. \(\frac{65}{8}\)  
   ii. \(8 \frac{5}{6}\)  
   iii. \(\frac{29}{4}\)

   
   
   7
   8
   9

   b. Compare the following by writing >, <, or =.
   \(8 \frac{5}{6}\) ________ \(\frac{65}{8}\)  
   \(\frac{29}{4}\) ________ \(\frac{65}{8}\)

c. Explain how you plotted the points in Problem 2(a).
3. Compare the fractions given below by writing $>$, $<$, or $=$. Give a brief explanation for each answer, referring to benchmark numbers.

a. $5\frac{1}{3} \underline{\hspace{2cm}} 5\frac{3}{4}$

b. $\frac{12}{4} \underline{\hspace{2cm}} \frac{25}{8}$

c. $\frac{18}{6} \underline{\hspace{2cm}} \frac{17}{4}$

d. $5\frac{3}{5} \underline{\hspace{2cm}} 5\frac{5}{10}$

e. $6\frac{3}{4} \underline{\hspace{2cm}} 6\frac{3}{5}$

f. $\frac{33}{6} \underline{\hspace{2cm}} \frac{34}{7}$

g. $\frac{23}{10} \underline{\hspace{2cm}} \frac{20}{8}$

h. $\frac{27}{12} \underline{\hspace{2cm}} \frac{15}{6}$

i. $2\frac{49}{50} \underline{\hspace{2cm}} 2\frac{99}{100}$

j. $6\frac{5}{9} \underline{\hspace{2cm}} 6\frac{49}{100}$
Lesson 27 Problem Set

Name ___________________________ Date __________________

1. Draw a tape diagram to model each comparison. Use >, <, or = to compare.
   a. $3\frac{2}{3} \underline{\quad}\quad 3\frac{5}{6}$
   b. $3\frac{2}{5} \underline{\quad}\quad 3\frac{6}{10}$
   c. $4\frac{3}{6} \underline{\quad}\quad 4\frac{1}{3}$
   d. $4\frac{5}{8} \underline{\quad}\quad 19\frac{1}{4}$

2. Use an area model to make like units. Then use >, <, or = to compare.
   a. $2\frac{3}{5} \underline{\quad}\quad \frac{18}{7}$
   b. $2\frac{3}{8} \underline{\quad}\quad 2\frac{1}{3}$
Lesson 27 Problem Set

3. Compare each pair of fractions using >, <, or = using any strategy.

   a. \(5\frac{3}{4} \quad \quad \quad 5\frac{3}{8}\)

   b. \(5\frac{2}{5} \quad \quad \quad 5\frac{8}{10}\)

   c. \(5\frac{6}{10} \quad \quad \quad 27\frac{5}{5}\)

   d. \(5\frac{2}{3} \quad \quad \quad 5\frac{9}{15}\)

   e. \(\frac{7}{2} \quad \quad \quad \frac{7}{3}\)

   f. \(\frac{12}{3} \quad \quad \quad \frac{15}{4}\)

   g. \(\frac{22}{5} \quad \quad \quad 4\frac{2}{7}\)

   h. \(\frac{21}{4} \quad \quad \quad 5\frac{2}{5}\)

   i. \(\frac{29}{8} \quad \quad \quad \frac{11}{3}\)

   j. \(\frac{3\frac{3}{4}}{4} \quad \quad \quad \frac{3\frac{4}{7}}{7}\)
1. Compare each pair of fractions using >, <, or = using any strategy.
   a. $\frac{3}{8}$ _______ $\frac{1}{4}$
   b. $\frac{4}{5}$ _______ $\frac{9}{10}$
   c. $\frac{1}{3}$ _______ $\frac{2}{5}$
   d. $\frac{2}{5}$ _______ $\frac{3}{4}$
Lesson 27: Compare fractions greater than 1 by creating common numerators or denominators.

Date: 1/15/14

1. Draw a tape diagram to model each comparison. Use >, <, or = to compare.
   
   a. $\frac{3}{4} \bigg\longrightarrow \frac{7}{8}$
   
   b. $10\frac{2}{6} \bigg\longrightarrow 10\frac{1}{3}$
   
   c. $5\frac{3}{8} \bigg\longrightarrow 5\frac{1}{4}$
   
   d. $2\frac{5}{9} \bigg\longrightarrow \frac{21}{3}$

2. Use an area model to make like units. Then use >, <, or = to compare.
   
   a. $2\frac{4}{5} \bigg\longrightarrow \frac{11}{4}$
   
   b. $2\frac{3}{5} \bigg\longrightarrow 2\frac{2}{3}$
3. Compare each pair of fractions using >, <, or = using any strategy.

a. \( \frac{61}{2} \) \underline{\hspace{1cm}} \frac{3}{8} \\

b. \( \frac{75}{6} \) \underline{\hspace{1cm}} \frac{711}{12} \\

c. \( \frac{36}{10} \) \underline{\hspace{1cm}} \frac{2}{5} \\

d. \( \frac{22}{5} \) \underline{\hspace{1cm}} \frac{8}{15} \\

e. \( \frac{10}{3} \) \underline{\hspace{1cm}} \frac{10}{4} \\

f. \( \frac{12}{4} \) \underline{\hspace{1cm}} \frac{10}{3} \\

g. \( \frac{38}{9} \) \underline{\hspace{1cm}} \frac{42}{12} \\

h. \( \frac{23}{4} \) \underline{\hspace{1cm}} \frac{52}{3} \\

i. \( \frac{30}{8} \) \underline{\hspace{1cm}} \frac{7}{12} \\

j. \( \frac{103}{4} \) \underline{\hspace{1cm}} \frac{104}{6} \\

\( \text{Date: 1/15/14} \)
Lesson 28 Problem Set

Name ____________________________   Date ______________

1. The chart to the right shows the distance fourth-graders in Ms. Smith’s class were able to run before stopping for a rest. Create a line plot to display the data in the table.

<table>
<thead>
<tr>
<th>Student</th>
<th>Distance (in miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joe</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>Arianna</td>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>Bobbi</td>
<td>$\frac{1}{8}$</td>
</tr>
<tr>
<td>Morgan</td>
<td>$\frac{5}{8}$</td>
</tr>
<tr>
<td>Jack</td>
<td>$\frac{5}{8}$</td>
</tr>
<tr>
<td>Saisha</td>
<td>$\frac{1}{4}$</td>
</tr>
<tr>
<td>Tyler</td>
<td>$\frac{2}{4}$</td>
</tr>
<tr>
<td>Jenny</td>
<td>$\frac{5}{8}$</td>
</tr>
<tr>
<td>Anson</td>
<td>$\frac{2}{8}$</td>
</tr>
<tr>
<td>Chandra</td>
<td>$\frac{4}{8}$</td>
</tr>
</tbody>
</table>
2. Solve each problem.
   a. Who ran a mile farther than Jenny?

   b. Who ran a mile less than Jack?

   c. Two students ran exactly \(2 \frac{1}{4}\) miles. Identify the students. How many quarter miles did each student run?

   d. What is the difference, in miles, between the longest and shortest distance run?

   e. Compare the distances run by Arianna and Morgan using >, <, or =.

   f. Ms. Smith ran twice as far as Jenny. How far did Ms. Smith run? Write her distance as a mixed number.

   g. Mr. Reynolds ran \(1 \frac{3}{10}\) miles. Use >, <, or = to compare the distance Mr. Reynolds ran to the distance that Ms. Smith ran. Who ran farther?

3. Using the information in the table and on the line plot, develop and write a question similar to those above. Solve, and then ask your partner to solve. Did you solve in the same way? Did you get the same answer?
Lesson 28: Solve word problems with line plots.

Date: 1/15/14

1. Mr. O’Neil asked his students to record the length of time they read over the weekend. The times are listed in the table.

   a. At the bottom of the page, make a line plot of the data.

   b. One of the students read $\frac{3}{4}$ hour on Friday, $\frac{3}{4}$ hour on Saturday, and $\frac{3}{4}$ hour on Sunday. How many hours did that student read over the weekend? Name that student.

<table>
<thead>
<tr>
<th>Student</th>
<th>Length of time (in hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robin</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>Bill</td>
<td>1</td>
</tr>
<tr>
<td>Katrina</td>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>Kelly</td>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>Mary</td>
<td>$\frac{1}{2}$</td>
</tr>
<tr>
<td>Gail</td>
<td>$2\frac{1}{4}$</td>
</tr>
<tr>
<td>Scott</td>
<td>$\frac{3}{4}$</td>
</tr>
<tr>
<td>Ben</td>
<td>$2\frac{2}{4}$</td>
</tr>
</tbody>
</table>
1. A group of children measured the lengths of their shoes. The measurements are shown in the table. Make a line plot to display the data.

<table>
<thead>
<tr>
<th>Students</th>
<th>Length of Shoe (in inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collin</td>
<td>8 1/2</td>
</tr>
<tr>
<td>Dickon</td>
<td>7 3/4</td>
</tr>
<tr>
<td>Ben</td>
<td>7 1/2</td>
</tr>
<tr>
<td>Martha</td>
<td>7 3/4</td>
</tr>
<tr>
<td>Lilias</td>
<td>8</td>
</tr>
<tr>
<td>Susan</td>
<td>8 1/2</td>
</tr>
<tr>
<td>Frances</td>
<td>7 3/4</td>
</tr>
<tr>
<td>Mary</td>
<td>8 3/4</td>
</tr>
</tbody>
</table>

2. Solve each problem. Write an equation and a statement for each. Draw models as needed.
   a. Who has a shoe length 1 inch longer than Dickon?
   b. Who has a shoe length 1 inch shorter than Susan?
c. How many quarter inches long is Martha’s shoe length?

d. What is the difference, in inches, between Lilias’ s and Martha’s shoe lengths?

e. Compare the shoe length of Ben and Frances using >, <, or =.

f. How many students had shoes that measured less than 8 inches?

g. How many children measured the length of their shoes?

h. Mr. Jones’ s shoe length was $\frac{25}{2}$ inches. Use >, <, or = to compare the length of Mr. Jones’ s shoe to the length of the longest student shoe length. Who had the longer shoe?

3. Using the information in the table and on the line plot, write a question you could solve by using the line plot. Solve.
Lesson 29: Estimate sums and differences using benchmark numbers.

Date: 1/15/14

1. Estimate each sum or difference to the nearest whole or half by rounding. Explain your estimate using words or a number line.
   
a. \[ \frac{2}{12} + \frac{7}{8} = \] 
   
b. \[ \frac{11}{12} + \frac{3}{4} = \] 
   
c. \[ \frac{7}{8} - \frac{1}{9} = \] 
   
d. \[ \frac{6}{8} - \frac{1}{12} = \] 
   
e. \[ \frac{3}{8} + \frac{5}{9} = \]
Lesson 29 Problem Set

2. Estimate each sum or difference to the nearest whole or half by rounding. Explain your estimate using words or a number line.
   a. \( \frac{16}{5} + \frac{11}{4} \approx \) 
   b. \( \frac{17}{3} - \frac{15}{7} \approx \) 
   c. \( \frac{59}{10} + \frac{26}{10} \approx \)

3. Montoya’s estimate for \( \frac{8}{8} - \frac{2}{3} \) was 7. Julio’s estimate was \( 6 \frac{1}{2} \). Whose estimate do you think is closer to the actual difference? Explain.

4. Use benchmark numbers or mental math to estimate the sum or difference.
   a. \( 14 \frac{3}{4} + 29 \frac{11}{12} \)
   b. \( 3 \frac{5}{12} + 54 \frac{5}{8} \)
   c. \( 17 \frac{4}{5} - 8 \frac{7}{12} \)
   d. \( 65 \frac{8}{12} - \frac{37}{6} \)
1. Estimate each sum or difference to the nearest whole or half by rounding. Explain your estimate using words or a number line.

a. $\frac{9}{10} + 2\frac{1}{4} \approx \underline{2.6}$

b. $11\frac{8}{9} - 3\frac{3}{8} \approx \underline{7.8}$
1. Estimate each sum or difference to the nearest whole or half by rounding. Explain your estimate using words or a number line.
   a. $3 \frac{1}{10} + 1 \frac{3}{4} = \underline{\hspace{2cm}}$

   b. $2 \frac{9}{10} + 4 \frac{4}{5} = \underline{\hspace{2cm}}$

   c. $9 \frac{9}{10} - 5 \frac{1}{5} = \underline{\hspace{2cm}}$

   d. $4 \frac{1}{9} - 1 \frac{1}{10} = \underline{\hspace{2cm}}$

   e. $6 \frac{3}{12} + 5 \frac{1}{9} = \underline{\hspace{2cm}}$
2. Estimate each sum or difference to the nearest whole or half by rounding. Explain your estimate using words or a number line.
   
   a. \( \frac{16}{3} + \frac{17}{8} = \) __________

   b. \( \frac{17}{3} - \frac{15}{4} = \) __________

   c. \( \frac{57}{8} + \frac{26}{8} = \) __________

3. Gina’s estimate for \( 7 \frac{5}{8} - 2 \frac{1}{2} \) was 5. Dominick’s estimate was \( 5 \frac{1}{2} \). Whose estimate do you think is closer to the actual difference? Explain.

4. Use benchmark numbers or mental math to estimate the sum or difference.

   a. \( 10 \frac{3}{4} + 12 \frac{11}{12} \)
   
   b. \( 2 \frac{7}{10} + 23 \frac{3}{8} \)

   c. \( 15 \frac{9}{12} - 8 \frac{11}{12} \)
   
   d. \( 56 \frac{7}{7} - 31 \frac{1}{8} \)
Lesson 30: Add a mixed number and a fraction.

Date: 1/15/14

1. Solve.
   a. $3\frac{1}{4} + \frac{1}{4}$
   b. $7\frac{3}{4} + \frac{1}{4}$
   c. $\frac{3}{8} + 5\frac{2}{8}$
   d. $\frac{1}{8} + 6\frac{7}{8}$

2. Complete the number sentences.
   a. $4\frac{7}{8} + ____ = 5$
   b. $7\frac{2}{5} + ____ = 8$
   c. $3 = 2\frac{1}{6} + ____$
   d. $12 = 11\frac{1}{12} + ____$

3. Use a number bond and the arrow way to show how to make one. Solve.
   a. $2\frac{3}{4} + \frac{2}{4}$
   b. $3\frac{3}{5} + \frac{3}{5}$
4. Solve.

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>a. $\frac{4}{3} + \frac{2}{3}$</td>
<td>b. $\frac{3}{5} + \frac{4}{5}$</td>
</tr>
<tr>
<td>c. $\frac{5}{6} + \frac{5}{6}$</td>
<td>d. $\frac{7}{8} + \frac{4}{8}$</td>
</tr>
<tr>
<td>e. $\frac{7}{10} + \frac{7}{10}$</td>
<td>f. $\frac{9}{12} + \frac{11}{12}$</td>
</tr>
<tr>
<td>g. $\frac{27}{100} + \frac{87}{100}$</td>
<td>h. $\frac{50}{100} + \frac{16}{100}$</td>
</tr>
</tbody>
</table>

5. To solve $\frac{9}{10} + \frac{5}{10}$ Maria thought, “$\frac{9}{10} + \frac{1}{10} = 8$ and $8 + \frac{4}{10} = 8 \frac{4}{10}$.”

Paul thought, “$\frac{9}{10} + \frac{5}{10} = \frac{14}{10} = \frac{7}{10} + \frac{4}{10} = 8 \frac{4}{10}$. “ Explain why Maria and Paul are both right.
Lesson 30 Exit Ticket

Name ________________________________ Date _______________________

1. Solve.
   a. $3\frac{2}{5} + _____ = 4$
   b. $2\frac{3}{8} + \frac{7}{8}$
Lesson 30 Homework

Name ___________________________ Date __________________________

1. Solve.
   a. \(4\frac{1}{3} + \frac{1}{3}\)  
   b. \(5\frac{1}{4} + \frac{2}{4}\)
   
   c. \(\frac{2}{6} + 3\frac{4}{6}\)  
   d. \(\frac{5}{8} + 7\frac{3}{8}\)

2. Complete the number sentences.
   a. \(3 \frac{5}{6} + \_ = 4\)
   b. \(5 \frac{3}{7} + \_ = 6\)
   
   c. \(5 = 4 \frac{1}{8} + \_\)
   d. \(15 = 14 \frac{4}{12} + \_\)

3. Draw a number bond and the arrow way to show how to make one. Solve.
   a. \(\frac{2}{5} + \frac{2}{5}\)
   b. \(3 \frac{2}{3} + \frac{2}{3}\)
   c. \(4 \frac{4}{5} + \frac{5}{6}\)

   \(2\frac{1}{5} \rightarrow 3\frac{3}{5} \rightarrow 3\frac{1}{5}\)
4. Solve.

<table>
<thead>
<tr>
<th>a. $\frac{2}{5} + \frac{3}{5}$</th>
<th>b. $\frac{3}{8} + \frac{4}{8}$</th>
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</thead>
<tbody>
<tr>
<td>c. $\frac{4}{6} + \frac{3}{6}$</td>
<td>d. $\frac{7}{10} + \frac{6}{10}$</td>
</tr>
<tr>
<td>e. $\frac{5}{10} + \frac{9}{10}$</td>
<td>f. $\frac{7}{12} + \frac{11}{12}$</td>
</tr>
<tr>
<td>g. $\frac{90}{100} + \frac{58}{100}$</td>
<td>h. $\frac{60}{100} + \frac{79}{100}$</td>
</tr>
</tbody>
</table>

5. To solve $\frac{8}{10} + \frac{3}{10}$, Carmen thought, “$\frac{8}{10} + \frac{2}{10} = 5$, and $5 + \frac{1}{10} = 5 \frac{1}{10}$.”

Benny thought, “$\frac{8}{10} + \frac{3}{10} = \frac{11}{10} = 4 + \frac{1}{10} = 5 \frac{1}{10}$.” Explain why Carmen and Benny are both right.
1. Solve.
   a. \(\frac{3}{3} + \frac{2}{3} = \frac{5}{3} + \frac{3}{3} = \)
      \[
      \begin{array}{c}
        3 \\
        1/3
      \end{array}
      \begin{array}{c}
        2 \\
        2/3
      \end{array}
      \]
   b. \(4 \frac{1}{4} + 3 \frac{2}{4} = \)
   c. \(2 \frac{2}{6} + 6 \frac{4}{6} = \)

2. Solve. Use a number line to show your work.
   a. \(\frac{2}{5} + \frac{1}{5} = 3 + \frac{6}{5} = \)
      \[
      \begin{array}{c}
        5/5 \\
        1/5
      \end{array}
      \]
   b. \(1 \frac{3}{4} + 3 \frac{3}{4} = \)
   c. \(3 \frac{3}{8} + 2 \frac{6}{8} = \)
3. Solve. Use the arrow way to show how to make one.
   a. \( \frac{4}{6} + \frac{5}{6} = \frac{3}{6} + \frac{5}{6} = \)

   \begin{align*}
   \frac{2}{6} \quad \frac{3}{6}
   \end{align*}

   b. \( 1 \frac{3}{4} + 3 \frac{3}{4} \)

   c. \( 3 \frac{3}{8} + 2 \frac{6}{8} \)

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

   b. \( 2 \frac{6}{8} + 3 \frac{7}{8} \)

   c. \( 3 \frac{8}{12} + 2 \frac{7}{12} \)
1. Solve.
   
   a. \(2\frac{3}{8} + 1\frac{5}{8}\)

   b. \(3\frac{4}{5} + 2\frac{3}{5}\)
1. Solve.
   a. $2\frac{1}{3} + 1\frac{2}{3} = 3 + \frac{3}{3} = \ \\
      \underline{2} \underline{\frac{1}{3}} \underline{1} \underline{\frac{2}{3}}$

   b. $2\frac{2}{5} + 2\frac{2}{5} \ \\

   c. $3\frac{3}{8} + 1\frac{5}{8} \ \\

2. Solve. Use a number line to show your work.

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

   b. $3\frac{4}{6} + 2\frac{5}{6} \ \\

   c. $1\frac{9}{12} + 1\frac{7}{12}$
3. Solve. Use the arrow way to show how to make one.
   a. \[2\frac{3}{4} + 1\frac{3}{4} = 3\frac{3}{4} + \frac{3}{4} = \]
      \[\frac{1}{4} \quad \frac{2}{4} \quad \frac{3}{4} \quad \frac{4}{4} \]
      \[\Rightarrow \quad 4 \quad \rightarrow \]
   b. \[2\frac{7}{8} + 3\frac{4}{8} \]
   c. \[1\frac{7}{9} + 4\frac{5}{9} \]

   a. \[1\frac{4}{5} + 1\frac{3}{5} \]
   b. \[3\frac{8}{10} + 1\frac{5}{10} \]
   c. \[2\frac{5}{7} + 3\frac{6}{7} \]
Lesson 32

Objective: Subtract a fraction from a mixed number.

Suggested Lesson Structure

- Fluency Practice (12 minutes)
- Application Problem (3 minutes)
- Concept Development (35 minutes)
- Student Debrief (10 minutes)

Total Time (60 minutes)

Fluency Practice (12 minutes)

- Count by Equivalent Fractions 4.NF.1 (5 minutes)
- Change Mixed Numbers to Fractions 4.NF.4 (4 minutes)
- Add Mixed Numbers 4.NF.3 (3 minutes)

Count by Equivalent Fractions (5 minutes)

Note: This activity reviews G4–M5–Lessons 24 and 25. The progression builds in complexity. Work the students up to the highest level of complexity in which they can confidently participate.

T: Count by twos to 18, starting at 0.

\[
\begin{array}{cccccccccccc}
0 & \frac{2}{6} & \frac{4}{6} & \frac{6}{6} & \frac{8}{6} & \frac{10}{6} & \frac{12}{6} & \frac{14}{6} & \frac{16}{6} & \frac{18}{6} \\
0 & \frac{2}{6} & \frac{4}{6} & 1 & \frac{8}{6} & \frac{10}{6} & 2 & \frac{14}{6} & \frac{16}{6} & 3 \\
0 & \frac{2}{6} & \frac{4}{6} & 1 & 1\frac{2}{6} & 1\frac{4}{6} & 2 & 2\frac{2}{6} & 2\frac{4}{6} & 3 \\
0 & \frac{1}{3} & \frac{2}{3} & 1 & 1\frac{1}{3} & 1\frac{2}{3} & 2 & 2\frac{1}{3} & 2\frac{2}{3} & 3 \\
\end{array}
\]

S: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18

T: Count by 2 sixths to 18 sixths, starting at 0 sixths. (Write as students count.)

\[
\begin{array}{cccccccccccc}
0 & \frac{2}{6} & \frac{4}{6} & \frac{6}{6} & \frac{8}{6} & \frac{10}{6} & \frac{12}{6} & \frac{14}{6} & \frac{16}{6} & \frac{18}{6} \\
0 & \frac{2}{6} & \frac{4}{6} & \frac{6}{6} & \frac{8}{6} & \frac{10}{6} & \frac{12}{6} & \frac{14}{6} & \frac{16}{6} & \frac{18}{6} \\
\end{array}
\]

S: 0, 2, 4, 6, 8, 10, 12, 14, 16, 18

T: Zero is the same as how many sixths?

S: 0 sixths.
Lesson 32: Subtract a fraction from a mixed number

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T: (Beneath $\frac{0}{6}$, write 0.) 1 is the same as how many sixths?
S: 6 sixths.
T: (Beneath $\frac{6}{6}$, write 1.)

Continue this process for 2 and 3.
T: Count by 2 sixths again. This time, when you come to the whole number, say the whole number. (Write as students count.)
S: 0, $\frac{2}{6}$, $\frac{4}{6}$, 1, $\frac{8}{6}$, $\frac{10}{6}$, $\frac{14}{6}$, $\frac{16}{6}$, 3.
T: (Point to $\frac{8}{6}$.) Say $\frac{8}{6}$ as a mixed number.
S: 1 $\frac{2}{6}$.

Continue this process for $\frac{10}{6}$, $\frac{14}{6}$, and $\frac{16}{6}$.
T: Count by 2 sixths again. This time, convert to whole numbers and mixed numbers. (Write as students count.)
S: 0, $\frac{2}{6}$, $\frac{4}{6}$, 1, $\frac{2}{6}$, $\frac{4}{6}$, 2, $\frac{2}{6}$, $\frac{4}{6}$, 3.

Possibly extend, having the students rename sixths as thirds.

Change Mixed Numbers to Fractions (4 minutes)

Materials: (S) Personal white boards

Note: This fluency reviews G4–M5–Lesson 25.

T: (Write $1\frac{4}{5}$.) Say the mixed number.
S: $1\frac{4}{5}$.

T: (Draw a number bond with $1\frac{4}{5}$ as the total. Write $\frac{4}{5}$ as the known part. Write $\frac{1}{5}$ as the other part.) Write the unknown part, filling in the numerator.
S: (Write $\frac{5}{5}$ as the unknown part.)

T: (Write $\frac{5}{5}$ as the unknown part. Write $1\frac{4}{5} = \frac{9}{5}$.) Fill in the numerator.
S: (Write $1\frac{4}{5} = \frac{9}{5}$.)

Continue this process for $2\frac{1}{4}$ and $3\frac{5}{6}$. 
Lesson 32 Problem Set

1. Subtract. Model with a number line or the arrow way.
   a. \( \frac{3}{4} - \frac{1}{4} \)
   b. \( 4 \frac{7}{10} - \frac{3}{10} \)
   c. \( 5 \frac{1}{3} - \frac{2}{3} \)
   d. \( 9 \frac{3}{5} - \frac{4}{5} \)

2. Use decomposition to subtract the fractions. Model with a number line or the arrow way.
   a. \( \frac{5}{5} - \frac{4}{5} \)
   b. \( 4 \frac{1}{4} - \frac{2}{4} \)
   c. \( 5 \frac{1}{3} - \frac{2}{3} \)
   d. \( 2 \frac{3}{8} - \frac{5}{8} \)
3. Decompose the total to subtract the fractions.
   a. \(3 \frac{1}{8} - \frac{3}{8} = 2 \frac{1}{8} + \frac{5}{8} = 2 \frac{6}{8}\)
   b. \(5 \frac{1}{8} - \frac{7}{8}\)
      
   2 \frac{1}{8} \quad 1

   c. \(\frac{5}{5} - \frac{4}{5}\)
   d. \(\frac{5}{6} - \frac{5}{6}\)

   e. \(\frac{6}{12} - \frac{7}{12}\)
   f. \(\frac{9}{8} - \frac{5}{8}\)

   g. \(\frac{7}{6} - \frac{5}{6}\)
   h. \(\frac{8}{10} - \frac{4}{10}\)

   i. \(12 \frac{3}{5} - \frac{4}{5}\)
   j. \(11 \frac{2}{6} - \frac{5}{6}\)
Lesson 32 Exit Ticket

1. Solve.
   a. $10\frac{5}{6} - \frac{4}{6}$
   b. $8\frac{3}{8} - \frac{6}{8}$
1. Subtract. Model with a number line or the arrow way.

   a. $6 \frac{3}{5} - \frac{1}{5}$
   b. $4 \frac{9}{12} - \frac{7}{12}$
   c. $7 \frac{1}{4} - \frac{3}{4}$
   d. $8 \frac{3}{8} - \frac{5}{8}$

2. Use decomposition to subtract the fractions. Model with a number line or the arrow way.

   a. $2 \frac{2}{5} - \frac{4}{5}$
   b. $2 \frac{1}{3} - \frac{2}{3}$
   c. $4 \frac{1}{6} - \frac{4}{6}$
   d. $3 \frac{3}{6} - \frac{5}{6}$
Lesson 32: Subtract a fraction from a mixed number.

Date: 1/15/14

3. Decompose the total to subtract the fractions.

a. $4 \frac{1}{8} - \frac{3}{8} = \frac{31}{8} + \frac{5}{8} = \frac{36}{8}$

b. $5 \frac{2}{5} - \frac{3}{5}$

c. $7 \frac{1}{8} - \frac{3}{8}$

d. $3 \frac{3}{9} - \frac{4}{9}$

e. $6 \frac{3}{10} - \frac{7}{10}$

f. $2 \frac{5}{9} - \frac{8}{9}$
Lesson 33 Problem Set

Name ________________________________ Date ____________________

1. Write a related addition sentence. Subtract by counting on. Use a number line or the arrow way to help. The first one has been partially done for you.
   a. \( \frac{3}{3} - \frac{2}{3} = \) _____
      \( \frac{2}{3} + \) _____ = \( \frac{3}{3} \)
   b. \( \frac{5}{4} - \frac{3}{4} = \) _____

2. Subtract, as shown in Problem 2(a), by decomposing the fractional part of the number you are subtracting. Use a number line or the arrow way to help you.
   a. \( \frac{3}{4} - \frac{1}{4} = \frac{2}{4} - \frac{1}{4} = \frac{1}{2} \)
      \( \frac{1}{4} \) \( \frac{2}{4} \)
   b. \( \frac{4}{5} - \frac{2}{5} \)
   c. \( \frac{5}{7} - \frac{6}{7} \)
Lesson 33 Problem Set

3. Subtract, as shown in Problem 3(a), by decomposing to take one out.
   a. \( \frac{5}{5} - \frac{4}{5} = \frac{3}{5} - \frac{4}{5} \)
      \[
      \begin{array}{c}
      2 \\
      3 \\
      \hline
      1 \\
      \end{array}
      \]
   b. \( \frac{3}{6} - \frac{5}{6} \)
   c. \( \frac{3}{10} - \frac{7}{10} \)

4. Solve using any method.
   a. \( \frac{1}{4} - \frac{3}{4} \)
   b. \( \frac{1}{8} - \frac{7}{8} \)
   c. \( \frac{3}{12} - \frac{8}{12} \)
   d. \( \frac{1}{100} - \frac{97}{100} \)
Name ________________________________ Date __________________

1. Solve using any strategy.
   a. \(4 \frac{2}{3} - 2 \frac{1}{3}\)
   b. \(12 \frac{5}{8} - 8 \frac{7}{8}\)
Name _________________________________ Date _________________

1. Write a related addition sentence. Subtract by counting on. Use a number line or the arrow way to help. The first one has been partially done for you.
   a. $3 \frac{2}{5} - 1 \frac{4}{5} = ____$
      
      $1 \frac{4}{5} + ____ = 3 \frac{2}{5}$

   b. $5 \frac{3}{8} - 2 \frac{5}{8}$

2. Subtract, as shown in Problem 2(a) below, by decomposing the fractional part of the number you are subtracting. Use a number line or the arrow way to help you.
   a. $4 \frac{1}{5} - 1 \frac{3}{5} = 3 \frac{1}{5} - \frac{3}{5} = 2 \frac{3}{5}$

   b. $4 \frac{1}{7} - 2 \frac{4}{7}$

   c. $5 \frac{5}{12} - 3 \frac{8}{12}$
3. Subtract, as shown in 3(a) below, by decomposing to take one out.
   a. \(5 \frac{5}{8} - 2 \frac{7}{8} = 3 \frac{5}{8} - \frac{7}{8} = \)

   \[\begin{array}{c}
   2 \frac{5}{8} \\
   1
   \end{array}\]

   b. \(4 \frac{3}{12} - 3 \frac{8}{12}\)

   c. \(9 \frac{1}{10} - 6 \frac{9}{10}\)

4. Solve using any strategy.
   a. \(6 \frac{1}{9} - 4 \frac{3}{9}\)
   b. \(5 \frac{3}{10} - 3 \frac{6}{10}\)

   c. \(8 \frac{7}{12} - 5 \frac{9}{12}\)
   d. \(7 \frac{4}{100} - 2 \frac{92}{100}\)
1. Subtract.
   a. $\frac{4}{3} - \frac{2}{3}$
      \[ \begin{array}{c}
          3 \\
          \frac{4}{3}
      \end{array} \]
      
   b. $\frac{5}{4} - \frac{3}{4}$

   c. $8\frac{3}{5} - \frac{4}{5}$

2. Subtract the ones first.
   a. $3\frac{1}{4} - 1\frac{3}{4} = 2\frac{1}{4} - \frac{3}{4} = 1\frac{2}{4}$
      \[ \begin{array}{c}
          1 \\
          \frac{5}{4}
      \end{array} \]

   b. $4\frac{2}{5} - 1\frac{3}{5}$
c. \( \frac{5}{6} - 3\frac{5}{6} \)

d. \( 9\frac{3}{5} - 2\frac{4}{5} \)

3. Solve using any strategy.

a. \( \frac{7}{8} - 2\frac{5}{8} \)

b. \( 6\frac{4}{10} - 3\frac{8}{10} \)

c. \( 8\frac{3}{12} - 3\frac{8}{12} \)

d. \( 14\frac{2}{50} - 6\frac{43}{50} \)
1. Solve.
   a. \(7\frac{1}{6} - 2\frac{4}{6}\)

   b. \(12\frac{5}{8} - 3\frac{7}{8}\)
1. Subtract.
   a. \( \frac{5}{4} - \frac{3}{4} \)

   \[
   \begin{array}{c}
   4 \\
   \frac{5}{4}
   \end{array}
   \]

   b. \( \frac{3}{8} - \frac{6}{8} \)

   c. \( \frac{7}{6} - \frac{5}{6} \)

2. Subtract the ones first.
   a. \( \frac{4}{5} - \frac{1}{5} = \frac{3}{5} - \frac{3}{5} = \frac{2}{5} \)

   \[
   \begin{array}{c}
   2 \\
   \frac{6}{5}
   \end{array}
   \]

   b. \( \frac{3}{6} - \frac{5}{6} \)
c. \( \frac{83}{8} - 2\frac{5}{8} \)

d. \( 13\frac{3}{10} - 8\frac{7}{10} \)

3. Solve using any strategy.

a. \( 7\frac{3}{12} - 4\frac{9}{12} \)

b. \( 9\frac{6}{10} - 5\frac{8}{10} \)

c. \( 17\frac{2}{16} - 9\frac{7}{16} \)

d. \( 12\frac{5}{100} - 8\frac{94}{100} \)
Lesson 35 Problem Set 4.5

Name ___________________________ Date __________________

1. Draw and label a tape diagram to show the following are true.
   a. 8 fifths = 4 × (2 fifths) = (4 × 2) fifths
   b. 10 sixths = 5 × (2 sixths) = (5 × 2) sixths

2. Write the expression in unit form to solve.
   a. $7 \times \frac{2}{3}$
   b. $4 \times \frac{2}{4}$
   c. $16 \times \frac{3}{8}$
   d. $6 \times \frac{5}{8}$
3. Solve.
   a. $7 \times \frac{4}{9}$
   b. $6 \times \frac{3}{5}$
   c. $8 \times \frac{3}{4}$
   d. $16 \times \frac{3}{8}$
   e. $12 \times \frac{7}{10}$
   f. $3 \times \frac{54}{100}$

4. Maria needs $\frac{3}{5}$ yard of fabric for each costume. How many yards of fabric does she need for 6 costumes?
Represent the multiplication of \( n \times \frac{a}{b} \) as \((n \times a)/b\) using the associative property and visual models.

1. Solve using unit form.
   \[
   5 \times \frac{2}{3} 
   \]

2. Solve.
   \[
   11 \times \frac{5}{6} 
   \]
1. Draw and label a tape diagram to show the following are true.
   a. \(8 \text{ thirds} = 4 \times (2 \text{ thirds}) = (4 \times 2) \text{ thirds}\)
   b. \(15 \text{ eighths} = 3 \times (5 \text{ eighths}) = (3 \times 5) \text{ eighths}\)

2. Write the expression in unit form to solve.
   a. \(10 \times \frac{2}{5}\)
   b. \(3 \times \frac{5}{6}\)
   c. \(9 \times \frac{4}{9}\)
   d. \(7 \times \frac{3}{4}\)
3. Solve.
   a. \(6 \times \frac{3}{4}\)  
   b. \(7 \times \frac{5}{8}\)
   c. \(13 \times \frac{2}{3}\)  
   d. \(18 \times \frac{2}{3}\)
   e. \(14 \times \frac{7}{10}\)  
   f. \(7 \times \frac{14}{100}\)

4. Mrs. Smith bought some orange juice. Each member of her family drank \(\frac{2}{3}\) cup for breakfast. There are five people in her family. How many cups of orange juice did they drink?
Lesson 36

Objective: Represent the multiplication of $n$ times $a/b$ as $(n \times a)/b$ using the associative property and visual models.

Suggested Lesson Structure

- **Fluency Practice** (10 minutes)
- **Application Problem** (5 minutes)
- **Concept Development** (35 minutes)
- **Student Debrief** (10 minutes)

**Total Time** (60 minutes)

**Fluency Practice (10 minutes)**

- Count by Equivalent Fractions 4.NF.1 (5 minutes)
- Multiply Fractions 4.NF.4 (5 minutes)

**Count by Equivalent Fractions (5 minutes)**

Note: This activity reviews G4–M5–Lesson 24 and 25. The progression builds in complexity. Work the students up to the highest level of complexity in which they can confidently participate.

T: Count by threes to 30, starting at 0.
S: 0, 3, 6, 9, 12, 15, 18, 21, 24, 27, 30.

T: Count by $3\text{ tenths}$ to $30\text{ tenths}$, starting at $0\text{ tenths}$.
(Write as students count.)

S: \[
\begin{array}{cccccccccc}
0 & 3 & 6 & 9 & 12 & 15 & 18 & 21 & 24 & 27 & 30 \\
\hline
0 & 3 & 6 & 9 & 12 & 15 & 18 & 21 & 24 & 27 & 30 \\
\end{array}
\]

T: Name the fraction that’s equal to a whole number.
S: $30\text{ tenths}$.

T: (Point to $\frac{30}{10}$.) $30\text{ tenths}$ is how many ones?
S: 3 ones.

T: (Beneath $\frac{30}{10}$, write 3 ones.) Count by $3\text{ tenths}$ again. This time, when you come to the whole
1. Draw a tape diagram to represent \[\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}\].

2. Draw a tape diagram to represent \[\frac{7}{12} + \frac{7}{12} + \frac{7}{12}\].

Write a multiplication expression equal to
\[\frac{3}{4} + \frac{3}{4} + \frac{3}{4} + \frac{3}{4}\].

Write a multiplication expression equal to
\[\frac{7}{12} + \frac{7}{12} + \frac{7}{12}\].

3. Rewrite each repeated addition problem as a multiplication problem, and solve. Express the result as a mixed number. The first one has been started for you.

a. \(\frac{7}{5} + \frac{7}{5} + \frac{7}{5} + \frac{7}{5} = 4 \times \frac{7}{5} = \frac{4 \times 7}{5} = \)

b. \(\frac{9}{10} + \frac{9}{10} + \frac{9}{10} \)

c. \(\frac{11}{12} + \frac{11}{12} + \frac{11}{12} + \frac{11}{12} + \frac{11}{12} \)
4. Solve using any method. Express your answers as whole or mixed numbers.

   a.  $8 \times \frac{2}{3}$  
   b.  $12 \times \frac{3}{4}$  

   c.  $50 \times \frac{4}{5}$  
   d.  $26 \times \frac{7}{8}$  

5. Morgan poured $\frac{9}{10}$ liter of punch into each of 6 bottles. How many liters of punch did she pour in all?

6. A recipe calls for $\frac{3}{4}$ cup rice. How many cups of rice are needed to make the recipe 14 times?

7. A butcher prepared 120 sausages using $\frac{3}{8}$ pound of meat for each. How many pounds did he use in all?
Lesson 36 Exit Ticket

Name ___________________________ Date _______________________

1. Solve using any method.
   
   a. $7 \times \frac{3}{4}$
   
   b. $9 \times \frac{2}{5}$
   
   c. $60 \times \frac{5}{8}$
Lesson 36: Represent the multiplication of \( n \times \frac{a}{b} \) as \( \left( n \times a \right) \div b \) using the associative property and visual models.

Date: 1/15/14

Name ___________________________ Date __________________

1. Draw a tape diagram to represent \( \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} \). 

2. Draw a tape diagram to represent \( \frac{7}{6} + \frac{7}{8} + \frac{7}{8} \).

Write a multiplication expression equal to \( \frac{2}{3} + \frac{2}{3} + \frac{2}{3} + \frac{2}{3} \). 

Write a multiplication expression equal to \( \frac{7}{6} + \frac{7}{8} + \frac{7}{8} \).

3. Rewrite each repeated addition problem as a multiplication problem and solve. Express the result as a mixed number. The first one has been completed for you.
   
   a. \( \frac{7}{5} + \frac{7}{5} + \frac{7}{5} + \frac{7}{5} = 4 \times \frac{7}{5} = \frac{4 \times 7}{5} = \frac{28}{5} = 5 \frac{3}{5} \)
   
   b. \( \frac{7}{10} + \frac{7}{10} + \frac{7}{10} \)
   
   c. \( \frac{5}{12} + \frac{5}{12} + \frac{5}{12} + \frac{5}{12} + \frac{5}{12} \)
   
   d. \( \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} + \frac{3}{8} \)

4. Solve using any method. Express your answers as whole or mixed numbers.
   
   a. \( 7 \times \frac{2}{9} \) 
   
   b. \( 11 \times \frac{2}{3} \)
Lesson 36: Represent the multiplication of \( \frac{n}{a} \) as \( (n \times a)/b \) using the associative property and visual models.

5. Coleton is playing with interlocking blocks that are each \( \frac{3}{4} \) inch tall. He makes a tower 17 blocks tall. How tall is his tower in inches?

6. There were 11 players on Mr. Maiorani’s softball team. They each ate \( \frac{3}{8} \) of a pizza. How many pizzas did they eat?

7. A bricklayer places 12 bricks along an outside wall of a shed. Each brick is \( \frac{3}{4} \) foot long. How many feet long is that wall of the shed?
Name ________________________________  Date ________________________________

1. Draw tape diagrams to show two ways to represent 2 units of 4 \(\frac{2}{3}\).

Write a multiplication expression to match each tape diagram.

2. Solve the following using the distributive property. The first one has been done for you. (As soon as you are ready, you may omit the step that is in line 2.)

<table>
<thead>
<tr>
<th>Expression</th>
<th>Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. (3 \times 6 \frac{4}{5})</td>
<td>(= 3 \times (6 + \frac{4}{5})) (= (3 \times 6) + (3 \times \frac{4}{5})) (= 18 + \frac{12}{5}) (= 18 + 2 \frac{2}{5}) (= 20 \frac{2}{5})</td>
</tr>
<tr>
<td>b. (2 \times 4 \frac{2}{3})</td>
<td></td>
</tr>
<tr>
<td>c. (3 \times 2 \frac{5}{8})</td>
<td></td>
</tr>
<tr>
<td>d. (2 \times 4 \frac{7}{10})</td>
<td></td>
</tr>
</tbody>
</table>
Lesson 37: Find the product of a whole number and a mixed number using the distributive property.

3. For one dance costume, Saisha needs \(4 \frac{2}{3}\) feet of ribbon. How much ribbon does she need for 5 identical costumes?

\[
\begin{align*}
e. & \quad 3 \times 7 \frac{3}{4} \\
\text{f.} & \quad 6 \times 3 \frac{1}{2} \\
g. & \quad 4 \times 9 \frac{1}{5} \\
h. & \quad 5 \frac{6}{8} \times 4
\end{align*}
\]
Lesson 37 Exit Ticket

Find the product of a whole number and a mixed number using the distributive property.

Date: 1/15/14

1. Multiply. Write each product as a mixed number.
   a. $4 \times 5\frac{3}{8}$
   b. $4\frac{3}{10} \times 3$
1. Draw tape diagrams to show two ways to represent 3 units of \(5 \frac{1}{12}\).

Write a multiplication expression to match each tape diagram.

2. Solve the following using the distributive property. The first one has been done for you. (As soon as you are ready, you may omit the step that is in line 2.)

   a. \(3 \times 6\frac{4}{5} = 3 \times \left(6 + \frac{4}{5}\right)\)
      \[= (3 \times 6) + \left(3 \times \frac{4}{5}\right)\]
      \[= 18 + \frac{12}{5}\]
      \[= 18 + 2\frac{2}{5}\]
      \[= 20\frac{2}{5}\]

   b. \(5 \times 4\frac{1}{6}\)

   c. \(6 \times 2\frac{3}{5}\)

   d. \(2 \times 7\frac{3}{10}\)
3. Sara’s street is $2 \frac{3}{10}$ mile long. She ran the length of the street 6 times. How far did she run?

4. Kelly’s new puppy weighed $4 \frac{7}{10}$ pounds when she brought him home. Now he weighs six times as much. How much does he weigh now?

---

e. $8 \times 7 \frac{1}{4}$  

f. $3 \frac{2}{8} \times 12$
Lesson 38 Problem Set

Name ______________________________________________________ Date ______________________

1. Fill in the unknown factors.
   a. $7 \times 3 \frac{4}{5} = (\_ \times 3) + (\_ \times \frac{4}{5})$
   b. $3 \times 12 \frac{7}{8} = (3 \times \_ ) + (3 \times \_ )$

2. Multiply. Use the distributive property.
   a. $7 \times 8 \frac{2}{5}$
   b. $4 \frac{5}{6} \times 9$
   c. $3 \times 8 \frac{11}{12}$
   d. $5 \times 20 \frac{8}{10}$
Lesson 38 Problem Set

NYS COMMON CORE MATHEMATICS CURRICULUM 4•5

Lesson 38: Find the product of a whole number and a mixed number using the distributive property.

Date: 1/15/14

3. The distance around the park is $2\frac{5}{10}$ miles. Cecilia ran around the park 3 times. How far did she run?

4. Windsor the dog ate $4\frac{3}{4}$ snack bones each day for a week. How many bones did Windsor eat that week?

e. $25\frac{4}{100} \times 4$
Lesson 38:

Find the product of a whole number and a mixed number using the distributive property.

Date: 1/15/14

5.G.44

Lesson 38 Exit Ticket

Name ______________________________ Date ________________

1. Fill in the unknown factors.

\[ 8 \times 5 \frac{2}{3} = (\_ \times 5) + (\_ \times \frac{2}{3}) \]

2. Multiply. Use the distributive property.

\[ 6 \frac{5}{8} \times 7 \]
Lesson 38: Find the product of a whole number and a mixed number using the distributive property.

Date: 1/15/14

1. Fill in the unknown factors.
   a. $8 \times 4\frac{4}{7} = (\_ \times 4) + (\_ \times \frac{4}{7})$
   b. $9 \times 7\frac{7}{10} = (9 \times \_ ) + (9 \times \_ )$

2. Multiply. Use the distributive property.
   a. $6 \times 8\frac{2}{7}$
   b. $7\frac{3}{4} \times 9$
   c. $9 \times 8\frac{7}{9}$
   d. $25\frac{7}{8} \times 3$
Lesson 38 Homework

3. Brandon is cutting 9 boards for a woodworking project. Each board is $4 \frac{5}{8}$ feet long. What is the total length of boards?

4. Rocky the collie ate $3 \frac{1}{4}$ cups of dog food each day for two weeks. How much dog food did Rocky eat in that time?

5. At the class party, each student will be given a container that holds $8 \frac{5}{8}$ ounces of juice. There are 25 students in the class. If each student’s container is filled, how many ounces of juice does the teacher need to buy?

e. $4 \times 20 \frac{8}{12}$

f. $30 \frac{3}{100} \times 12$
Use the RDW process to solve.

1. Tameka ran $2\frac{5}{8}$ miles. Her sister ran twice as far. How far did Tameka’s sister run?

2. Natasha’s sculpture was $5\frac{3}{16}$ inches tall. Maya’s was 4 times as tall. How much shorter was Natasha’s sculpture than Maya’s?

3. A seamstress needs $1\frac{5}{8}$ yards of fabric to make a child’s dress. She needs 3 times as much fabric to make a woman’s dress. How many yards of fabric does she need for both dresses?
4. A piece of blue yarn is $5 \frac{2}{3}$ yards long. A piece of pink yarn is 5 times as long as the blue yarn. Bailey tied them together with a knot that used $1 \frac{1}{3}$ yard from each piece of yarn. What is the total length of the yarn tied together?

5. A truck driver drove $35 \frac{2}{10}$ miles before he stopped for breakfast. He then drove 5 times as far before he stopped for lunch. How far did he drive that day before his lunch break?

6. Mr. Washington’s motorcycle needs $5 \frac{5}{10}$ gallons of gas to fill the tank. His van needs 5 times as much gas to fill it. If Mr. Washington pays $3 per gallon for gas, how much will it cost him to fill both the motorcycle and the van?
Use the RDW process to solve.

1. Jeff has ten packages that he wants to mail. Nine identical packages weigh \(2\frac{3}{8}\) pounds each. A tenth package weighs two times as much as one of the other packages. How many pounds do all ten packages weigh?
Lesson 39 Homework

Name _______________________________ Date ________________

Use the RDW process to solve.

1. A grocery store had a sale on ground turkey. Eight families each bought $2\frac{1}{2}$ pounds of ground turkey. How many pounds did the store sell to these families?

2. Trevor’s stack of books is $7\frac{7}{8}$ inches tall. Rick’s stack is 3 times as tall. What is the difference in the heights of their stacks of books?

3. Gail has two yards of fabric. It takes $8\frac{3}{4}$ yards of fabric to make one quilt. She wants to make three quilts. How many more yards of fabric does she need to buy in order to make three quilts?
4. Carol made punch. She used \(12 \frac{3}{8}\) cups of juice and then added three times as much ginger ale. Then she added 1 cup of lemonade. How many cups of punch did her recipe make?

5. Brandon drove \(72 \frac{7}{10}\) miles on Monday. He drove 3 times as far on Tuesday. How far did he drive in the two days?

6. Mr. Reiser fills the gas tank of his truck with \(9 \frac{8}{10}\) gallons of gas each week. He fills it five times per month. If Mr. Reiser pays $3 per gallon for gas, how much will it cost him to fill his truck for the entire month?
1. The chart to the right shows the height of some football players. Use the data to create a line plot at the bottom of this page and to answer the questions below.

   a. What is the difference in height of the tallest and shortest player?

   b. Player I and Player B have a combined height that is $1 \frac{1}{8}$ feet taller than a school bus. What is the height of a school bus?

<table>
<thead>
<tr>
<th>Player</th>
<th>Height (in feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>$6 \frac{1}{4}$</td>
</tr>
<tr>
<td>B</td>
<td>$5 \frac{7}{8}$</td>
</tr>
<tr>
<td>C</td>
<td>$6 \frac{1}{2}$</td>
</tr>
<tr>
<td>D</td>
<td>$6 \frac{1}{4}$</td>
</tr>
<tr>
<td>E</td>
<td>$6 \frac{2}{8}$</td>
</tr>
<tr>
<td>F</td>
<td>$5 \frac{7}{8}$</td>
</tr>
<tr>
<td>G</td>
<td>$6 \frac{1}{8}$</td>
</tr>
<tr>
<td>H</td>
<td>$6 \frac{5}{8}$</td>
</tr>
<tr>
<td>I</td>
<td>$6 \frac{5}{8}$</td>
</tr>
<tr>
<td>J</td>
<td>$6 \frac{1}{8}$</td>
</tr>
</tbody>
</table>
2. One of the players on the team is now 4 times as tall as he was at birth, when he measured $1\frac{5}{8}$ feet. Who is the player?

3. Six of the players on the team weigh over 300 pounds. Doctors recommend that players of this size drink at least $3\frac{3}{4}$ quarts of water each day. At least how much water should be consumed per day by all 6 players?

4. Nine of the players on the team weigh about 200 pounds. Doctors recommend that people of this weight each eat about $7\frac{7}{10}$ grams of protein per pound each day. About how many combined grams of protein should these 9 players eat per day?
Name ___________________________ Date ________________

1. Coach Taylor asked his team to record the distance they ran during practice. The distances are listed in the table.

   a. Use the table to locate the incorrect data on the line plot. Circle any incorrect points.
      Mark any missing points.

   b. Of the team members who ran \( \frac{6}{8} \) miles, how many miles did those team members run combined?

<table>
<thead>
<tr>
<th>Team Members</th>
<th>Distance (in miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alec</td>
<td>( \frac{3}{4} )</td>
</tr>
<tr>
<td>Henry</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>Charles</td>
<td>( \frac{1}{8} )</td>
</tr>
<tr>
<td>Steve</td>
<td>( \frac{3}{4} )</td>
</tr>
<tr>
<td>Pitch</td>
<td>( \frac{2}{4} )</td>
</tr>
<tr>
<td>Raj</td>
<td>( \frac{6}{8} )</td>
</tr>
<tr>
<td>Pam</td>
<td>( \frac{1}{2} )</td>
</tr>
<tr>
<td>Tony</td>
<td>( \frac{3}{8} )</td>
</tr>
</tbody>
</table>
1. The chart to the right shows the total monthly rainfall for a city. Use the data to create a line plot at the bottom of this page and to answer the following questions.

<table>
<thead>
<tr>
<th>Month</th>
<th>Rainfall (in inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>2(\frac{2}{8})</td>
</tr>
<tr>
<td>February</td>
<td>1(\frac{3}{8})</td>
</tr>
<tr>
<td>March</td>
<td>2(\frac{3}{8})</td>
</tr>
<tr>
<td>April</td>
<td>2(\frac{5}{8})</td>
</tr>
<tr>
<td>May</td>
<td>4(\frac{1}{4})</td>
</tr>
<tr>
<td>June</td>
<td>2(\frac{1}{4})</td>
</tr>
<tr>
<td>July</td>
<td>3(\frac{7}{8})</td>
</tr>
<tr>
<td>August</td>
<td>3(\frac{1}{4})</td>
</tr>
<tr>
<td>September</td>
<td>1(\frac{5}{8})</td>
</tr>
<tr>
<td>October</td>
<td>3(\frac{2}{8})</td>
</tr>
<tr>
<td>November</td>
<td>1(\frac{3}{4})</td>
</tr>
<tr>
<td>December</td>
<td>1(\frac{5}{8})</td>
</tr>
</tbody>
</table>
a. What is the difference in rainfall from the wettest and driest months?

b. How much more rain fell in May than in April?

c. What is the combined rainfall amount for the summer months of June, July, and August?

d. How much more rain fell in the summer months than the combined rainfall for the last 4 months of the year?

e. In which months did it rain twice as much as it rained in December?

f. Each inch of rain can produce ten times that many inches of snow. If all of the rainfall in January was in the form of snow, how many inches of snow fell in January?
Lesson 41: Find and use a pattern to calculate the sum of all fractional parts between 0 and 1. Share and critique peer strategies.

Date: 1/15/14

1. Find the sums.

   a. \( \frac{0}{3} + \frac{1}{3} + \frac{2}{3} + \frac{3}{3} \)
   
   b. \( \frac{0}{4} + \frac{1}{4} + \frac{2}{4} + \frac{3}{4} + \frac{4}{4} \)

   c. \( \frac{0}{5} + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} + \frac{5}{5} \)
   
   d. \( \frac{0}{6} + \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \frac{6}{6} \)

   e. \( \frac{0}{7} + \frac{1}{7} + \frac{2}{7} + \frac{3}{7} + \frac{4}{7} + \frac{5}{7} + \frac{6}{7} + \frac{7}{7} \)
   
   f. \( \frac{0}{8} + \frac{1}{8} + \frac{2}{8} + \frac{3}{8} + \frac{4}{8} + \frac{5}{8} + \frac{6}{8} + \frac{7}{8} + \frac{8}{8} \)

2. Describe a pattern you notice when adding the sums of fractions with even denominators as opposed to those with odd denominators.

3. How would the sums change if the addition started with the unit fraction rather than with 0?
4. Find the sums.

a. \(\frac{0}{10} + \frac{1}{10} + \frac{2}{10} + \ldots + \frac{10}{10}\)  
b. \(\frac{0}{12} + \frac{1}{12} + \frac{2}{12} + \ldots + \frac{12}{12}\)

c. \(\frac{0}{15} + \frac{1}{15} + \frac{2}{15} + \ldots + \frac{15}{15}\)  
d. \(\frac{0}{25} + \frac{1}{25} + \frac{2}{25} + \ldots + \frac{25}{25}\)

e. \(\frac{0}{50} + \frac{1}{50} + \frac{2}{50} + \ldots + \frac{50}{50}\)  
f. \(\frac{0}{100} + \frac{1}{100} + \frac{2}{100} + \ldots + \frac{100}{100}\)

5. Compare your strategy for finding the sums in Problems 4(d), 4(e), and 4(f) with a partner.

6. Could you apply this strategy to find the sum of all the whole numbers from 0 to 100?
Lesson 41 Exit Ticket

Find the sums.

a. \( \frac{0}{20} + \frac{1}{20} + \frac{2}{20} + \ldots + \frac{20}{20} \)

b. \( \frac{0}{200} + \frac{1}{200} + \frac{2}{200} + \ldots + \frac{200}{200} \)
1. Find the sums. Express each sum as a mixed number.

   a. $\frac{0}{5} + \frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \frac{4}{5} + \frac{5}{5}$
   
   b. $\frac{0}{6} + \frac{1}{6} + \frac{2}{6} + \frac{3}{6} + \frac{4}{6} + \frac{5}{6} + \frac{6}{6}$

   c. $\frac{0}{7} + \frac{1}{7} + \frac{2}{7} + \frac{3}{7} + \frac{4}{7} + \frac{5}{7} + \frac{6}{7} + \frac{7}{7}$
   
   d. $\frac{0}{8} + \frac{1}{8} + \frac{2}{8} + \frac{3}{8} + \frac{4}{8} + \frac{5}{8} + \frac{6}{8} + \frac{7}{8} + \frac{8}{8}$

   e. $\frac{0}{9} + \frac{1}{9} + \frac{2}{9} + \frac{3}{9} + \frac{4}{9} + \frac{5}{9} + \frac{6}{9} + \frac{7}{9} + \frac{8}{9} + \frac{9}{9}$
   
   f. $\frac{0}{10} + \frac{1}{10} + \frac{2}{10} + \frac{3}{10} + \frac{4}{10} + \frac{5}{10} + \frac{6}{10} + \frac{7}{10} + \frac{8}{10} + \frac{9}{10} + \frac{10}{10}$

2. Describe a pattern you notice when adding the sums of fractions with even denominators as opposed to those with odd denominators.

3. How would the sums change if the addition started with the unit fraction rather than with 0?
4. Find the sums.

a. \( \frac{0}{20} + \frac{1}{20} + \frac{2}{20} + \ldots + \frac{20}{20} \)

b. \( \frac{0}{35} + \frac{1}{35} + \frac{2}{35} + \ldots + \frac{35}{35} \)

c. \( \frac{0}{36} + \frac{1}{36} + \frac{2}{36} + \ldots + \frac{36}{36} \)

d. \( \frac{0}{75} + \frac{1}{75} + \frac{2}{75} + \ldots + \frac{75}{75} \)

e. \( \frac{0}{100} + \frac{1}{100} + \frac{2}{100} + \ldots + \frac{100}{100} \)

f. \( \frac{0}{99} + \frac{1}{99} + \frac{2}{99} + \ldots + \frac{99}{99} \)

5. Could you apply this strategy to find the sum of all the whole numbers from 0 to 50? To 99?
Name ___________________________ Date __________________________

1. Let each small square represent $\frac{1}{4}$.
   
a. Using the same unit, draw and shade the following fractions. Represent each as a sum of unit fractions.

Example: $\frac{3}{4}$

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

   i. 1
   ii. $\frac{2}{4}$
   iii. $\frac{5}{4}$

b. Record the decompositions of parts (i) and (iii) using only 2 addends.

   i. 

   iii. 

c. Rewrite the equations from Part (a) as the multiplication of a whole number by a unit fraction.

   i. 

   ii. 

   iii.
2. a. Using the fractional units shown, identify the fraction of the rectangle that is shaded. Continue this pattern by drawing the next area model in the sequence and identifying the fraction shaded.

   ![Fractional units diagram]

   b. Use multiplication to explain why the first two fractions are equivalent.

   ![Fractional units diagram]

3. Cross out the fraction that is not equivalent to the other three. Show how you know.

   a. \( \frac{3}{5} \) \( \frac{60}{100} \) \( \frac{6}{10} \) \( \frac{6}{5} \)

   b. \( \frac{6}{4} \) \( \frac{3}{2} \) \( \frac{12}{8} \) \( \frac{8}{4} \)

   c. \( \frac{6}{4} \) \( \frac{16}{12} \) \( \frac{9}{6} \) \( \frac{3}{2} \)
4. Fill in the circle with $<$, $=$, or $>$ to make a true number sentence. Justify each response by drawing a model (such as an area model or number line), creating common denominators or numerators, or explaining a comparison to a benchmark fraction.

a. $\frac{6}{5} \quad \square \quad \frac{4}{5}$

b. $\frac{5}{8} \quad \square \quad \frac{5}{10}$

c. $\frac{5}{5} \quad \square \quad \frac{12}{12}$

d. $\frac{5}{12} \quad \square \quad \frac{6}{10}$

e. $\frac{5}{6} \quad \square \quad \frac{3}{4}$

f. $\frac{8}{3} \quad \square \quad \frac{16}{6}$

g. $\frac{7}{4} \quad \square \quad \frac{9}{5}$

h. $\frac{12}{8} \quad \square \quad \frac{11}{6}$
5. Fill in the blanks to make each number sentence true. Draw a number line, tape diagram, or area model to represent each problem.

a. \[ \underline{\text{______}} = \frac{5}{12} + \frac{6}{12} \]

b. \[ \frac{53}{100} - \frac{27}{100} = \underline{\text{______}} \]

c. \[ \frac{8}{12} + \underline{\text{______}} = 1 \]

d. \[ \frac{3}{10} + \frac{6}{10} + \frac{2}{10} = \underline{\text{______}} \]

e. \[ 1 - \frac{5}{8} = \underline{\text{______}} \]

f. \[ \frac{7}{8} - \frac{3}{8} = \underline{\text{______}} \]
   a. They spent $\frac{1}{6}$ of their money on water, $\frac{4}{6}$ of their money on lunch, and the rest on worms. What fraction of their money was spent on worms? Draw a model and write an equation to solve.

   b. Robin noticed her water bottle was $\frac{1}{2}$ full and Freddy’s was $\frac{3}{4}$ full. Robin said, “My $\frac{1}{2}$ full bottle has more water than your $\frac{3}{4}$ full bottle.” Explain how $\frac{1}{2}$ bottle could be more than $\frac{3}{4}$ bottle.

   c. Ray, Robin, and Freddy each had identical containers of worms. Ray used $\frac{3}{8}$ container. Robin used $\frac{6}{8}$ container, and Freddy used $\frac{7}{8}$ container. How many containers of worms did they use?

   d. Express the number of remaining containers as a product of a whole number and a unit fraction.

   e. Six out of the eight fish they caught were trout. What is another fraction equal to 6 eighths? Write a number sentence and draw a model to show the two fractions are equal.
1. a. Partition the tape diagram to show $5 \times \frac{2}{3}$. Partition the number line to show $10 \times \frac{1}{3}$.

![Tape Diagram and Number Line]

b. Use the models above to explain why $5 \times \frac{2}{3} = 10 \times \frac{1}{3}$.

2. Fill in the circles below with $<$, $=$, or $>$ to make true number sentences. Use decomposition or multiplication to justify your answer.

   a. $7 \quad \boxed{\quad} \quad \frac{43}{6}$

   b. $11 \frac{1}{3} \quad \boxed{\quad} \quad \frac{34}{3}$

   c. $\frac{13}{6} \quad \boxed{\quad} \quad \frac{38}{12}$
3. Generate a pattern of at least 13 fractions by adding \( \frac{4}{3} \) to \( \frac{1}{3} \) and then continuing to add \( \frac{4}{3} \) to each fraction. Circle each fraction equal to a whole number. Write what you notice about the pattern of whole numbers. The first two fractions are written for you.

\[
\frac{1}{3} \quad \frac{5}{3} \\
\frac{7}{3} 
\]

4. Find each sum or difference.

a. \( \frac{6}{10} + \frac{7}{10} \)

b. \( \frac{3}{8} + \frac{5}{8} + \frac{7}{8} \)

c. \( \frac{1}{12} - \frac{4}{12} \)

d. \( \frac{5}{5} - \frac{3}{5} \)
5. a. Rewrite \(3 \times \frac{6}{8}\) as the product of a unit fraction and a whole number. Solve.

b. Rewrite \(4 \times 6\frac{2}{3}\) as the product of a unit fraction and a whole number. Solve.

6. Determine if the following are true or false. Explain how you know using models or words. Make false problems true by rewriting the right side of the number sentence.

   a. \(7\frac{1}{3} = 7 + \frac{1}{3}\)  
   b. \(\frac{5}{3} = \frac{3}{3} + \frac{2}{3}\)

   c. \(\frac{13}{6} - \frac{5}{6} = \frac{13 - 5}{6}\)  
   d. \(\frac{11}{3} = 11 + \frac{1}{3}\)

   e. \(\frac{7}{8} + \frac{7}{8} + \frac{7}{8} + \frac{7}{8} = 4 \times \frac{7}{8}\)  
   f. \(5 \times 3\frac{3}{4} = 15 + \frac{3}{4}\)
7. The chart to the right shows data Amashi collected about butterfly wingspans.

   a. At the bottom of this page, create a line plot to display the data in the table.

   b. What is the difference in wingspan between the widest and narrowest butterflies on the chart?

   c. Three butterflies have the same wingspan. Explain how you know the measurements are equal.

<table>
<thead>
<tr>
<th>Butterfly</th>
<th>Wingspan (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monarch</td>
<td>7 7/8</td>
</tr>
<tr>
<td>Milbert’s Tortoiseshell</td>
<td>5 2/8</td>
</tr>
<tr>
<td>Zebra Swallowtail</td>
<td>1 1/2</td>
</tr>
<tr>
<td>Viceroy</td>
<td>6 2/8</td>
</tr>
<tr>
<td>Postman</td>
<td>3 3/8</td>
</tr>
<tr>
<td>Purple Spotted Swallowtail</td>
<td>2 2/8</td>
</tr>
<tr>
<td>Julia</td>
<td>3 3/4</td>
</tr>
<tr>
<td>Southern Dogface</td>
<td>2 3/8</td>
</tr>
<tr>
<td>Tiger Swallowtail</td>
<td>1 1/2</td>
</tr>
<tr>
<td>Regal Fritillary</td>
<td>3 4/8</td>
</tr>
</tbody>
</table>
Solve each problem. Draw a model, write an equation, and write a statement for each.

d. Amashi wants to display a Postman and Viceroy side-by-side in a photo box with width of 6 inches. Will these two butterflies fit? Explain how you know.

e. Compare the wingspan of the Milbert’s Tortoiseshell and the Zebra Swallowtail using >, <, or =.

f. The Queen Alexandra Birdwing can have a wingspan that is 5 times as wide as the Southern Dogface’s. How many inches can the Birdwing’s wingspan be?

g. Amashi discovered a pattern. She started with $2\frac{7}{8}$ inches and added $\frac{1}{8}$ inch to each measurement. List the next four measurements in her pattern. Name the five butterflies whose wingspans match the measurements in her pattern.
### End-of-Module Assessment Task Standards Addressed

<table>
<thead>
<tr>
<th>Standards Addressed</th>
<th>Topics A–H</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Generate and analyze patterns.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4.OA.5</strong> Generate a number or shape pattern that follows a given rule. Identify</td>
<td></td>
</tr>
<tr>
<td>apparent features of the pattern that were not explicit in the rule itself. For</td>
<td></td>
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<tr>
<td>example, given the rule “Add 3” and the starting number 1, generate terms in</td>
<td></td>
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<tr>
<td>the resulting sequence and observe that the terms appear to alternate between odd</td>
<td></td>
</tr>
<tr>
<td>and even numbers. Explain informally why the numbers will continue to alternate</td>
<td></td>
</tr>
<tr>
<td>in this way.</td>
<td></td>
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<tr>
<td><strong>Extend understanding of fraction equivalence and ordering.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4.NF.1</strong> Explain why a fraction (\frac{a}{b}) is equivalent to a fraction</td>
<td></td>
</tr>
<tr>
<td>((n \times a)/(n \times b)) by using visual fraction models, with attention to</td>
<td></td>
</tr>
<tr>
<td>how the number and size of the parts differ even though the two fractions</td>
<td></td>
</tr>
<tr>
<td>themselves are the same size. Use this principle to recognize and generate</td>
<td></td>
</tr>
<tr>
<td>equivalent fractions.</td>
<td></td>
</tr>
<tr>
<td><strong>4.NF.2</strong> Compare two fractions with different numerators and different</td>
<td></td>
</tr>
<tr>
<td>denominators, e.g., by creating common denominators or numerators, or by</td>
<td></td>
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<tr>
<td>comparing to a benchmark fraction such as 1/2. Recognize that comparisons are</td>
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<tr>
<td>valid only when the two fractions refer to the same whole. Record the results of</td>
<td></td>
</tr>
<tr>
<td>comparisons with symbols &gt;, =, or &lt;, and justify the conclusions, e.g., by using a</td>
<td></td>
</tr>
<tr>
<td>visual fraction model.</td>
<td></td>
</tr>
<tr>
<td>**Build fractions from unit fractions by applying and extending previous</td>
<td></td>
</tr>
<tr>
<td>understanding of operations of whole numbers.</td>
<td></td>
</tr>
<tr>
<td><strong>4.NF.3</strong> Understand a fraction (\frac{a}{b}) with (a &gt; 1) as a sum of</td>
<td></td>
</tr>
<tr>
<td>fractions (\frac{1}{b}).</td>
<td></td>
</tr>
<tr>
<td>a. Understand addition and subtraction of fractions as joining and separating</td>
<td></td>
</tr>
<tr>
<td>parts referring to the same whole.</td>
<td></td>
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<tr>
<td>b. Decompose a fraction into a sum of fractions with the same denominator in</td>
<td></td>
</tr>
<tr>
<td>more than one way, recording each decomposition by an equation. Justify</td>
<td></td>
</tr>
<tr>
<td>decompositions, e.g., by using a visual fraction model. Examples: 3/8 = 1/8 +</td>
<td></td>
</tr>
<tr>
<td>1/8 + 1/8; 3/8 = 1/8 + 2/8; 2 1/8 = 1 + 1 + 1/8 = 8/8 + 8/8 + 1/8.</td>
<td></td>
</tr>
<tr>
<td>c. Add and subtract mixed numbers with like denominators, e.g., by replacing</td>
<td></td>
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<tr>
<td>each mixed number with an equivalent fraction, and/or by using properties of</td>
<td></td>
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<tr>
<td>operations and the relationship between addition and subtraction.</td>
<td></td>
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<tr>
<td>d. Solve word problems involving addition and subtraction of fractions referring</td>
<td></td>
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<tr>
<td>to the same whole and having like denominators, e.g., by using visual fraction</td>
<td></td>
</tr>
<tr>
<td>models and equations to represent the problem.</td>
<td></td>
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<tr>
<td><strong>4.NF.4</strong> Apply and extend previous understandings of multiplication to</td>
<td></td>
</tr>
<tr>
<td>multiply a fraction by a whole number.</td>
<td></td>
</tr>
<tr>
<td>a. Understand a fraction (\frac{a}{b}) as a multiple of (\frac{1}{b}). For</td>
<td></td>
</tr>
<tr>
<td>example, use a visual fraction model to represent 5/4 as the product 5 (\times)</td>
<td></td>
</tr>
<tr>
<td>(1/4), recording the conclusion by the equation 5/4 = 5 (\times) (1/4).</td>
<td></td>
</tr>
</tbody>
</table>
Learning Resources
CoSer 501
Educational Media

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