

Improper Fractions and Mixed Numbers

Name _____

A mixed number combines a whole number with a fraction. It is greater than one.

An improper fraction has a numerator that is larger than its denominator.

How to Write an Improper Fraction as a Mixed Number

Write $\frac{12}{5}$ as a mixed number.

Divide the numerator by the denominator.

$$\begin{array}{r} 2 \\ 5 \overline{)12} \\ \underline{10} \\ 2 \end{array}$$

The quotient is the whole number in the mixed number.

The remainder is the numerator. The denominator stays the same.

$$\frac{12}{5} = 2\frac{2}{5}$$

How to Write a Mixed Number as an Improper Fraction

Multiply the denominator by the whole number.

$$3\frac{3}{5} \times 5$$

$$5 \times 3 = 15$$

Then add the numerator. $15 + 2 = 17$

Write this number for the numerator. $\rightarrow \frac{17}{5}$

Use the original denominator. $\rightarrow \frac{5}{5}$

$$3\frac{3}{5} = \frac{17}{5}$$

1. Draw a picture to show $4\frac{2}{3}$.

For 2-4, write each improper fraction as a whole number or mixed number in simplest form.

2. $\frac{20}{30}$ _____

3. $\frac{20}{66}$ _____

4. $\frac{14}{24}$ _____

Write each mixed number as an improper fraction.

5. $4\frac{1}{3}$ _____

6. $1\frac{20}{50}$ _____

7. $8\frac{7}{8}$ _____

8. Write 6 as an improper fraction with a denominator of 10.

Improper Fractions and Mixed Numbers

Name _____

Practice
10-1

1. Draw a picture to show $\frac{6}{8}$.
2. Draw a picture to show $3\frac{6}{5}$.

Write each improper fraction as a whole number or mixed number in simplest form.

3. $\frac{30}{6}$ _____

4. $\frac{9}{47}$ _____

5. $\frac{52}{7}$ _____

Write each mixed number as an improper fraction.

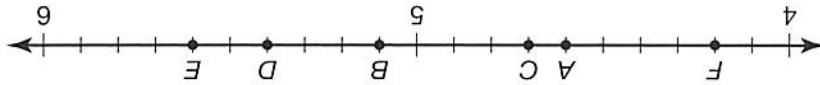
6. $4\frac{4}{5}$ _____

7. $13\frac{4}{3}$ _____

8. $9\frac{5}{8}$ _____

9. Write 8 as an improper fraction with a denominator of 4.

Which letter on the number line corresponds to each number?



10. $\frac{5}{27}$ _____

11. $4\frac{10}{7}$ _____

12. $4\frac{3}{5}$ _____

13. Which number does the model represent?



A $\frac{8}{12}$

B $2\frac{8}{8}$

C $2\frac{7}{4}$

D $\frac{8}{20}$

14. Can you express $\frac{6}{9}$ as a mixed number? Why or why not?

Estimating Sums and Differences of Mixed Numbers

Name _____

You can use rounding to estimate sums and differences of fractions and mixed numbers.

How to round fractions:

If the fractional part is greater than or equal to $\frac{1}{2}$, round up to the next whole number.

Example: Round $3\frac{2}{5}$ to the nearest whole number.

$\frac{2}{5}$ is greater than $\frac{1}{2}$, so $3\frac{2}{5}$ rounds up to 4.

If the fractional part is less than $\frac{1}{2}$, drop the fraction and use the whole number you already have.

Example: Round $6\frac{3}{4}$ to the nearest whole number.

$\frac{3}{4}$ is less than $\frac{1}{2}$, so drop $\frac{3}{4}$ and round down to 6.

How to estimate sums and differences of fractions and mixed numbers:

Round both numbers to the nearest whole number. Then add or subtract.

Example: Estimate $4\frac{1}{8} + 7\frac{2}{3}$.

$4\frac{1}{8}$ rounds down to 4.

$7\frac{2}{3}$ rounds up to 8.

$$4 + 8 = 12$$

So, $4\frac{1}{8} + 7\frac{2}{3}$ is about 12.

Round to the nearest whole number.

- | | | | |
|---------------------|-------|----------------------|-------|
| 1. $8\frac{6}{5}$ | _____ | 2. $13\frac{9}{8}$ | _____ |
| 4. $7\frac{81}{40}$ | _____ | 5. $29\frac{5}{4}$ | _____ |
| 7. $19\frac{34}{3}$ | _____ | 8. $63\frac{41}{49}$ | _____ |

Estimate each sum or difference.

- | | | | |
|---|-------|---|-------|
| 9. $7\frac{1}{9} + 8\frac{5}{9}$ | _____ | 11. $2\frac{1}{4} + 5\frac{2}{1} + 10\frac{4}{3}$ | _____ |
| 13. $9 + 3\frac{14}{11} + 5\frac{1}{9}$ | _____ | 12. $11\frac{5}{3} - 4\frac{1}{12}$ | _____ |
| 10. $14\frac{8}{5} - 3\frac{10}{7}$ | _____ | 14. $15\frac{7}{7} - 12\frac{2}{10}$ | _____ |

Estimating Sums and Differences of Mixed Numbers

Name _____

Round to the nearest whole number.

Estimate each sum or difference.

1. $3\frac{3}{8}$ _____

2. $6\frac{11}{5}$ _____

3. $1\frac{11}{20}$ _____

4. $12\frac{6}{13}$ _____

7. $5\frac{13}{5} + 8\frac{3}{5}$ _____

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

8. $11 - 6\frac{7}{3} + 2\frac{2}{5}$ _____

6. $5\frac{6}{9} - 1\frac{4}{3}$ _____

Robert and May are competing in a track meet. The table at the right shows the results of their events.

9. Robert says his better jump was about 1 ft longer than May's better jump. Is he correct?

| Participant | Event | Results/Distance |
|-------------|----------------|--|
| Robert | Long jump | $1.6\frac{12}{5}$ ft $2.5\frac{2}{3}$ ft |
| | Softball throw | $62\frac{1}{5}$ ft |
| May | Long jump | $1.4\frac{2}{3}$ ft $2.4\frac{3}{4}$ ft |
| | Softball throw | $71\frac{8}{8}$ ft |

10. Use the table above. If the school record for the softball throw is 78 ft, about how much farther must Robert throw the ball to match the record?

- A 15 ft B 16 ft C 18 ft D 20 ft

11. Consider the sum of $\frac{5}{3} + \frac{4}{3}$. Round each fraction and estimate the sum. Add the two fractions using a common denominator and then round the result. Which estimate is closer to the actual answer?

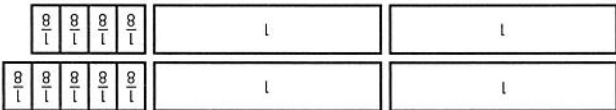
Modeling Addition and

Subtraction of Mixed Numbers

Example 1: Draw a model to add $2\frac{5}{8} + 2\frac{1}{2}$.

Step 1 Rename the fractions as equivalent fractions with like denominators. $2\frac{1}{2} = 2\frac{4}{8}$

Model each mixed number using fraction strips.



Step 2 Add the fractions. Regroup if you can.

$$\begin{array}{r} 2\frac{5}{8} \\ + 2\frac{4}{8} \\ \hline 4\frac{9}{8} = 4\frac{1}{8} \end{array}$$

Step 3 Add the whole

numbers to the regrouped fractions. Write the sum.

Simplify, if possible.

So, $2\frac{5}{8} + 2\frac{4}{8} = 4\frac{1}{8}$.

Example 2: Draw a model to subtract $2\frac{1}{6} - 1\frac{10}{6}$.

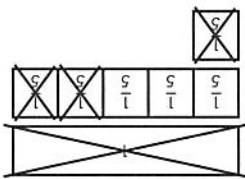
Step 1 Rename the fractions as equivalent fractions with like denominators. $1\frac{10}{6} = 1\frac{5}{3}$ Model the number

you are subtracting from, $2\frac{1}{3}$.



Express the part of the model that is not crossed out as a fraction

or mixed number. So, $2\frac{1}{3} - 1\frac{10}{6} = \frac{5}{6}$.



Step 2 Rename $2\frac{1}{3}$ as $1\frac{2}{3}$. Cross out one whole and $\frac{5}{6}$ to show subtracting $1\frac{5}{6}$.

1. $3\frac{2}{3} + 1\frac{4}{3}$
2. $5\frac{3}{3} + 4\frac{7}{8}$
3. $6\frac{4}{4} + 1\frac{3}{2}$
4. $8\frac{4}{3} + 1\frac{5}{6}$
5. $5\frac{3}{3} - 4\frac{7}{8}$
6. $6 - 2\frac{2}{3}$
7. $4\frac{6}{5} - 2\frac{12}{11}$
8. $8\frac{4}{3} - 2\frac{1}{6}$

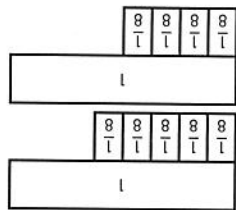
Name _____

Modeling Addition and

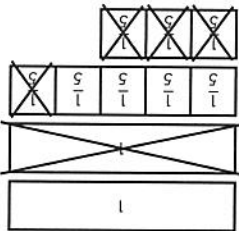
Subtraction of Mixed Numbers

For 1 and 2, use each model to find each sum or difference. Rename the fractions as equivalent fractions with like denominators.

1. $1\frac{8}{5} + 1\frac{2}{2} = 1\frac{1}{4} = 1\frac{2}{8}$



2. $3\frac{3}{5} - 1\frac{8}{10} = 1\frac{10}{10} = 1\frac{1}{5}$



Use fraction strips to find each sum or difference. Simplify, if possible.

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

11. Isabella's rain gauge showed $3\frac{5}{4}$ centimeters (cm) last Tuesday. This Tuesday, the rain gauge showed $5\frac{10}{7}$ centimeters. How many more centimeters of rain fell during the week?

- A $9\frac{2}{1}$ cm B $8\frac{2}{1}$ cm C $2\frac{5}{4}$ cm D $1\frac{10}{9}$ cm

12. You are adding $6\frac{7}{4} + 3\frac{2}{3}$ using fraction strips. Explain how you rename the fraction part of the sum.

Adding Mixed Numbers

10-4
Reteaching

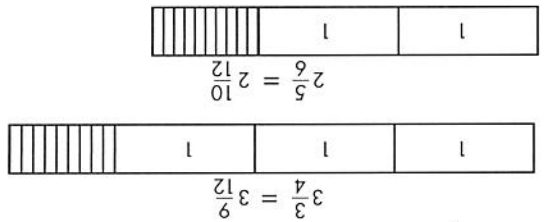
Randy talks on the telephone for $2\frac{6}{5}$ hours, and then surfs the Internet for $3\frac{4}{3}$ hours. How many hours does he spend on the two activities?

Step 1. Write equivalent fractions

with the least common denominator.

You can use fraction strips to show

the equivalent fractions.



Step 2. Add the fraction part of the mixed number first. Then add the whole numbers.

$$\frac{9}{10} + \frac{12}{10} = \frac{21}{10}$$

$$\frac{19}{12} + 5 = 5\frac{19}{12}$$

$$3 + 2 = 5$$

Step 3. Simplify the sum if possible.

$$5\frac{19}{12} = 6\frac{7}{12} \text{ hours}$$

$$\text{So, } 2\frac{6}{5} + 3\frac{4}{3} = 6\frac{7}{12}$$

In 1 through 6, find each sum. Simplify if possible.

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

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

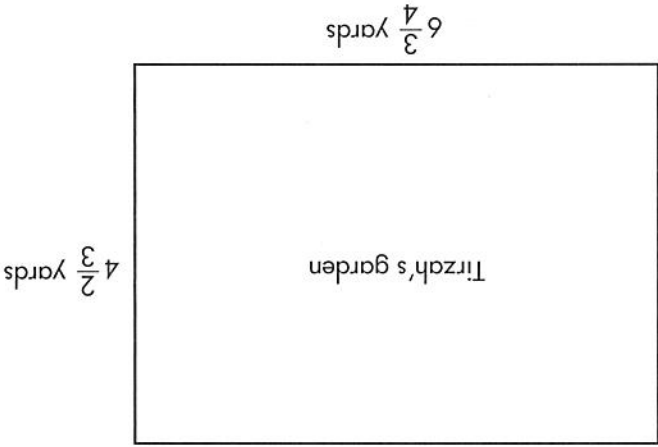
3. $5\frac{5}{2} + 4\frac{1}{2}$

4. $10\frac{1}{1} + \frac{6}{7} =$ _____

5. $3\frac{4}{1} + 6\frac{3}{3} =$ _____

6. $1\frac{7}{5} + 3\frac{2}{2} =$ _____

7. Tirzah wants to put a fence around her garden. She has 22 yards of fence material. Does she have enough to go all the way around the garden?



12. Can the sum of two mixed numbers be equal to 2? Explain why or why not.

- A** Estimated > actual
B Actual = estimated
C Actual > estimated
D Estimated > actual

11. Which is a good comparison of the estimated sum and the actual sum of $7\frac{8}{11} + 2\frac{12}{12}$?

10. What is the sum of the measures of an average man's brain and an average woman's brain in kilograms?

9. What is the total weight of an average woman's brain and heart in pounds (lb)?

| | | |
|-----------------------|--------------------|-------------------|
| Average woman's brain | $1\frac{10}{3}$ kg | $2\frac{5}{4}$ lb |
| Average man's brain | $1\frac{5}{2}$ kg | 3 lb |
| Average human heart | $\frac{3}{10}$ kg | $\frac{7}{10}$ lb |

Vital Organ Measures

8. What is the total measure of an average man's brain and heart in kilograms (kg)?

7. Write two mixed numbers that have a sum of 3.

1. $7\frac{2}{3} + 8\frac{5}{6}$ _____
2. $4\frac{4}{3} + 2\frac{5}{5}$ _____
3. $11\frac{10}{9} + 3\frac{1}{20}$ _____
4. $7\frac{7}{6} + 5\frac{7}{2}$ _____
5. $5\frac{8}{9} + 3\frac{1}{2}$ _____
6. $21\frac{12}{11} + 17\frac{2}{3}$ _____

In 1 through 6, find each sum. Simplify, if possible. Estimate for reasonableness.

Adding Mixed Numbers

Name _____

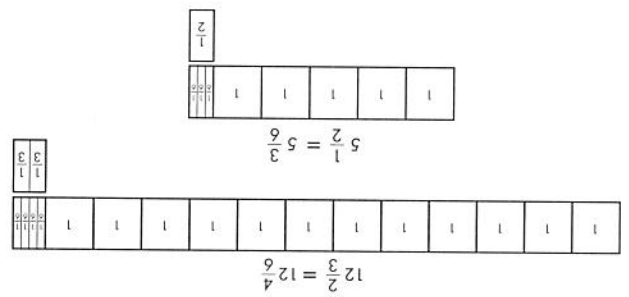
Subtracting Mixed Numbers

Reteaching
10-5

Name _____

The Plainville Zoo has had elephants for $12\frac{3}{4}$ years. The zoo has had zebras for $5\frac{1}{2}$ years. How many years longer has the zoo had elephants?

Step 1: Write equivalent fractions with the least common denominator. You can use fraction strips.



Step 2: Find the difference of $12\frac{6}{8} - 5\frac{4}{8}$. Subtract the fractions. Then subtract the whole numbers. Simplify the difference if possible.

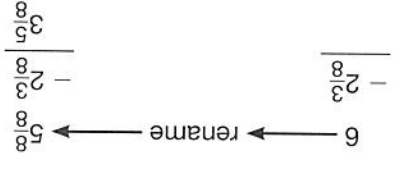
$$12 - 5 = 7$$

$$4 - 3 = 1$$

$$6 - 4 = 2$$

So, $12\frac{3}{4} - 5\frac{1}{2} = 7\frac{2}{8}$ years.

Example 2: Sometimes you may have to rename a fraction so you can subtract. Find the difference of $6 - 2\frac{3}{8}$.



For 1 through 4, find each difference. Simplify, if possible. Remember: You may have to rename a fraction in order to subtract.

1. $4\frac{5}{3} - 2\frac{1}{3}$
2. $5\frac{7}{6} - 1\frac{1}{2}$
3. $3 - 1\frac{3}{4}$
4. $6\frac{6}{5} - 5\frac{1}{2}$

5. To find the difference of $7 - 3\frac{12}{5}$, how do you rename the 7?

6. Robyn ran $5\frac{4}{4}$ miles last week. She ran $4\frac{10}{10}$ miles this week. How many more miles did she run last week?

Name _____

Subtracting Mixed Numbers

For 1 through 10, find each difference. Simplify, if possible.

1. $10\frac{3}{4} - 7\frac{1}{4}$

2. $7\frac{7}{3} - 2\frac{2}{8}$

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

4. $17\frac{7}{8} - 12\frac{3}{12}$

5. $9\frac{5}{9} - 6\frac{6}{5}$

7. $6\frac{1}{4} - 3\frac{3}{3}$

9. $8\frac{7}{2} - 7\frac{1}{3}$

6. $4\frac{3}{4} - 2\frac{2}{3}$

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

10. $2\frac{10}{9} - 2\frac{1}{3}$

The table shows the length and width of several kinds of bird eggs.

11. How much longer is the Canada goose egg than the raven egg?

12. How much wider is the turtledove egg than the robin egg?

| Bird | Length | Width |
|--------------|-----------------|-----------------|
| Canada goose | $3\frac{5}{2}$ | $2\frac{10}{3}$ |
| Robin | $\frac{4}{3}$ | $\frac{5}{3}$ |
| Turtledove | $1\frac{1}{5}$ | $\frac{10}{9}$ |
| Raven | $1\frac{10}{9}$ | $1\frac{3}{10}$ |

13. Which is the difference of $21\frac{16}{15} - 18\frac{4}{4}$?

- A $2\frac{16}{7}$ B $2\frac{16}{9}$ C $3\frac{16}{3}$ D $3\frac{16}{9}$

14. Explain why it is necessary to rename $4\frac{4}{4}$ if you subtract $\frac{4}{3}$ from it.

Problem Solving: Draw a Picture and Write an Equation

Name _____

A jeweler has a strand of gold wire that is $1\frac{3}{8}$ inches. He cuts $\frac{3}{4}$ of an inch of wire to make a loop. How long is the remaining piece of wire?

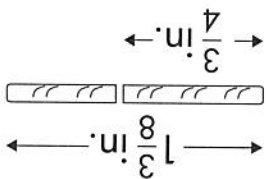
Read and Understand

What do you know?

What are you trying to find?

Plan and Solve

Draw a picture for what you know.



$$1\frac{3}{8} - \frac{3}{4} = x$$

$$1\frac{3}{8} - \frac{6}{8} - \frac{6}{8} = \frac{8}{8} - \frac{6}{8} = \frac{2}{8}$$

The remaining wire is $\frac{2}{8}$ inch long.

Look Back and Check

Is your answer correct?

$$\text{Yes, } \frac{2}{8} + \frac{6}{8} = \frac{8}{8} = 1 = 1\frac{3}{8}$$

From his house, Jason rode his bike $1\frac{3}{8}$ miles to the post office. He then rode in the same direction to the park, which is $\frac{3}{4}$ of a mile from the post office. How far did Jason ride?

1. To the right, draw a picture to represent the problem to be solved. Let x = the distance Jason rode from his house to the park.

2. Write an equation that represents this distance. Then solve for x .

Name _____

Problem Solving: Draw a Picture and Write an Equation

Draw a picture and write an equation. Then solve.

1. Mr. Flanders drives $1\frac{3}{4}$ miles to school and $1\frac{2}{3}$ miles home each day. He also drives an extra $2\frac{7}{8}$ miles to go to the gym. How many miles does he drive in one day?

2. Alison is making a 16-inch necklace. The first $4\frac{1}{4}$ inches are filled with red beads and $8\frac{3}{8}$ inches are filled with blue beads. The rest has white beads. How many inches are filled with white beads?

3. Stewart draws a triangle, and each side is $2\frac{6}{11}$ inches long. Judith draws a square, and each side is $1\frac{8}{5}$ inches long. Which figure has the greater perimeter, the triangle or the square?

4. Cristoff practices playing his guitar for $1\frac{1}{2}$ hours each weekday. He practices this amount of time plus an additional $1\frac{2}{3}$ hours on Sundays. Let $x =$ the number of hours Cristoff practices on Sundays. Draw a picture and write an equation and solve to find the number of hours he practices on Sundays.

5. Which of these fractions, when added to $2\frac{1}{3}$, will give you a sum greater than six?

A $3\frac{1}{2}$ B $3\frac{12}{5}$ C $3\frac{12}{7}$ D $3\frac{4}{4}$

6. Dennis says that $1\frac{1}{2}$, $1\frac{2}{4}$, and $1\frac{6}{8}$ are all equivalent. Is he correct? Draw a picture and explain your answer.
