## Subtract Mixed Numbers <br> 

After Lucy worked on her art project, she had $2 \frac{3}{4}$ jars of paint left. Later, she used $1 \frac{1}{4}$ jars of paint to finish her painting. How much paint is left now?

## Discuss the Math

## How do you subtract mixed numbers?

## Example 1: Subtract Mixed Numbers With Like Denominators

Subtract. Write the answer in lowest terms.
$2 \frac{3}{4}-1 \frac{1}{4}$

## Solution

## Method 1: Use Fraction Strips

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

$\square$ $\square 1 \quad 1$

[^0]
$\qquad$
$\qquad$

There are now $1 \frac{2}{4}$ fraction strips.


Write the answer in lowest terms.

$$
1 \frac{2}{4}=1 \frac{1}{2}
$$



## Method 2: Use a Subtraction Statement

Subtract the whole numbers.

$$
2-1=1
$$

Subtract the fractions.

$$
\frac{3}{4}-\frac{1}{4}=\frac{2}{4}
$$

$$
2 \frac{3}{4}-1 \frac{1}{4}=1 \frac{2}{4} \circ \circ \circ \bigcirc \bigcirc \bigcirc
$$

Write the answer in lowest terms.

$$
1 \frac{2}{4}=1 \frac{1}{2}
$$

Check: $\mathbb{N}^{\oplus}$.
$2 \frac{3}{4}-1 \frac{1}{4} \approx 3-1$
$3-1=2$
$1 \frac{1}{2}$ is close to the estimate of 2 .
The answer is reasonable.

## Show You Know

Subtract. Write each answer in lowest terms.
a) $2 \frac{2}{3}-1 \frac{1}{3}$
b) $3 \frac{7}{8}-1 \frac{3}{8}$
c) $4 \frac{3}{4}-\frac{1}{4}$

Refer to page xvii.

[^1]
## Example 2: Subtract Mixed Numbers With Unlike Denominators

Subtract.
$3 \frac{3}{8}-1 \frac{1}{2}$

## Solution

Method 1: Use Fraction Strips


To subtract $\frac{3}{8}$ and $\frac{1}{2}$, you need to use parts that are the same size.


You cannot subtract $\frac{4}{8}$ from $\frac{3}{8}$.
Take 1 whole strip from $3 \frac{3}{8}$ and make it the equivalent fraction $\frac{8}{8}$.
$\qquad$
Subtract.


There are $1 \frac{7}{8}$ strips left.
$3 \frac{3}{8}-1 \frac{1}{2}=1 \frac{7}{8}$

## Method 2: Use a Subtraction Statement and Regroup

Use multiples to determine a common denominator.
Multiples of 2 are $2,4,6,8, \ldots$
Multiples of 8 are (8, $16, \ldots$
Use 8 as a common denominator.
$3 \frac{3}{8}-1 \frac{1}{2}=3 \frac{3}{8}-1 \frac{4}{8}$
You cannot subtract $\frac{4}{8}$ from $\frac{3}{8}$. You need to regroup.

Regroup 1 whole from $3 \frac{3}{8}$.

$$
\begin{aligned}
3 \frac{3}{8} & =2+\frac{8}{8}+\frac{3}{8} \\
& =2 \frac{11}{8} \\
3 \frac{3}{8}-1 \frac{4}{8} & =2 \frac{11}{8}-1 \frac{4}{8} \\
& =1 \frac{7}{8}
\end{aligned}
$$

Subtract the whole numbers and subtract the fractions.
 $\bigcirc$


Method 3: Use a Subtraction Statement and Improper Fractions
Determine a common denominator.
$3 \frac{3}{8}-1 \frac{1}{2}=3 \frac{3}{8}-1 \frac{4}{8}$
You cannot subtract $\frac{4}{8}$ from $\frac{3}{8}$.
You can change to improper fractions.

$$
\begin{aligned}
& 3 \frac{3}{8}-1 \frac{4}{8}=\frac{27}{8}-\frac{12}{8} \quad \text { Subtract. } \\
& =\frac{15}{8} \\
& =1 \frac{7}{8} \circ \circ \bigcirc \bigcirc \bigcirc \bigcirc \bigcirc
\end{aligned}
$$



Check: $\mathrm{N}^{\mathrm{D}}$
$3 \frac{3}{8}-1 \frac{1}{2} \approx 3 \frac{1}{2}-1 \frac{1}{2}$
$3 \frac{1}{2}-1 \frac{1}{2}=2$
$1 \frac{7}{8}$ is a little less than the estimate of 2 . The answer is reasonable.

## Show You Know

Subtract. Write each answer in lowest terms.
a) $3 \frac{3}{8}-1 \frac{1}{2}$
b) $4 \frac{1}{4}-3 \frac{2}{5}$
c) $4 \frac{1}{4}-\frac{7}{8}$

## Did You Know?

Chinese fractions do not have a fraction bar. A symbol is used that represents the words "part of" or "parts of." $\frac{1}{2}$ is written or spoken as" 1 part of 2."

## Rey Ideas

- When subtracting mixed numbers with like denominators, you can
- subtract the whole numbers
- subtract the fractions
- When subtracting mixed numbers with unlike denominators, you can
- determine a common denominator for the fractions
- subtract the whole numbers
- subtract the fractions
- Sometimes, mixed numbers need to be regrouped or changed to improper fractions before subtracting.
Regroup Change to Improper Fractions

$$
\begin{array}{rlrl}
4 \frac{3}{8}-1 \frac{5}{8} & =3 \frac{11}{8}-1 \frac{5}{8} & 4 \frac{3}{8}-1 \frac{5}{8} & =\frac{35}{8}-\frac{13}{8} \\
& =2 \frac{6}{8} & & =\frac{22}{8} \\
& =2 \frac{3}{4} & & =2 \frac{6}{8} \\
& & =2 \frac{3}{4}
\end{array}
$$

- To check your answer, compare to an estimate.


## Communicate the Ideas

1. After Jack's party, $2 \frac{3}{4}$ bottles of pop were left. The next day, Jack's family drank $2 \frac{1}{4}$ bottles. How much pop is left now? Discuss with a partner how you would solve this problem.
2. a) What do you need to do before you can calculate $2 \frac{1}{6}-1 \frac{5}{12}$ ?
b) Determine the answer to $2 \frac{1}{6}-1 \frac{5}{12}$.
c) Use estimation to check your answer. What method did you use?
d) With a partner, compare how you calculated the answer to $2 \frac{1}{6}-1 \frac{5}{12}$. Then compare the method you used to check your answer.

## Practise

For help with \#3 to \#6, refer to Example 1 on pages 252-253.
3. For each set of fraction strips, write the subtraction statement.

4. Write a subtraction statement to represent each diagram.

5. Subtract. Write your answers in lowest terms. Check your answers
 using estimation.
a) $1 \frac{2}{5}-1 \frac{1}{5}$
b) $6 \frac{7}{8}-5 \frac{5}{8}$
c) $3 \frac{1}{4}-1 \frac{1}{4}$
d) $3 \frac{1}{12}-1 \frac{7}{12}$
e) $2 \frac{1}{6}-\frac{5}{6}$
f) $4-1 \frac{1}{7}$
6. Determine the difference. Write your answers in lowest terms.
a) $4 \frac{5}{9}-3 \frac{1}{9}$
b) $2 \frac{1}{3}-2 \frac{1}{3}$
c) $5 \frac{2}{5}-1 \frac{4}{5}$
d) $4 \frac{3}{10}-2 \frac{9}{10}$
e) $5-4 \frac{7}{12}$
f) $3 \frac{5}{8}-2 \frac{7}{8}$

For help with \#7 to \#10, refer to Example 2 on pages 254-255.
7. Write a subtraction statement for each set of fraction strips.
a)

b)

c)

8. For each diagram, write a subtraction statement.
a)

b)

c)

9. Subtract. Write your answers in lowest terms. Check your answers using estimation.
a) $6 \frac{7}{10}-3 \frac{2}{5}$
b) $4 \frac{1}{2}-\frac{1}{5}$
c) $7 \frac{7}{15}-3 \frac{1}{6}$
d) $5 \frac{5}{9}-2 \frac{2}{3}$
e) $1 \frac{4}{5}-1 \frac{2}{3}$
f) $2 \frac{3}{14}-\frac{6}{7}$
10. Determine the difference. Write your answers in lowest terms.
a) $3 \frac{2}{5}-1 \frac{3}{10}$
b) $1 \frac{1}{3}-1 \frac{1}{4}$
c) $7 \frac{5}{9}-5 \frac{1}{6}$
d) $4 \frac{1}{4}-2 \frac{5}{12}$
e) $3 \frac{1}{6}-\frac{3}{4}$
f) $2 \frac{3}{4}-1 \frac{4}{5}$

## Apply

11. Karen goes to swimming practice for $1 \frac{1}{3} \mathrm{~h}$ each day. In the morning she has $\frac{2}{3} \mathrm{~h}$ of practice. How many hours of practice does she have in the afternoon?
12. A large Thermos ${ }^{\mathrm{TM}}$ has enough water to fill $9 \frac{3}{4}$ water bottles for a team of soccer players. Halfway through practice, the players drink $4 \frac{1}{2}$ bottles of water. How much water is left for the rest of the practice?

13. It takes Ria $3 \frac{3}{4} \mathrm{~h}$ to complete the marathon. The race started $1 \frac{1}{2} \mathrm{~h}$ ago.
a) How much longer will Ria be running?
b) Check your answer using estimation.
14. A pie recipe calls for $3 \frac{1}{2}$ packages of Saskatoon berries. Julia has $1 \frac{1}{3}$ packages. How much more does she need? Include diagrams with your answer.
15. Mark and Lin race to see who can collect the most hockey cards. Mark has collected $5 \frac{1}{3}$ sets. Lin has collected $4 \frac{3}{4}$ sets. Who has collected more sets? How much more?
16. Alex has just completed $2 \frac{3}{4} \mathrm{~h}$ of a babysitting course. He must complete $13 \frac{1}{2} \mathrm{~h}$ to get his certificate.
a) How many more hours does he need?
b) Check your answer using estimation.
17. For gym class Ben ran $1 \frac{5}{12}$ laps. Mei ran $\frac{18}{12}$ laps. Who ran farther and by how much?
18. You can subtract a mixed number and an improper fraction. Determine each difference.
a) $3 \frac{3}{4}-\frac{3}{2}$
b) $2 \frac{7}{10}-\frac{6}{5}$
c) $5 \frac{1}{3}-\frac{7}{4}$
19. $1 \frac{3}{4}$ trays of dinner rolls are for sale in the bakery window. A customer comes and buys $\frac{5}{6}$ of a tray. How much is left? Include diagrams with your answer.

## Extend

20. Daniel spends $9 \frac{1}{2} \mathrm{~h}$ sleeping. He spends $6 \frac{1}{4} \mathrm{~h}$ at school.
a) How much more time does he spend sleeping than at school?
b) How much time does he spend at school and sleeping altogether?
c) How much time is left in the day to do other things?
21. Diana is allowed to use the computer for 3 h each weekend. She used it for $\frac{1}{2} \mathrm{~h}$ on Saturday morning, $1 \frac{1}{4} \mathrm{~h}$ on Saturday night, and $\frac{3}{4} \mathrm{~h}$ on Sunday morning.
a) For how much time can Diana use the computer on Sunday night?
b) Show how you would check your answer using estimation.
22. Bella uses 4.1 pieces of construction paper to make an art project. Shelly uses $3 \frac{1}{4}$ pieces. For each of the following questions, calculate your answer using only fractions. Then calculate using only decimals. Compare the answers.
a) How much more paper does Bella use?
b) How much paper do Bella and Shelly use in total?
23. There are 12 golf balls in a package. The Takeda family has $2 \frac{2}{3}$ packages. Cindy takes $\frac{1}{2}$ package, her dad takes 1 package, and her brother takes 4 golf balls.
a) What fraction of a package is left?
b) How many golf balls is this?


## MATH LINK

The Babylonian system of numbers was based on 60, not 10.
Babylonian fractions were expressed as numbers out of 60, e.g., $\frac{2}{60}, \frac{3}{60}, \frac{5}{60}, \frac{12}{60}$. Many things we use today come from the Babylonian times. Our clock is based on the number 60.

The time can be written as a fraction out of 60 min . For example, 9:10 a.m. $=9 \frac{10}{60}$. For a) to e) write your answers as fractions.
a) Write each time as a fraction out of 60 . 8:10 p.m. 9:20 a.m. 7:48 a.m. 12:12 p.m.
b) The time now is $2: 15 \mathrm{p} . \mathrm{m}$. What was the time 1 h and 12 min ago?
c) The time now is 4:30 p.m. What will be the time 2 h and 36 min from now?

d) Amanda studied for $\frac{1}{3}$ of an hour. She started studying at 9:15 a.m. At what time did she finish studying?
e) How much time passed between 1:07 p.m. and 3:42 p.m.? between 5:45 p.m. and 9:20 p.m.?
f) Sam started reading the newspaper at 9:45 a.m. and finished reading it in $\frac{7}{12} \mathrm{~h}$. Mila took $\frac{1}{4} \mathrm{~h}$ more to read the paper than Sam did. She started at 10:30 a.m. At what time did she finish reading the paper?


[^0]:    Subtract.
    Subtract.

[^1]:    

