Pg 299

Add and Subtract Mixed Numbers

🔊 What You'll Learn

MIXED FRACTIONS

Scan the lesson. List two real-world scenarios in which you would add or subtract mixed numbers.

- $2\frac{3}{4} = \boxed{\frac{4}{4}} + \boxed{\frac{4}{4}} + \frac{3}{4} = \frac{4+4+3}{4} = \frac{11}{4}$
- _____

🄴 Essential Question

WHAT happens when you add, subtract, multiply, and divide fractions?

CCSS Common Core State Standards

Content Standards
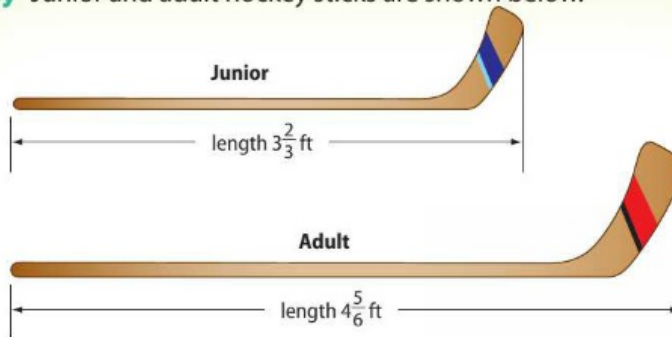7.NS.1, 7.NS.1d, 7.NS.3, 7.EE.3
Mathematical Practices
1, 3, 4

🔊 🌎 Real-World Link

Hockey Junior and adult hockey sticks are shown below.

Junior

length $3\frac{2}{3}$ ft

Adult

length $4\frac{5}{6}$ ft

1. Use the expression $4\frac{5}{6} - 3\frac{2}{3}$ to find how much longer the adult hockey stick is than the junior hockey stick.

   Rename the fractions using the LCD, 6.   Subtract the fractions. Then subtract the whole numbers.

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

   5-4

   4-3

   $\boxed{\frac{2}{2}} \cdot \frac{2}{3} = \frac{4}{6}$

2. Explain how to find $3\frac{7}{10} - 2\frac{2}{5}$. Then use your conjecture to find the difference.

   _____
   _____
   _____

Add and Subtract Mixed Numbers

To add or subtract mixed numbers, first add or subtract the fractions. If necessary, rename them using the LCD. Then add or subtract the whole numbers and simplify if necessary.

Sometimes when you subtract mixed numbers, the fraction in the first mixed number is less than the fraction in the second mixed number. In this case, rename one or both fractions in order to subtract.

Properties

$120\frac{1}{2} + 40\frac{1}{3}$ can be written as $(120 + \frac{1}{2}) + (40 + \frac{1}{3})$. Then the Commutative and Associative Properties can be used to reorder and regroup the numbers to find the sum.

Examples

Tutor

1. Find $7\frac{4}{9} + 10\frac{2}{9}$. Write in simplest form.

Estimate $7 + 10 = 17$

$$7\frac{4}{9}$$
$$+\ 10\frac{2}{9}$$

Add the whole numbers and fractions separately.

$$17\frac{6}{9} \text{ or } 17\frac{2}{3}$$ Simplify.

Check for Reasonableness $17\frac{2}{3} \approx 17$ ✔

2. Find $8\frac{5}{6} - 2\frac{1}{3}$. Write in simplest form.

Estimate $9 - 2 = 7$

$$8\frac{5}{6} \rightarrow 8\frac{5}{6}$$
$$-2\frac{1}{3} \rightarrow -2\frac{2}{6}$$

Rename the fraction using the LCD. Then subtract.

$$6\frac{3}{6} \text{ or } 6\frac{1}{2}$$ Simplify.

Check for Reasonableness $6\frac{1}{2} \approx 7$ ✔

Got It? Do these problems to find out.

Add or subtract. Write in simplest form.

a. $6\frac{1}{8} + 2\frac{5}{8}$ **b.** $5\frac{1}{5} + 2\frac{3}{10}$ **c.** $1\frac{5}{9} + 4\frac{1}{6}$

d. $5\frac{4}{5} - 1\frac{3}{10}$ **e.** $13\frac{7}{8} - 9\frac{3}{4}$ **f.** $8\frac{2}{3} - 2\frac{1}{2}$

Handwritten work:

a. $8\frac{6}{8} = 8\frac{3}{4}$ (Show your work)

c. $5\frac{13}{18}$

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

(a) $6\frac{1}{8}$
$+2\frac{5}{8}$
$8\frac{6}{8}$

(c) $1\frac{10}{18}$
$+4\frac{3}{18}$
$5\frac{13}{18}$
$\frac{2}{2} \cdot \frac{5}{9} = \frac{10}{18}$
$\frac{3}{3} \cdot \frac{1}{6} = \frac{3}{18}$

(e) $13\frac{7}{8}$
$-9\frac{6}{8}$
$4\frac{1}{8}$
$\frac{2}{2} \cdot \frac{3}{4} = \frac{6}{8}$
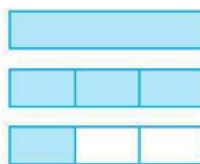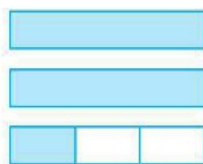
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Example

3. Find $2\frac{1}{3} - 1\frac{2}{3}$.

Method 1 Rename Mixed Numbers

Estimate $2 - 1\frac{1}{2} = \frac{1}{2}$

Since $\frac{1}{3}$ is less than $\frac{2}{3}$, rename $2\frac{1}{3}$ before subtracting.

Change 1 to $\frac{3}{3}$.

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

$2\frac{1}{3}$ → $1\frac{4}{3}$ Rename $2\frac{1}{3}$ as $1\frac{4}{3}$.

$-1\frac{2}{3}$ → $-1\frac{2}{3}$ Subtract the whole numbers and then the fractions.

$\dfrac{\phantom{-1\frac{2}{3}}}{\quad\frac{2}{3}}$

Check for Reasonableness $\frac{2}{3} \approx \frac{1}{2}$ ✔

Method 2 Write as Improper Fractions

$2\frac{1}{3}$ → $\frac{7}{3}$ Write $2\frac{1}{3}$ as $\frac{7}{3}$.

$-1\frac{2}{3}$ → $-\frac{5}{3}$ Write $1\frac{2}{3}$ as $\frac{5}{3}$.

$\dfrac{\phantom{-\frac{5}{3}}}{\quad\frac{2}{3}}$ Simplify.

So, $2\frac{1}{3} - 1\frac{2}{3} = \frac{2}{3}$.

Using either method, the answer is $\frac{2}{3}$.

Got It? Do these problems to find out.

Subtract. Write in simplest form.

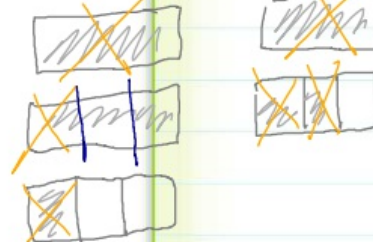**g.** $7 - 1\frac{1}{2}$ **h.** $5\frac{3}{8} - 4\frac{11}{12}$ **i.** $11\frac{2}{5} - 2\frac{3}{5}$

j. $8 - 3\frac{3}{4}$ **k.** $3\frac{1}{4} - 1\frac{3}{4}$ **l.** $16 - 5\frac{5}{6}$

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

Fractions Greater Than One

An improper fraction has a numerator that is greater than or equal to the denominator. Examples of improper fractions are $\frac{5}{4}$ and $2\frac{6}{5}$.

Show your work.

g. _____

h. _____

i. _____

j. _____

k. _____

l. _____

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Choose an Operation

Add or subtract unlike fractions to solve real-world problems.

Example

4. An urban planner is designing a skateboard park. The length of the skateboard park is $120\frac{1}{2}$ feet. The length of the parking lot is $40\frac{1}{3}$ feet. What will be the length of the park and the parking lot combined?

$$120\frac{1}{2} + 40\frac{1}{3} = 120\frac{3}{6} + 40\frac{2}{6}$$ Rename $\frac{1}{2}$ as $\frac{3}{6}$ and $\frac{1}{3}$ as $\frac{2}{6}$.

$$= 160 + \frac{5}{6}$$ Add the whole numbers and fractions separately.

$$= 160\frac{5}{6}$$ Simplify.

The total length is $160\frac{5}{6}$ feet.

Guided Practice

Add or subtract. Write in simplest form. (Examples 1–3)

1. $8\frac{1}{2} + 3\frac{4}{5} = $ _____

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

3. $11 - 6\frac{3}{8} = $ _____

4. A hybrid car's gas tank can hold $11\frac{9}{10}$ gallons of gasoline. It contains $8\frac{3}{4}$ gallons of gasoline. How much more gasoline is needed to fill the tank? (Example 4) _____

5. ⓔ **Building on the Essential Question** How can you subtract mixed numbers when the fraction in the first mixed number is less than the fraction in the second mixed number? _____

_____

_____

Rate Yourself!

How confident are you about adding and subtracting mixed numbers? Shade the ring on the target.

I'm on target.

I need help.

For more help, go online to access a Personal Tutor.

Independent Practice

eHelp

Add or subtract. Write in simplest form. (Examples 1–3)

1. $2\frac{1}{9} + 7\frac{4}{9} =$ _____

2. $8\frac{5}{12} + 11\frac{1}{4} =$ _____

3. $10\frac{4}{5} - 2\frac{1}{5} =$ _____

Show your work.

4. $9\frac{4}{5} - 2\frac{3}{10} =$ _____

5. $11\frac{3}{4} - 4\frac{1}{3} =$ _____

6. $9\frac{1}{5} - 2\frac{3}{5} =$ _____

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

8. $14\frac{1}{6} - 7\frac{1}{3} =$ _____

9. $8 - 3\frac{2}{3} =$ _____

CCSS Justify Conclusions For Exercises 10 and 11, choose an operation to solve. Explain your reasoning. Then solve the problem. Write your answer in simplest form. (Example 4)

10. If Juliana and Brody hiked both of the trails listed in the table, how far did they hike?

_____

Trail	Length (mi)
Woodland Park	$3\frac{2}{3}$
Mill Creek Way	$2\frac{5}{6}$

11. The length of Kasey's garden is $4\frac{5}{8}$ feet. Find the width of Kasey's garden if it is $2\frac{7}{8}$ feet shorter than the length.

_____

12. Karen wakes up at 6:00 A.M. It takes her $1\frac{1}{4}$ hours to shower, get dressed, and comb her hair. It takes her $\frac{1}{2}$ hour to eat breakfast, brush her teeth, and make her bed. At what time will she be ready for school? _____

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Add or subtract. Write in simplest form.

13. $-3\frac{1}{4} + (-1\frac{3}{4}) = $ _____

14. $\dfrac{3\frac{1}{2}}{5} + \dfrac{4\frac{2}{3}}{2} = $ _____

15. $6\frac{1}{3} + 1\frac{2}{3} + 5\frac{5}{9} = $ _____

16. $3\frac{1}{4} + 2\frac{5}{6} - 4\frac{1}{3} = $ _____

H.O.T. Problems Higher Order Thinking

17. **CCSS** **Model with Mathematics** Write a real-world problem that could be represented by the expression $5\frac{1}{2} - 3\frac{7}{8}$. Then solve your problem.

_____

_____

_____

_____

18. **CCSS** **Persevere with Problems** A string is cut in half. One of the halves is thrown away. One fifth of the remaining half is cut away and the piece left is 8 feet long. How long was the string initially? Justify your answer.

_____

_____

_____

19. **CCSS** **Model with Mathematics** Using three mixed numbers as side lengths, draw an equilateral triangle with a perimeter of $8\frac{1}{4}$ feet.

Show your work.

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Extra Practice

Add or subtract. Write in simplest form.

20. $6\frac{1}{4} - 2\frac{3}{4} =$ ___ $3\frac{1}{2}$

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

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

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

Homework Help

21. $8\frac{3}{8} + 10\frac{1}{3} =$ _____

22. $13 - 5\frac{5}{6} =$ _____

23. $3\frac{2}{7} + 4\frac{3}{7} =$ _____

24. $4\frac{3}{10} - 1\frac{3}{4} =$ _____

**25.** $12\frac{1}{2} - 6\frac{5}{8} =$ _____

CCSS Justify Conclusions Choose an operation to solve. Explain your reasoning. Then solve the problem. Write your answer in simplest form.

26. The length of Alana's hair was $9\frac{3}{4}$ inches. After her haircut, the length was $6\frac{1}{2}$ inches. How many inches did she have cut?

_____

27. Emeril used a total of $7\frac{1}{4}$ cups of flour to make three pastries. He used $2\frac{1}{4}$ cups of flour for the first and $2\frac{1}{3}$ cups for the second. How much flour did Emeril use for the third pastry?

_____

28. Margarite made the jewelry shown. If the necklace is $10\frac{5}{8}$ inches longer than the bracelet, how long is the necklace?

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

bracelet

necklace

_____
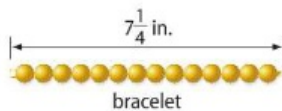
29. Find the perimeter of the figure. Write your answer in simplest form.

_____

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

$2\frac{3}{8}$ yd
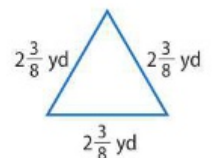
30. Suppose you want to place a shelf that is $30\frac{1}{3}$ inches long in the center of a wall that is $45\frac{3}{4}$ inches wide. About how far from each edge of the wall should you place the shelf? _____

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31. A recipe for snack mix calls for $4\frac{3}{4}$ cups of cereal. The amount of peanuts needed is $1\frac{2}{3}$ cups less than the amount of cereal needed. Complete each box below to make a true statement.

The recipe calls for [　　　] cups of peanuts. A total of

[　　　] cups of peanuts and cereal are needed in all.

32. Maria practiced the piano for $2\frac{1}{2}$ hours last week and $1\frac{3}{4}$ hours this week. Use the bar diagram sections to construct a bar diagram that represents how many hours Maria practiced in the past 2 weeks.

How many hours did Maria practice the piano in the past 2 weeks?

[　　　]

Common Core Spiral Review

Round each mixed number to its nearest whole number. Then estimate each product. 5.NF.4

33. $5\frac{1}{4} \times 7\frac{2}{3} \approx$ [　] $\times$ [　] $\approx$ [　]

34. $1\frac{1}{11} \times 8\frac{14}{15} \approx$ [　] $\times$ [　] $\approx$ [　]

35. Zoe's average running speed is about $6\frac{4}{5}$ miles per hour. Suppose Zoe runs for $1\frac{3}{4}$ hours. About how far will she have run? Explain. 5.NF.4

_____

_____

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