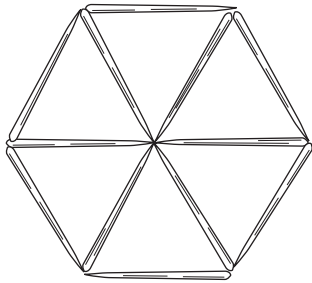# Operations with Fractions

Just for Fun

Toothpick Puzzle

Make this shape with 12 toothpicks:

Remove 4 toothpicks to leave 3 triangles.

Penny Puzzle

Arrange 10 pennies in this pattern:

Move 3 pennies to make this pattern:

Compose It!

A Game for 2 or more

Make as many words as you can from the letters of the word EQUIVALENT.
The person who makes the most words in 1 minute wins!

_____
_____

Activating Prior Knowledge

Equivalent Fractions
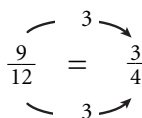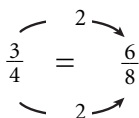
$\frac{1}{2}$, $\frac{2}{4}$, $\frac{3}{6}$, and $\frac{6}{12}$ are **equivalent fractions.**
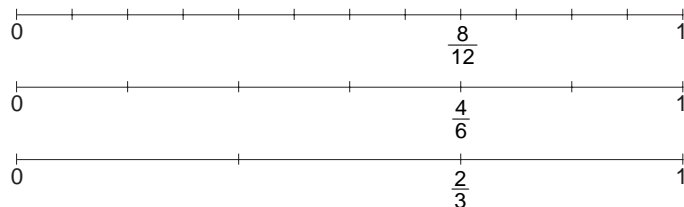
They name the same fractional parts.

$\frac{1}{2}$ ◆◆◆◆◆◆◆◇◇◇◇◇◇◇ ◆◆◆◆◇◇◇◇ $\frac{2}{4}$

$\frac{3}{6}$ ◆◆◆◆◇◇◇◇ ◆◆◆◆◆◇◇◇ $\frac{6}{12}$

➤ To find equivalent fractions, multiply or divide the numerator and denominator by the same number.

$$\frac{3}{4} = \frac{6}{8} \quad\text{(×2)} \qquad\qquad \frac{9}{12} = \frac{3}{4} \quad\text{(÷3)}$$

$\frac{6}{8}$ is equivalent to $\frac{3}{4}$. $\frac{3}{4}$ is equivalent to $\frac{9}{12}$.

So, $\frac{3}{4}$, $\frac{6}{8}$, and $\frac{9}{12}$ are all equivalent fractions.

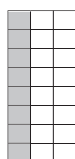➤ You can use number lines to find equivalent fractions.

$$\begin{array}{c} 0 \qquad\qquad \underset{\frac{8}{12}}{\quad} \qquad 1 \\ 0 \qquad\qquad \underset{\frac{4}{6}}{\quad} \qquad 1 \\ 0 \qquad\qquad \underset{\frac{2}{3}}{\quad} \qquad 1 \end{array}$$

$\frac{2}{3}$, $\frac{4}{6}$, and $\frac{8}{12}$ align vertically; they are equivalent fractions.
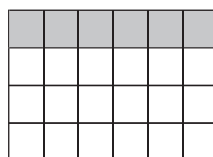
Check

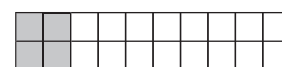**1.** Write 3 equivalent fractions to represent each shaded part.

a) _____

b) _____

c) _____

2. Write 3 equivalent fractions for each fraction.

a) $\frac{10}{8}$ _____

b) $\frac{2}{5}$ _____

c) $\frac{10}{60}$ _____

Relating Mixed Numbers and Improper Fractions

➤ This diagram models the **mixed number** $2\frac{3}{5}$:

The diagram shows 2 wholes and 3 fifths.
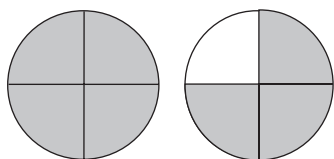Two wholes are the same as 10 fifths.
Ten-fifths and 3 fifths are 13 fifths.

$2\frac{3}{5} = \frac{10}{5} + \frac{3}{5} = \frac{13}{5}$

$\frac{13}{5}$ is an **improper fraction.**
It represents the same amount as $2\frac{3}{5}$.

➤ To write the improper fraction $\frac{7}{4}$ as a mixed number, picture 7 fourths.
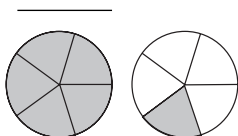
There are 4 fourths in 1 whole.

So, $\frac{7}{4}$ is 1 whole and 3 fourths.

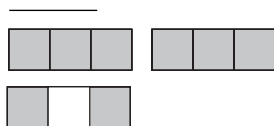So, $\frac{7}{4}$ is the same as $1\frac{3}{4}$.

Check

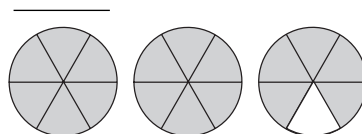**3.** Write an improper fraction and a mixed number to represent each diagram.

a) _____

b) _____

c) _____

4. Write each mixed number as an improper fraction.

a) $2\frac{3}{8}$ ___

b) $4\frac{1}{3}$ ___

c) $3\frac{4}{5}$ ___

5. Write each improper fraction as a mixed number.

a) $\frac{20}{9}$ ____

b) $\frac{18}{12}$ _____
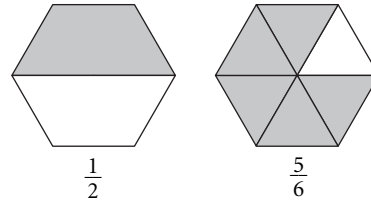
c) $\frac{20}{8}$ _____

Quick Review

At Home
At School

Here is one way to add $\frac{1}{2}$ and $\frac{5}{6}$.

Use Pattern Blocks.
The yellow hexagon represents one whole.

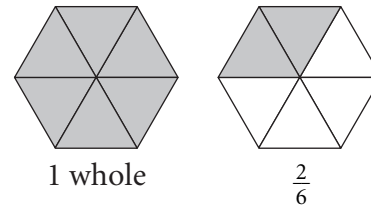➤ Model $\frac{1}{2}$ and $\frac{5}{6}$.

$\frac{1}{2}$ $\frac{5}{6}$

➤ Take 3 sixths from $\frac{5}{6}$.

Put $\frac{3}{6}$ with the $\frac{1}{2}$ to make 1 whole.

That leaves 2 sixths.

1 whole and 2 sixths equals 1 and 2 sixths,
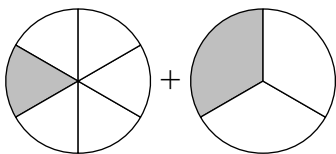or 1 and 1 third.

So, $\frac{1}{2} + \frac{5}{6} = 1\frac{2}{6}$
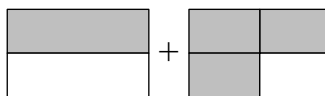
$= 1\frac{1}{3}$

1 whole $\frac{2}{6}$

Practice

1. Write an addition equation for the shaded part of each picture.
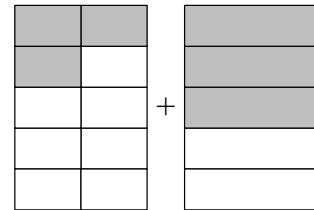
a) +

b) +

c) +

_____ _____ _____

2. Colour the Pattern Blocks to find each sum.

a)
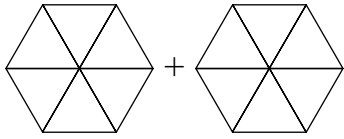
$\frac{2}{3} + \frac{1}{6} =$ _____
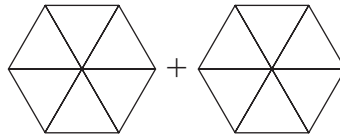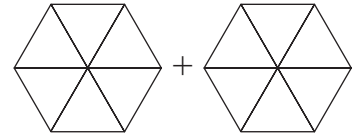
b)

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

c)

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

3. Add.

a) $\frac{4}{5} + \frac{1}{5} =$ _____

b) $\frac{1}{4} + \frac{2}{4} =$ _____

c) $\frac{1}{6} + \frac{4}{6} =$ _____

d) $\frac{3}{4} + \frac{3}{4} =$ _____

e) $\frac{3}{5} + \frac{4}{5} =$ _____

f) $\frac{3}{10} + \frac{6}{10} =$ _____

4. Divide and colour the shapes to find each sum.

a)

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

b)

$\frac{1}{3} + \frac{3}{6} =$ _____

c)
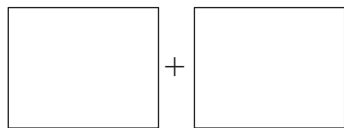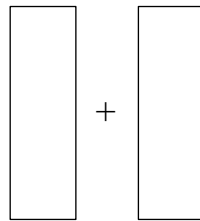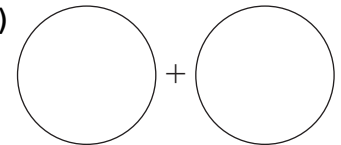
$\frac{3}{4} + \frac{1}{2} =$ _____

5. Draw a diagram to find each sum.

a) $\frac{1}{4} + \frac{5}{8} =$ _____

b) $\frac{1}{2} + \frac{1}{4} =$ _____

c) $\frac{1}{3} + \frac{5}{6} =$ _____

6. Divide and colour the circles to find each sum.

a) $\frac{1}{2} + \frac{2}{4} =$ ___

◯ + ◯

b) $\frac{1}{2} + \frac{1}{8} =$ ___

◯ + ◯

c) $\frac{1}{4} + \frac{1}{8} =$ ___

◯ + ◯

d) $\frac{3}{4} + \frac{1}{8} =$ ___

◯ + ◯
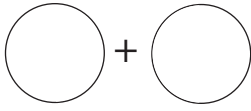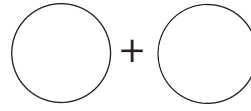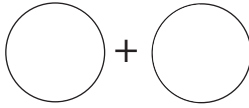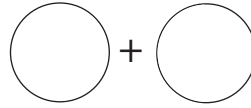
7. Draw pictures to show if each sum is greater than or less than 1.

a) $\frac{3}{4} + \frac{2}{4} =$ _____

b) $\frac{1}{2} + \frac{1}{2} =$ _____

c) $\frac{3}{8} + \frac{7}{8} =$ _____

d) $\frac{2}{5} + \frac{2}{5} =$ _____

8. During his first training session, Milo walked for 30 min and ran for 20 min.

a) How many minutes did Milo train the first day? _____

b) Use fractions of an hour.

Write an addition equation that represents Milo's training session. _____

9. Find as many pairs of fractions as you can that have a sum of 1.

_____

Quick Review

At Home
At School

There are many models that help you add fractions.

Circle models are useful when the sum of the fractions is less than 1.

Use fraction strips and a number line when the sum of the fractions is greater than 1.

To add $\frac{2}{3} + \frac{1}{2}$, model each fraction with a fraction strip.

Place the fraction strips end-to-end on a number line that shows halves.

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

$0 \qquad \frac{1}{2} \qquad 1 \qquad \frac{3}{2} \qquad 2$
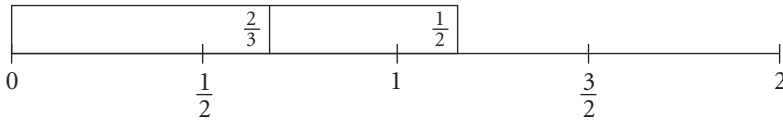
The right end of the strips does not line up with a fraction.

Try using a number line that shows thirds.

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

$0 \qquad \frac{1}{3} \qquad \frac{2}{3} \qquad 1 \qquad \frac{4}{3} \qquad \frac{5}{3} \qquad 2$
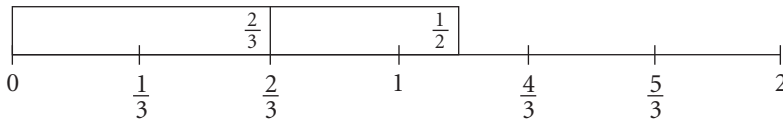
The right end of the strips still does not line up with a fraction.

Find a number line that shows sixths.

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

$0 \quad \frac{1}{6} \quad \frac{2}{6} \quad \frac{3}{6} \quad \frac{4}{6} \quad \frac{5}{6} \quad 1 \quad \frac{7}{6} \quad \frac{8}{6} \quad \frac{9}{6} \quad \frac{10}{6} \quad \frac{11}{6} \quad 2$
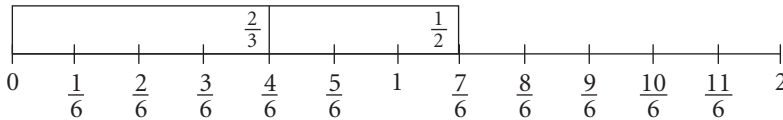
The right end of the strips lines up with $\frac{7}{6}$.

So, $\frac{2}{3} + \frac{1}{2} = \frac{7}{6}$

HINT

¡oo-¹ožašu ež þše² þh a dešo þšatož that ha oth 2 ašd a ¹a tož ¾

Practice

1. Use fraction strips to add: $\frac{3}{8} + \frac{1}{4}$

		$\frac{3}{8}$

	$\frac{1}{4}$

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

HINT

þšdaše uþaešt ¹ža tþš¹ož—¹⁄₄"

2. Use fraction strips to add: $\frac{1}{2} + \frac{1}{5}$

| | | | | $\frac{1}{2}$ |

| | $\frac{1}{5}$ |

$\frac{1}{2} + \frac{1}{5} = $ _____

3. Use the number lines below.
List fractions equivalent to each fraction.

a) $\frac{1}{2}$ _____

b) $\frac{1}{4}$ _____

c) $\frac{1}{3}$ _____

```
0 ─────────────────────── 1/2 ─────────────────────── 1

0 ─────────── 1/3 ─────────── 2/3 ─────────── 1

0 ──── 1/4 ──── 2/4 ──── 3/4 ──── 1

0 ── 1/6 ── 2/6 ── 3/6 ── 4/6 ── 5/6 ── 1

0 ─ 1/8 ─ 2/8 ─ 3/8 ─ 4/8 ─ 5/8 ─ 6/8 ─ 7/8 ─ 1

0 1/12 2/12 3/12 4/12 5/12 6/12 7/12 8/12 9/12 10/12 11/12 1
```

4. Write an addition equation for each picture.

a) _____

```
0   1/6   2/6   3/6   4/6   5/6   1
              [2/3]    [1/6]
```

b) _____

```
0              3/6              1
           [1/2]       [1/3]
```

c) _____

```
0              6/12              1
                 [3/4]      [1/3]
```
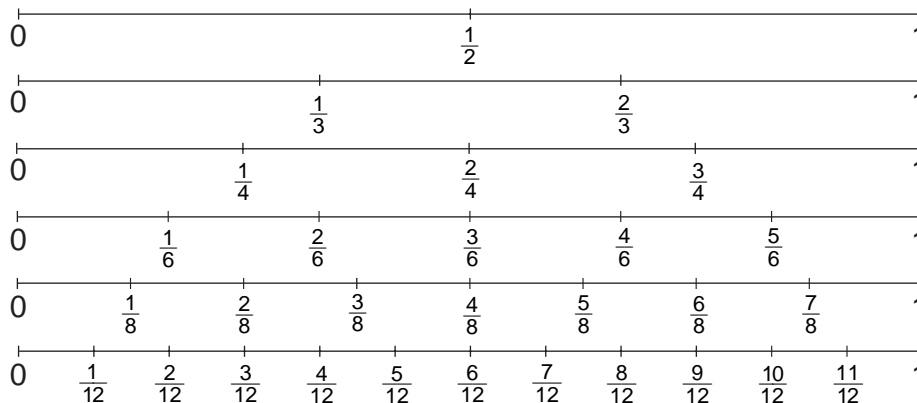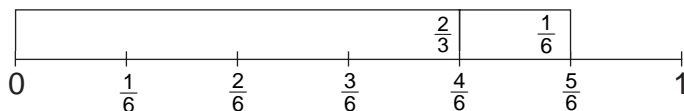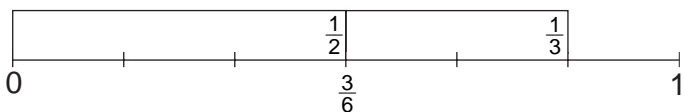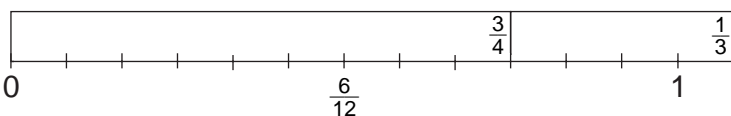
5. Add. Use your fraction strips and a number line like this to help.

$$0 \quad \frac{1}{10} \quad \frac{2}{10} \quad \frac{3}{10} \quad \frac{4}{10} \quad \frac{5}{10} \quad \frac{6}{10} \quad \frac{7}{10} \quad \frac{8}{10} \quad \frac{9}{10} \quad 1 \quad \frac{11}{10} \quad \frac{12}{10} \quad \frac{13}{10} \quad \frac{14}{10} \quad \frac{15}{10} \quad \frac{16}{10} \quad \frac{17}{10} \quad \frac{18}{10} \quad \frac{19}{10} \quad 2$$
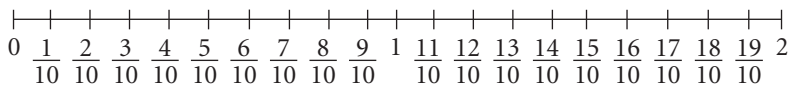
$$\frac{3}{5} + \frac{3}{10} = \underline{}$$

6. Use fraction strips and number lines like these to help you add fractions.
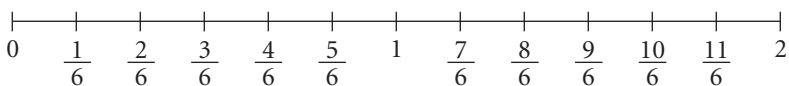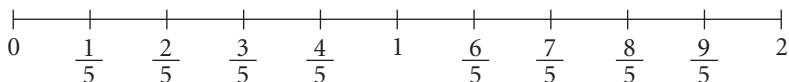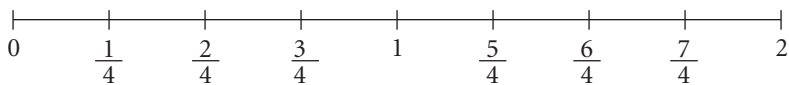
$$0 \quad \frac{1}{4} \quad \frac{2}{4} \quad \frac{3}{4} \quad 1 \quad \frac{5}{4} \quad \frac{6}{4} \quad \frac{7}{4} \quad 2$$

$$0 \quad \frac{1}{5} \quad \frac{2}{5} \quad \frac{3}{5} \quad \frac{4}{5} \quad 1 \quad \frac{6}{5} \quad \frac{7}{5} \quad \frac{8}{5} \quad \frac{9}{5} \quad 2$$

$$0 \quad \frac{1}{6} \quad \frac{2}{6} \quad \frac{3}{6} \quad \frac{4}{6} \quad \frac{5}{6} \quad 1 \quad \frac{7}{6} \quad \frac{8}{6} \quad \frac{9}{6} \quad \frac{10}{6} \quad \frac{11}{6} \quad 2$$

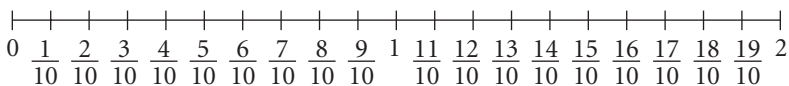$$0 \quad \frac{1}{10} \quad \frac{2}{10} \quad \frac{3}{10} \quad \frac{4}{10} \quad \frac{5}{10} \quad \frac{6}{10} \quad \frac{7}{10} \quad \frac{8}{10} \quad \frac{9}{10} \quad 1 \quad \frac{11}{10} \quad \frac{12}{10} \quad \frac{13}{10} \quad \frac{14}{10} \quad \frac{15}{10} \quad \frac{16}{10} \quad \frac{17}{10} \quad \frac{18}{10} \quad \frac{19}{10} \quad 2$$

a) $\frac{3}{2} + \frac{2}{4} = \underline{}$ **b)** $\frac{6}{6} + \frac{3}{4} = \underline{}$ **c)** $\frac{9}{10} + \frac{3}{5} = \underline{}$

7. Add.

a) $\frac{1}{10} + \frac{1}{5} = \underline{}$ **b)** $\frac{1}{6} + \frac{1}{2} = \underline{}$

c) $\frac{2}{3} + \frac{2}{6} = \underline{}$ **d)** $\frac{2}{5} + \frac{3}{10} = \underline{}$

> **Tip**
> Sketch the fraction strips.

8. Robert and his brother ordered a pizza. Robert ate $\frac{1}{4}$ of the pizza.

His brother ate $\frac{3}{8}$ of the pizza.

How much pizza was eaten? $\underline{}$

9. Three friends shared a chocolate bar.

Anika ate $\frac{1}{3}$ of the chocolate bar, Ali ate $\frac{1}{6}$, and Augusto ate $\frac{1}{3}$.

a) What fraction of the chocolate bar did Anika and Ali eat? $\underline{}$

b) What fraction of the chocolate bar did the 3 friends eat? $\underline{}$

Quick Review

➤ To add fractions with the same denominator, add the numerators.
Then write the sum of the numerators over the common denominator.

For example, $\frac{1}{12} + \frac{4}{12} = \frac{5}{12}$

➤ To add fractions with different denominators,
first write them with the same denominator.

For example, to add $\frac{1}{2} + \frac{3}{5}$, estimate first.

Think: $\frac{3}{5} > \frac{1}{2}$; so, $\frac{1}{2} + \frac{3}{5} > 1$

To add $\frac{1}{2} + \frac{3}{5}$, find equivalent fractions for $\frac{1}{2}$ and $\frac{3}{5}$
with a common denominator.

The common denominator is a multiple of 2 and 5.
Multiples of 2 are: 2, 4, 6, 8, **10**, 12, 14, . . .
Multiples of 5 are: 5, **10**, 15, . . .
10 is a common multiple of 2 and 5.
So, you can use 10 as the common denominator.

Then, write the equivalent fractions for $\frac{1}{2}$ and $\frac{3}{5}$ with 10 as the denominator.
To get equivalent fractions, multiply the numerator and denominator
by the same number.

$\frac{1}{2} = \frac{5}{10} \qquad \frac{3}{5} = \frac{6}{10}$

Tip
Use fraction strips to check equivalent fractions.

$\frac{1}{2} + \frac{3}{5} = \frac{5}{10} + \frac{6}{10}$

$= \frac{11}{10}$

You can write a fraction greater than 1 as a mixed number.

$\frac{11}{10} = 1\frac{1}{10}$

Practice

1. Write 2 equivalent fractions for each fraction.

a) $\frac{4}{5}$ 　 $\frac{4}{5} =$ ⌢2⌢　$\frac{4}{5} =$ ⌢—⌢　**b)** $\frac{4}{6}$ 　 $\frac{4}{6} =$ ⌢—⌢　$\frac{4}{6} =$ ⌢—⌢

2. Complete each equation to make it true.

a) $\frac{3}{4} = \frac{}{12}$ 　　　**b)** $\frac{1}{2} = \frac{}{10}$ 　　**c)** $\frac{4}{6} = \frac{}{3}$ 　　　**d)** $\frac{10}{12} = \frac{}{6}$

3. Find a common denominator for each pair of fractions.

a) $\frac{1}{2}$ and $\frac{3}{4}$

The multiples of 2 are: _____

The multiples of 4 are: _____

The lowest common multiple and a common denominator is: ___

b) $\frac{2}{3}$ and $\frac{3}{5}$

The multiples of 3 are: _____

The multiples of 5 are: _____

The lowest common multiple and a common denominator is: ____

4. Add.

a) $\frac{2}{9} + \frac{1}{3}$

The multiples of 9 are: _____

The multiples of 3 are: _____

The lowest common multiple of 9 and 3 is: __

Use this as a common denominator.

$\frac{1}{3} =$ ⌢3⌢

$\frac{2}{9} + \frac{1}{3} =$ _____

$= \underline{\ }$

113

b) $\dfrac{7}{10} + \dfrac{1}{6}$

The lowest common multiple of 10 and 6 is: _____.

$$\dfrac{7}{10} + \dfrac{1}{6} = \underline{\hspace{2cm}}$$

$$= \dfrac{}{}$$

$$= \dfrac{}{}$$

5. Add. Write each sum in simplest form.

a) $\dfrac{5}{6} + \dfrac{1}{3} = \underline{\hspace{1cm}}$

b) $\dfrac{2}{3} + \dfrac{3}{4} = \underline{\hspace{1cm}}$

c) $\dfrac{3}{10} + \dfrac{1}{2} = \underline{\hspace{1.5cm}}$

> **Tip**
> *You can write a fraction greater than 1 as a mixed number.*

6. Colin is wrapping presents.

He needs $\dfrac{3}{4}$ of a metre of green ribbon and $\dfrac{7}{8}$ of a metre of red ribbon.

How much ribbon does Colin need altogether?

_____

7. Complete this magic square so that the sum of every row, column, and diagonal is 1.

Write all fractions in simplest form.

$\dfrac{8}{15}$	$\dfrac{1}{15}$	
	$\dfrac{1}{3}$	

> **key to success**
>
> During a test or an exam, read all the questions first. Start with those questions that you know how to answer.

Quick Review

When you subtract $7 - 3$, you could think:
What do I add to 3 to make 7?
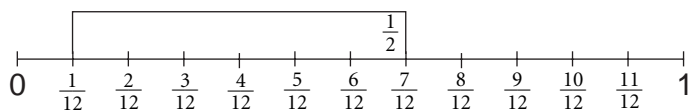You can use the same strategy to subtract fractions.

To subtract $\frac{7}{12} - \frac{1}{2}$, use fraction strips and a number line.

Think: What do I add to $\frac{1}{2}$ to get $\frac{7}{12}$?

The lowest common multiple of 12 and 2 is 12.
Use a number line that shows twelfths.

Place the $\frac{1}{2}$ strip on the number line with its right end at $\frac{7}{12}$.

The left end of the strip is at $\frac{1}{12}$.

So, $\frac{7}{12} - \frac{1}{2} = \frac{1}{12}$

Practice

1. Use Pattern Blocks. Subtract.

a) $\frac{1}{2} - \frac{1}{3} = $ _____

b) $\frac{5}{6} - \frac{4}{6} = $ _____

c) $\frac{2}{3} - \frac{1}{2} = $ _____

d) $\frac{2}{3} - \frac{2}{6} = $ _____

e) $\frac{1}{2} - \frac{1}{6} = $ _____

f) $\frac{1}{2} - \frac{3}{6} = $ _____

2. Use Pattern Blocks. Is each difference greater than $\frac{1}{2}$ or less than $\frac{1}{2}$?
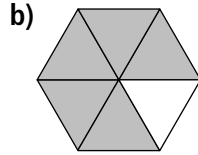Show how you know.

a) $\frac{5}{6} - \frac{1}{6}$ _____
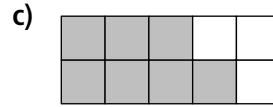
b) $1 - \frac{1}{3}$ _____

c) $\frac{5}{6} - \frac{1}{2}$ _____

3. Use each diagram to subtract.

a)

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

b)

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

c)
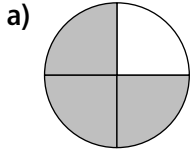
$\frac{7}{10} - \frac{3}{5} = $ _____

4. Use fraction circles to subtract.

a) $\frac{9}{10} - \frac{2}{5} = $ _____

b) $\frac{5}{8} - \frac{1}{4} = $ _____

c) $1 - \frac{2}{3} = $ _____

d) $2 - \frac{3}{4} = $ _____

e) $\frac{4}{5} - \frac{1}{2} = $ _____

f) $\frac{1}{2} - \frac{1}{4} = $ _____

5. Write a subtraction equation for each picture.

a) _____

$0 \qquad \frac{2}{8} \qquad \frac{4}{8} \qquad \frac{6}{8} \qquad 1$

b) _____

$0 \qquad \frac{5}{10} \qquad 1$

c) _____

$0 \qquad \frac{3}{6} \qquad 1$
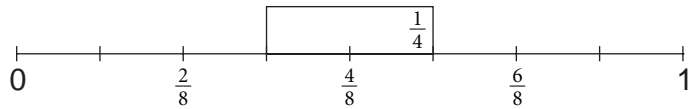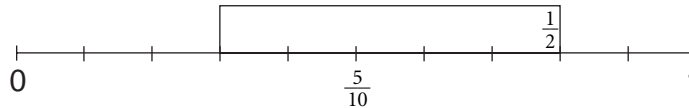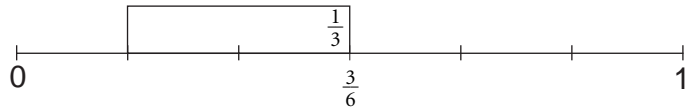
6. Subtract.

$\frac{6}{10} - \frac{2}{5}$

The lowest common multiple of 10 and 5 is: _____

Use a number line that shows _____.

HINT

What do you add to $\frac{2}{5}$ to get $\frac{6}{10}$?

Place the $\frac{2}{5}$ fraction strip on the number line with the right end at $\frac{6}{10}$.

The left end of the $\frac{2}{5}$ strip is at: ___

So, $\frac{6}{10} - \frac{2}{5} = $ _____

7. Subtract.

a) $\frac{5}{6} - \frac{1}{6}$

Use a number line that shows:

_____

The left end of the $\frac{1}{6}$ strip is at: __

So, $\frac{5}{6} - \frac{1}{6} =$ _____

b) $\frac{7}{8} - \frac{3}{4}$

Use a number line that shows:

_____

The left end of the $\frac{3}{4}$ strip is at: __

So, $\frac{7}{8} - \frac{3}{4} =$ __

8. Subtract.

a) $\frac{9}{10} - \frac{1}{2} =$ _____

b) $\frac{5}{6} - \frac{1}{2} =$ _____

c) $\frac{11}{6} - \frac{1}{3} =$ _____

d) $1 - \frac{5}{8} =$ __

9. Sergio has $\frac{7}{8}$ of a cup of trail mix. He gives Lien $\frac{3}{4}$ of a cup.
How much does Sergio have left? Use pictures, numbers, and words.

_____

_____

10. Kate drank $\frac{7}{10}$ of a glass of buttermilk.

Vicky drank $\frac{4}{5}$ of a glass.

a) Who drank more buttermilk? _____

b) How much more did she drink? Explain how you know.

_____

11. Write 5 subtraction statements with a difference of $\frac{1}{2}$.
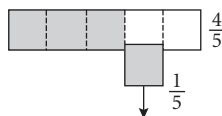
_____ _____ _____ _____ _____

Quick Review

The strategies for subtracting fractions are similar to those for adding fractions.

➤ If the denominators are the same, subtract the numerators.
Then write the difference over the common denominator.

4 fifths − 1 fifth = 3 fifths

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

➤ If the denominators are different, subtract equivalent fractions
with the same denominator.

To subtract $\frac{1}{2} - \frac{1}{8}$, find the lowest common multiple of 2 and 8.

Multiples of 2 are: 2, 4, 6, **8**, 10, 12, …

Multiples of 8 are: **8**, 16, 24, …

The lowest common multiple of 2 and 8 is 8.

Tip

Since 8 is a multiple of 2, 8 is the lowest common multiple of 2 and 8.

Write equivalent fractions using 8 as the denominator.

$$\frac{1}{2} \quad = \quad \frac{4}{8}$$

4
4

So, $\frac{1}{2} - \frac{1}{8} = \frac{4}{8} - \frac{1}{8}$

$$= \frac{3}{8}$$

Practice

1. Subtract.

a) $\frac{7}{8} - \frac{3}{8} = $ _____

b) $\frac{3}{5} - \frac{1}{5} = $ __

c) $\frac{9}{10} - \frac{2}{10} = $ __

d) $\frac{8}{9} - \frac{2}{9} = $ _____

e) $\frac{6}{7} - \frac{1}{7} = $ __

f) $\frac{11}{12} - \frac{3}{12} = $ _____

2. Subtract.

a) $\frac{3}{4} - \frac{1}{12}$

The multiples of 4 are: _____

The multiples of 12 are: _____

A multiple of 4 and 12 is: ___

Use this as a common denominator.

$$\frac{3}{4} - \frac{1}{12} = \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

b) $\frac{2}{3} - \frac{2}{10}$

The multiples of 3 are: _____

The multiples of 10 are: _____

A multiple of 3 and 10, and a common denominator is: ___

$$\frac{2}{3} - \frac{2}{10} = \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

c) $\frac{3}{4} - \frac{3}{10}$

Multiples of 4 are: _____

Multiples of 10 are: _____

A multiple of 4 and 10, and a common denominator is: ___

$$\frac{3}{4} - \frac{3}{10} = \underline{\hspace{2cm}}$$

$$= \underline{\hspace{1cm}}$$

d) $\frac{3}{2} - \frac{7}{10}$

The multiples of 2 are: _____

The multiples of 10 are: _____

A multiple of 2 and 10, and a common denominator is: ___

$$\frac{3}{2} - \frac{7}{10} = \underline{\hspace{2cm}}$$

$$= \underline{\hspace{2cm}}$$

3. Subtract: $\frac{4}{9} - \frac{1}{3}$

The lowest common multiple of 9 and 3 is: _____

$\frac{4}{9} - \frac{1}{3} =$ _____

$=$ ___

4. Subtract. Write the answer in simplest form.

a) $\frac{5}{8} - \frac{1}{6} =$ _____

b) $\frac{2}{3} - \frac{5}{12} =$ _____

c) $\frac{5}{7} - \frac{2}{5} =$ _____

d) $\frac{2}{5} - \frac{1}{6} =$ _____

5. Complete this magic square so that the sum of every row, column, and diagonal is 1.
Write all fractions in simplest form.

$\frac{3}{8}$	$\frac{1}{6}$	
	$\frac{1}{3}$	

HINT

³ he o² e †
o   oš u†b e
o¹ ' 6 ašd b 2" ¾
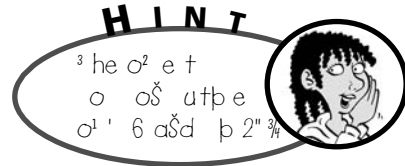
6. Jie weeds $\frac{2}{5}$ of her garden on Friday, and $\frac{1}{3}$ on Saturday.
How much of the garden still needs to be weeded?

_____

Quick Review

To add mixed numbers, follow these steps:

- Change the fractions to equivalent fractions with common denominators.
- Add the fractions.
- Then add the whole numbers.

For example, to add $3\frac{7}{8} + 2\frac{1}{3}$:

$$3\frac{7}{8} + 2\frac{1}{3} = 3\frac{21}{24} + 2\frac{8}{24}$$

$$= 5\frac{29}{24}$$

$$= 5 + \frac{24}{24} + \frac{5}{24}$$

$$= 5 + 1 + \frac{5}{24}$$

$$= 6\frac{5}{24}$$

Practice

1. Write each mixed number as an improper fraction.

a) $4\frac{3}{4} = \frac{16}{4} + \frac{3}{4}$

$= \frac{}{4}$

b) $4\frac{7}{10} = \frac{}{10} + \frac{}{10}$

$= \frac{}{10}$

c) $2\frac{3}{8} =$ _____

$=$ ___

2. Write each improper fraction as a mixed number.

a) $\frac{8}{5} = \frac{5}{5} + \frac{3}{5}$

$= 1\frac{}{5}$

b) $\frac{16}{3} = \frac{}{3} + \frac{}{3}$

$=$ ___

c) $\frac{17}{5} =$ _____

$=$ ___

d) $\frac{29}{8} =$ _____

$=$ ___

e) $\frac{33}{9} =$ _____

$=$ _____

f) $\frac{41}{7} =$ _____

$=$ ___
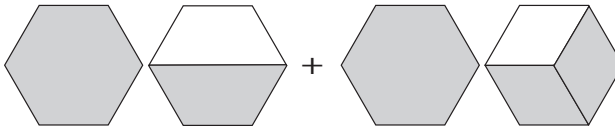
3. Write the addition equation represented by each diagram.

a) _____
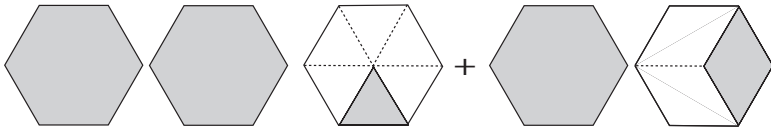
b) _____

c) _____

d) _____

4. Add.

a) $2\dfrac{1}{2} + 3\dfrac{2}{5} =$ _____

b) $7\dfrac{1}{9} + 3\dfrac{1}{6} =$ _____

5. Linda is making new curtains for her kitchen and living room windows.

She needs $1\dfrac{1}{3}$ m of fabric for the kitchen and $2\dfrac{3}{5}$ m for the living room.

How many metres of fabric does Linda need altogether?

_____

6. Last week, Jenna worked $5\dfrac{2}{3}$ h baby-sitting and $3\dfrac{1}{2}$ h giving swimming lessons. How many hours did she work in all?

_____

Quick Review

To subtract mixed numbers, follow these steps:

- Change the fractions to equivalent fractions with common denominators.
- Subtract the fractions.
- Then subtract the whole numbers.

Sometimes, you need to write improper fractions to subtract mixed numbers.

For example, to subtract: $3\frac{1}{8} - 2\frac{1}{2}$

$3\frac{1}{8} - 2\frac{1}{2} = 3\frac{1}{8} - 2\frac{4}{8}$

Since $\frac{1}{8} < \frac{4}{8}$, write $3\frac{1}{8}$ as $3 + \frac{1}{8}$, then take 1 from 3 and write it as $\frac{8}{8}$.

$3\frac{1}{8} = 2\frac{8}{8} + \frac{1}{8}$

$\quad = 2\frac{9}{8}$

So, $3\frac{1}{8} - 2\frac{1}{2} = 2\frac{9}{8} - 2\frac{4}{8}$
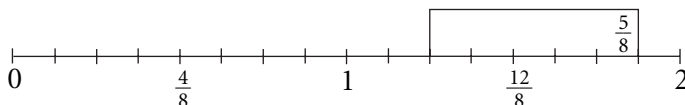
$\qquad\qquad = \frac{5}{8}$

Practice

1. Write a subtraction equation for each picture.
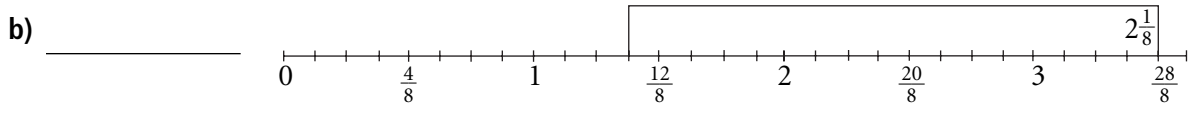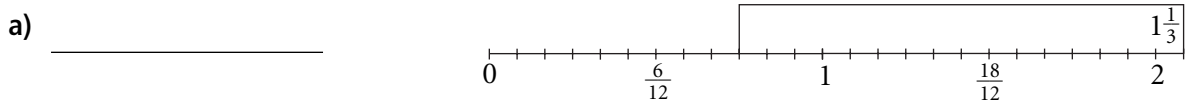
a) _____
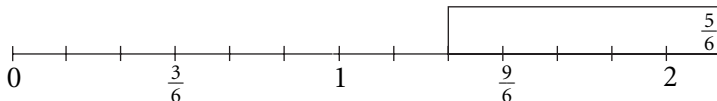
b) _____

2. Subtract.

a) $3\frac{7}{8} - 1\frac{5}{8} =$ _____

b) $8\frac{3}{4} - 2\frac{1}{4} =$ _____

c) $5\frac{7}{12} - 3\frac{1}{12} =$ _____

3. Write a subtraction equation for each picture.

a) _____

Number line from 0 to 2, marks at $\frac{6}{12}$, 1, $\frac{18}{12}$, 2, bracket labeled $1\frac{1}{3}$

b) _____

Number line from 0 to $\frac{28}{8}$, marks at $\frac{4}{8}$, 1, $\frac{12}{8}$, 2, $\frac{20}{8}$, 3, $\frac{28}{8}$, bracket labeled $2\frac{1}{8}$

4. We know that $\frac{1}{2} - \frac{1}{3} = \frac{1}{6}$.

Use this result to find each sum.

a) $5\frac{1}{2} - 1\frac{1}{3} = $ ____

b) $2\frac{1}{2} - 1\frac{1}{3} = $ ____

c) $4\frac{1}{2} - \frac{1}{3} = $ ____

5. Regroup to subtract.

a) $2 - \frac{1}{3} = 1\frac{}{3} - $ __

$= $ ____

b) $3 - 1\frac{5}{8} = $ _____

$= $ __

c) $4 - \frac{2}{5} = $ _____

$= $ __

6. Subtract. Regroup if necessary.

a) $4\frac{1}{9} - 2\frac{2}{3} = $ _____

b) $4 - 1\frac{1}{2} = $ _____

c) $3\frac{4}{7} - 1\frac{1}{2} = $ _____

d) $7\frac{1}{4} - 3\frac{5}{6} = $ _____

7. George swam $8\frac{3}{4}$ laps on Monday and $6\frac{1}{5}$ laps on Tuesday.

How many more laps did he swim on Monday than on Tuesday?

_____

8. Armin has 3 flower gardens. He bought 5 bags of mulch.

Armin used $1\frac{1}{2}$ bags of mulch on each garden.

How much mulch is left? _____

In Your Words

Here are some of the important mathematical words of this unit.
Build your own glossary by recording definitions and examples here. The first one is done for you.

improper fraction

a fraction where the numerator is

greater than the denominator; for example,

$\frac{3}{2}$ *is an improper fraction*

common denominator

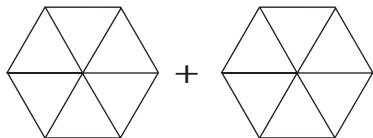**mixed number**

unit fraction

related denominators

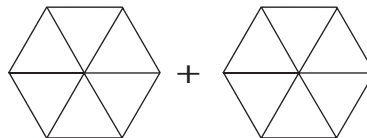**unrelated denominators**

List other mathematical words you need to know.

_____

Unit Review

1. Colour each pair of Pattern Block shapes to help you to add the fractions.
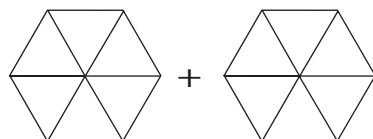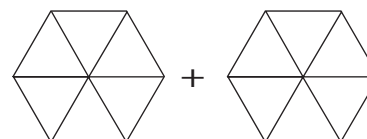
a) $\frac{1}{2} + \frac{1}{6} =$ _____

b) $\frac{1}{2} + \frac{1}{3} =$ _____

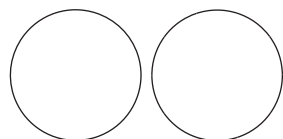c) $\frac{1}{3} + \frac{1}{6} =$ _____
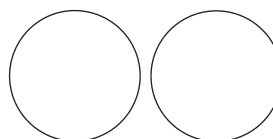
d) $\frac{2}{3} + \frac{1}{2} =$ _____
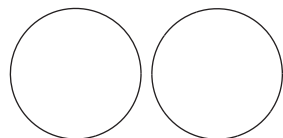
2. Use fraction circles to find each sum.
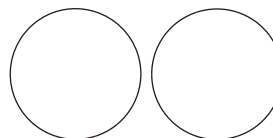
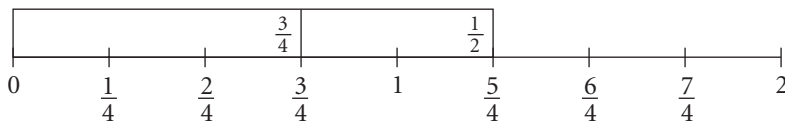a) $\frac{3}{5} + \frac{3}{10} =$ ___

b) $\frac{5}{8} + \frac{1}{4} =$ __

c) $\frac{5}{12} + \frac{3}{4} =$ _____

d) $\frac{5}{6} + \frac{7}{12} =$ _____

3. Write the addition equation represented by the diagram.

_____

5.2 **4.** Use fraction strips and number lines to add.

a) $\frac{2}{3} + \frac{1}{6} =$ ___

b) $\frac{1}{2} + \frac{3}{10} =$ _____

c) $\frac{3}{4} + \frac{11}{12} =$ _____

d) $\frac{3}{2} + \frac{2}{5} =$ _____

e) $\frac{7}{8} + \frac{1}{2} =$ _____

f) $\frac{2}{3} + \frac{3}{4} =$ _____

5.3 **5.** Zach took $\frac{5}{12}$ of an hour to drive to work and $\frac{2}{3}$ of an hour to drive home.

a) Write the total time it took Zach to drive to and from work as a fraction of an hour.

_____

b) Write the time in part a in minutes. _____

6. Estimate, then add.

a) $\frac{3}{4} + \frac{2}{5}$ Estimate: ___   Sum: _____

b) $\frac{5}{8} + \frac{1}{3}$ Estimate: ___   Sum: ___

c) $\frac{5}{9} + \frac{1}{6}$ Estimate: __   Sum: ___

d) $\frac{1}{2} + \frac{3}{7}$ Estimate: ___   Sum: ___

e) $\frac{2}{3} + \frac{3}{5}$ Estimate: ___   Sum: _____
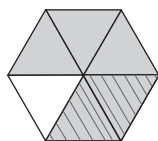
f) $\frac{4}{5} + \frac{5}{6}$ Estimate: ___   Sum: _____

5.4 **7.** Use each diagram to find the difference.
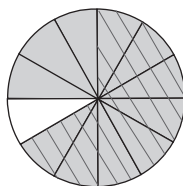
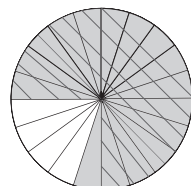a) $\frac{5}{6} - \frac{1}{3} =$ _____

b) $\frac{9}{10} - \frac{3}{5} =$ ___
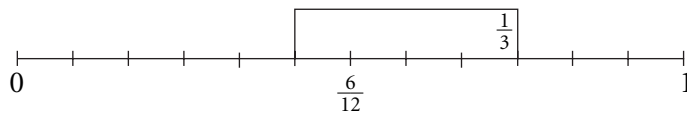
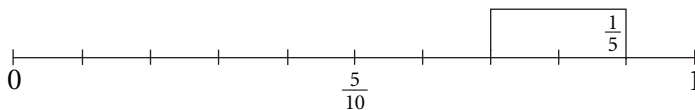c) $\frac{11}{12} - \frac{2}{3} =$ _____

d) $\frac{4}{5} - \frac{3}{4} =$ ___

5.4 **8.** Write the subtraction equation represented by each diagram.

a) _____

$$0 \qquad\qquad \frac{6}{12} \qquad\qquad \boxed{\frac{1}{3}} \qquad\qquad 1$$

_____

b) _____

$$0 \qquad\qquad \frac{5}{10} \qquad\qquad \boxed{\frac{1}{5}} \qquad\qquad 1$$

5.5 **9.** Estimate, then subtract.

a) $\frac{7}{8} - \frac{3}{4}$ Estimate: ___   Difference: ___

b) $\frac{3}{2} - \frac{3}{8}$ Estimate: ___   Difference: _____

c) $\frac{5}{4} - \frac{7}{12}$ Estimate: ___   Difference: _____

d) $\frac{2}{3} - \frac{2}{9}$ Estimate: ___   Difference: ___

5.6 **10.** Add.

a) $3\frac{7}{8} + 1\frac{5}{8} =$ _____   **b)** $2\frac{2}{3} + 4\frac{5}{12} =$ _____

11. On Sunday, Maya studied $1\frac{1}{4}$ h for her math exam.

On Monday she studied $1\frac{2}{3}$ h.

What is the total time Maya studied?

_____

5.7 **12.** Subtract.

a) $5\frac{11}{12} - 1\frac{7}{12} =$ _____   **b)** $2\frac{5}{7} - 1\frac{3}{14} =$ _____

13. Leigh has $4\frac{1}{2}$ m of ribbon.

He uses $1\frac{3}{4}$ m to wrap a present and $\frac{1}{3}$ m to make a bow.

How much ribbon is left?

_____