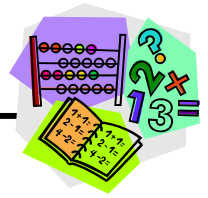# Adding and Subtracting Fractions with Like Denominators
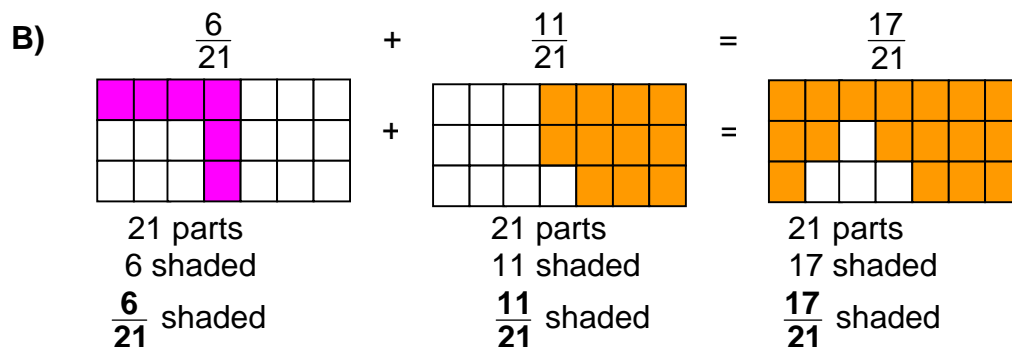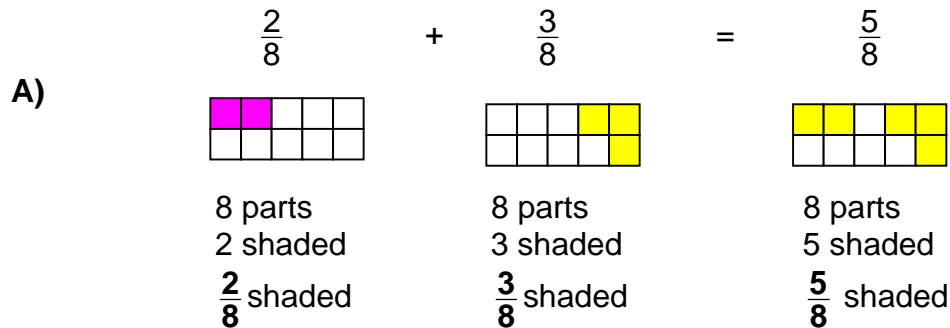
Adding Fractions with Like Denominators

To add fractions they must have a common denominator.

**To add proper or improper fractions with the same denominator:**
- add the numerators together
- the denominator stays the same.

Examples

A)

$$\frac{2}{8} \quad + \quad \frac{3}{8} \quad = \quad \frac{5}{8}$$

8 parts
2 shaded
$\frac{2}{8}$ shaded

8 parts
3 shaded
$\frac{3}{8}$ shaded

8 parts
5 shaded
$\frac{5}{8}$ shaded

B)

$$\frac{6}{21} \quad + \quad \frac{11}{21} \quad = \quad \frac{17}{21}$$

21 parts
6 shaded
$\frac{6}{21}$ shaded

21 parts
11 shaded
$\frac{11}{21}$ shaded

21 parts
17 shaded
$\frac{17}{21}$ shaded

To add mixed numbers with the same denominator:
- add the whole numbers together
- add the numerators
- the denominator stays the same.
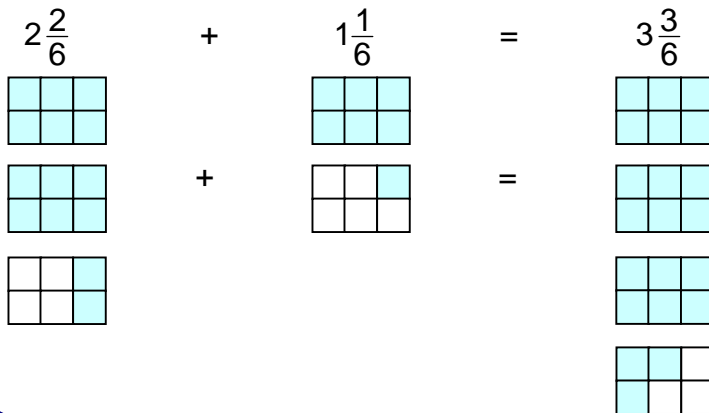
$$2\frac{2}{6} \qquad + \qquad 1\frac{1}{6} \qquad = \qquad 3\frac{3}{6}$$

Examples

A) $2\frac{2}{6}$

$+1\frac{1}{6}$

$3\frac{3}{6} \rightarrow$ reduce to lowest form $= 3\frac{1}{2}$

B) $4\frac{1}{16}$

$+3\frac{5}{16}$

$+\ \frac{6}{16}$

$7\frac{12}{16} \rightarrow$ reduce to lowest form $= 7\frac{3}{4}$

Practice: Adding Fractions with Like Denominators

1. Use paper and pencil, fraction circles or other methods to demonstrate adding the following fractions and solve. Reduce answers to **lowest forms**. The first two questions have been done for you.

a) $\dfrac{4}{5} + \dfrac{1}{5} = \dfrac{5}{5} = 1$

b) $\dfrac{3}{8} + \dfrac{2}{8} = \dfrac{5}{8}$

c) $\dfrac{3}{24} + \dfrac{8}{24} =$ _____

d) $\dfrac{6}{10} + \dfrac{3}{10} =$ _____

e) $\dfrac{3}{9} + \dfrac{4}{9} =$ _____

f) $\dfrac{5}{12} + \dfrac{6}{12} =$ _____

g) $\dfrac{9}{14} + \dfrac{2}{14} =$ _____

h) $\dfrac{1}{6} + \dfrac{3}{6} =$ _____

2. After painting her room, Maryann had $\dfrac{3}{8}$ cans of burgundy and $\dfrac{4}{8}$ cans of taupe paint left. How much paint in all did Maryann have left over?

3. At the end of the class pizza party, Frank tried to determine how much pizza was left. Each pizza originally had 8 slices. There was 1 slice of pepperoni left, 2 slices of Hawaiian and 3 slices of supreme. In fraction form, how much pizza was left?

4. Jim needs 2 inches of ribbon to finish his project. He measured the three scraps of ribbon leftover and he had $\frac{1}{3}$ inch, $\frac{5}{8}$ inch and $\frac{3}{4}$ inch. How much ribbon does Jim have leftover? Does Jim have enough ribbon left over to finish his project?

5. Use paper and pencil, fraction circles, a calculator or another method to add the following.

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

   b) $2\frac{3}{7} + 1\frac{2}{7} =$

   c) $14\frac{1}{5} + \frac{3}{5} =$

   d) $\frac{2}{9} + 6\frac{3}{9} =$

6. Fay made two pies for a picnic. $\frac{2}{6}$ of her apple pie and $\frac{1}{6}$ of her cherry pie were left. How much pie in total did she take home?

7. Jeff did schoolwork for almost one hour, as shown below.
   - Review: 15 min → $\frac{15}{60}$
   - Reading notes: 7 min → $\frac{7}{60}$
   - Practicing math: 20 min → $\frac{20}{60}$

   Show Jeff's total time for doing schoolwork in lowest fraction form.
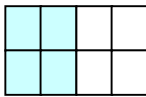
Subtracting Fractions with Like Denominators

To subtract fractions, they must have a common denominator.

To subtract proper or improper fractions with the same denominator:
- subtract the numerators
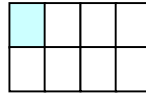- the denominator stays the same.

Examples

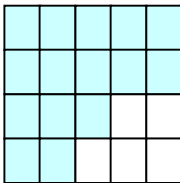**A)** $\dfrac{4}{8}$ – $\dfrac{3}{8}$ = $\dfrac{1}{8}$
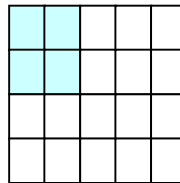
remove 3 =

B) $\dfrac{15}{20}$ – $\dfrac{11}{20}$ = $\dfrac{4}{20}$
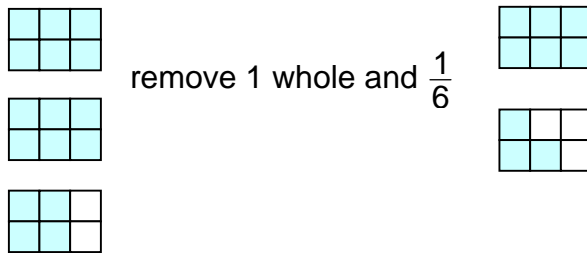
remove 11 =

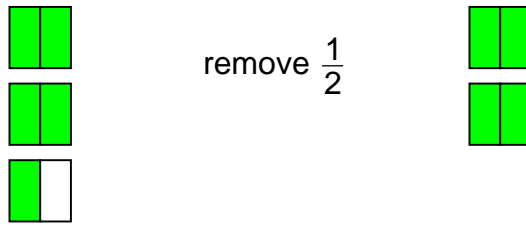**To subtract mixed numbers with the same denominator:**

- subtract the whole number
- subtract the numerators
- the denominator stays the same.

Examples

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

remove 1 whole and $\frac{1}{6}$

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

remove $\frac{1}{2}$

Special Cases of Subtraction

Subtracting from 1

Fractions that have the same numerator and denominator represent one whole.

Examples

A) $\frac{4}{4} = 1$

B) $\frac{8}{8} = 1$

C) $\frac{250}{250} = 1$

1 is one whole and can represent any fraction as needed.

Examples

A) $1 = \frac{6}{6}$

B) $1 = \frac{7}{7}$

C) $1 = \frac{40}{40}$

To add or subtract fractions, the same denominator is needed.

Examples

A) To subtract $1 - \frac{2}{5}$, convert the 1 into the fraction $\frac{5}{5}$.

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

B) To subtract $1 - \frac{4}{7}$, change 1 to the fraction $\frac{7}{7}$.

$$\frac{7}{7} - \frac{4}{7} = \frac{3}{7}$$

Subtracting from a whole number 2 or greater

Examples

A) To subtract $2 - \frac{1}{6}$, borrow 1 whole from 2.

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

The borrowed 1 becomes the fraction $\frac{6}{6}$, because the denominator of $\frac{1}{6}$ is 6.

B) To subtract $5 - \frac{7}{8}$, borrow 1 whole from 5.

$$4\frac{8}{8} - \frac{7}{8} = 4\frac{1}{8}$$

The borrowed 1 becomes the fraction $\frac{8}{8}$, because the denominator in $\frac{1}{8}$ is 8.

Subtracting a fraction of greater value from a fraction of less value in mixed numbers

Examples

A)

$$3\frac{1}{6} - \frac{3}{6} \quad = \quad 2\frac{7}{6} - \frac{3}{6} \quad = \quad 2\frac{4}{6} \quad = \quad 2\frac{2}{3}$$

$\frac{3}{6}$ is larger than $\frac{1}{6}$, so 1 must be borrowed from 3.	The borrowed 1 becomes $\frac{6}{6}$ because 6 is the denominator. Add $\frac{1}{6} + \frac{6}{6} = \frac{7}{6}$.	Subtract $7 - 3 = 4$	Reduce to lowest form

B)

$$8\frac{2}{7} - 3\frac{4}{7} \quad = \quad 7\frac{9}{7} - 3\frac{4}{7} \quad = \quad 4\frac{5}{7}$$

$\frac{2}{7}$ < (is smaller than) $\frac{4}{7}$. Borrow 1 whole from 8.	The borrowed 1 becomes $\frac{7}{7}$ because 7 is the denominator. Add $\frac{2}{7} + \frac{7}{7} = \frac{9}{7}$.	Subtract $7 - 3 = 4$	Subtract $9 - 4 = 5$

Subtracting a whole number from a mixed number

Example

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

Subtract the whole number. $2 - 1 = 1$
Subtract 0 from $\frac{1}{2}$.

Practice: Subtracting Fractions and Mixed Numbers with Like Denominators

1. Use paper and pencil, fraction circles, calculators or other methods to subtract the following. Reduce to lowest form.

   a) $\dfrac{6}{7} - \dfrac{2}{7}$

   b) $\dfrac{10}{10} - \dfrac{3}{10}$

   c) $\dfrac{10}{12} - \dfrac{3}{12}$

   d) $\dfrac{6}{12} - \dfrac{5}{12}$

   e) $\dfrac{9}{14} - \dfrac{2}{14}$

   f) $\dfrac{3}{6} - \dfrac{1}{6}$

2. Tilly was working on a science project. To manage her time, she divided her project into 9 parts. If Tilly has already completed $\dfrac{4}{9}$ of her project, how much of her project, in fraction form, does she have left?

3. Kari usually takes $\frac{40}{60}$ h to feed the chickens. Today she took only $\frac{35}{60}$ h. How much extra time does Kari have? Show your answer in fraction form.

4. Use paper and pencil, fraction circles, a calculator or another method to solve the following.

a) $\begin{array}{r} 4\frac{5}{7} \\ -\ 2\frac{3}{7} \\ \hline \end{array}$

b) $\begin{array}{r} 3 \\ -\ 1\frac{1}{4} \\ \hline \end{array}$

c) $\begin{array}{r} 3\frac{1}{6} \\ -\ 2 \\ \hline \end{array}$

d) $\begin{array}{r} 10\frac{1}{5} \\ -\ 9\frac{4}{5} \\ \hline \end{array}$

5. Mr. Cardinal had $4\frac{3}{4}$ cans of paint and used $3\frac{1}{4}$. How much paint does he have left?

6. Judy was to run $6\frac{5}{8}$ laps to train for a race. She ran $5\frac{2}{8}$. How many laps does she need to run to complete her training?

7. Kalia brought $3\frac{1}{4}$ packages of balloons to decorate the gym. When they were done, there was $\frac{3}{4}$ of a package of balloons left. How many packages were used to decorate the gym?

8. Solve the following. Record each answer in a complete sentence and in lowest terms.

1. A bannock recipe calls for $2\frac{3}{4}$ cups of flour. Robert added $1\frac{1}{4}$ cups and then ran out of flour. How much more flour needs to be added?

2. Les baked 48 cookies for the bake sale at school, and sold 36 of them. In fraction form, how many cookies did Les sell?

3. When making homemade turkey soup, Lora added $8\frac{3}{6}$ cups of water to make the broth. After adding the vegetables, she added another $3\frac{2}{6}$ cups of water. How much water did Lora add all together?