FRACTIONS

ADDING AND SUBTRACTING FRACTIONS AND MIXED NUMBERS

VOCABULARY TERMS:

Fraction- a number that names a part of a whole
       numerator- the part or top number in a fraction
       denominator-the bottom or the total number in a fraction

Mixed Number- a number that is made up of a whole number and a fraction

Improper Fraction- a number/fraction in which the numerator is larger than the denominator

Simplest form- the form of a fraction in which the numerator and denominator have only 1 as their common factor

Equivalent fractions- fractions that name the same amount or part

FRACTION

$$\frac{3}{4}$$

Numerator

Denominator
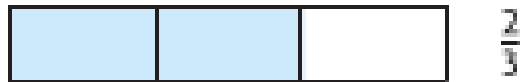
Improper Fraction

$$\frac{7}{2}$$

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

Mixed Number

COMPARING AND ORDERING

- To compare fractions with the same denominators, compare the numerators
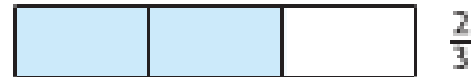
Same Denominators

$\frac{2}{3}$

$\frac{1}{3}$

Two of three equal parts is greater than one of three equal parts.

So, $\frac{2}{3} > \frac{1}{3}$.

- To compare fractions with the same numerators, compare the denominators.
  - Remember the smaller the denominators, the larger the piece, so the larger the

Same Numerators

$\frac{2}{3}$

$\frac{2}{5}$

Two of three equal parts is greater than two of five equal parts.

So, $\frac{2}{3} > \frac{2}{5}$.

When comparing only 2 fractions...

When you have only two fractions to be compared, you can cross multiply on an upward diagonal. When doing this, write your answer **above**   the diagonal (two numbers you are multiplying). Then you can compare the two products to determine the larger fraction.

12   4/8   >   2/3   16

40   5/6   <   7/8   42

Fraction Butterfly

multiply the digits in the blue cell of wings to find the product for the blue antenna

multiply the digits in the red cell of wings to find the product for the red antenna

$$\frac{16}{24} = \frac{2}{3} \quad \frac{3}{8} = \frac{9}{24}$$

16

9

24

multiply the digits in the denominators (bottom) to find a common denominator

you can
compare the fractions by comparing the products in the antennae

create an equivalent fraction for each original fraction using the new numerators and common denominator

add or subtract the fractions using the equivalent fractions

To order two or more fractions…

- You must get common denominators in order to compare the numerators.

- You get common denominators by finding a common multiple that all of the numbers go into evenly.

- There will be many common multiples, if you get stuck you can multiple the common denominators by each other.

- *However, if you change the denominator, you must change the numerator.

  - What ever you multiply the denominator by, you must multiple the numerator by the same number .

Comparing and Ordering

Compare $\dfrac{3}{4}$ & $\dfrac{2}{3}$

The LCM of 3 and 4 is 12

$$\dfrac{3 \times 3}{4 \times 3} = \dfrac{9}{12} \qquad \dfrac{2 \times 4}{3 \times 4} = \dfrac{8}{12}$$
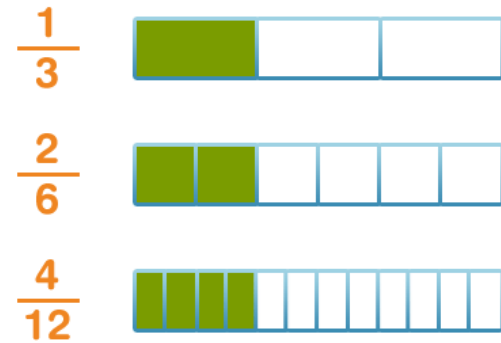
$$\dfrac{9}{12} > \dfrac{8}{12}$$

$$\dfrac{2}{3} \xrightarrow[\times\,6]{\times\,6} \dfrac{12}{18}$$

$$\dfrac{5}{6} \xrightarrow[\times\,3]{\times\,3} \dfrac{15}{18}$$

$$\dfrac{1}{3} \xrightarrow[\times\,6]{\times\,6} \dfrac{6}{18}$$

wikiHow

Equivalent Fractions

- To make an equivalent fraction, multiply the numerator and denominator by the same number.

- Sometimes you can divide both by the same number, this is also called simplifying or reducing.

$$\frac{1}{3} \begin{array}{l} \times 2 \\ \times 2 \end{array} = \frac{2}{6} \begin{array}{l} \times 2 \\ \times 2 \end{array} = \frac{4}{12}$$

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

$$\frac{2}{6}$$

$$\frac{4}{12}$$

$$\frac{30 \div 6}{42 \div 6} = \frac{5}{7}$$

To REDUCE or simplify…

- To **reduce** a **fraction** you divide the numerator **and** the denominator by the same number. *The number you divide by must go into **both** the numerator and denominator evenly.

  *Sometimes, you may be able to reduce again.

- To **reduce** a **fraction** to lowest terms, divide the numerator and denominator by their Greatest Common Factor (GCF). This is also called **simplifying the fraction.**

If a fraction is in simplest form, then the only common factor between the numerator and the denominator is 1

ADDING AND SUBTRACTING FRACTIONS

There are 3 Simple Steps to **add /subtract fractions**:

Step 1: Make sure the bottom numbers
(the denominators) are the same.

If not- make them the same
(make equivalent fractions)

Step 2: Add/Subtract the top numbers (the numerators),
put the answer over the denominator.

Step 3: Simplify the **fraction** (if needed)

ADDING & SUBTRACTING

To add or subtract fractions with unlike denominators, you need to rename them as fractions with like denominators. You can do this by making a list of equivalent fractions.

Add. $\dfrac{5}{12} + \dfrac{1}{8}$

Step 1   Write equivalent fractions for $\frac{5}{12}$. $\dfrac{5}{12} \; \dfrac{10}{24} \; \dfrac{15}{36} \; \dfrac{20}{48}$

Step 2   Write equivalent fractions for $\frac{1}{8}$. $\dfrac{1}{8} \; \dfrac{2}{16} \; \dfrac{3}{24}$

Step 3   Rewrite the problem using the equivalent fractions.

     Then add.

$\dfrac{5}{12} + \dfrac{1}{8}$ becomes $\dfrac{10}{24} + \dfrac{3}{24} = \dfrac{13}{24}$.

Stop when you find two fractions with the same denominator.

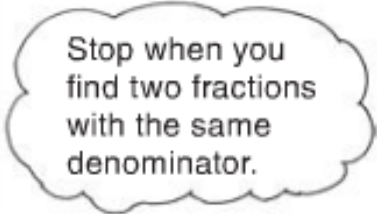**Subtract.** $\dfrac{9}{10} - \dfrac{1}{2}$

Step 1   Write equivalent fractions for $\frac{9}{10}$. $\dfrac{9}{10} \; \dfrac{18}{20} \; \dfrac{27}{30} \; \dfrac{36}{40}$

Step 2   Write equivalent fractions for $\frac{1}{2}$. $\dfrac{1}{2} \; \dfrac{2}{4} \; \dfrac{3}{6} \; \dfrac{4}{8} \; \dfrac{5}{10}$

Step 3   Rewrite the problem using the equivalent fractions.

     Then subtract.

$\dfrac{9}{10} - \dfrac{1}{2}$ becomes $\dfrac{9}{10} - \dfrac{5}{10} = \dfrac{4}{10}$. Written in simplest form, $\dfrac{4}{10} = \dfrac{2}{5}$.

EXAMPLES FOR YOU TO TRY:

Find the sum or difference. Write your answer in simplest form.

1. $\frac{2}{9} + \frac{1}{3}$

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

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

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

_____ _____ _____ _____

5. $\frac{7}{8} - \frac{1}{4}$

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

7. $\frac{9}{10} - \frac{4}{5}$

8. $\frac{8}{9} - \frac{5}{6}$

_____ _____ _____ _____

ANSWERS:

Find the sum or difference. Write your answer in simplest form.

1. $\dfrac{2}{9} + \dfrac{1}{3}$ 2. $\dfrac{1}{2} + \dfrac{2}{5}$ 3. $\dfrac{1}{4} + \dfrac{1}{6}$ 4. $\dfrac{1}{5} + \dfrac{3}{4}$

$\dfrac{5}{9}$ $\dfrac{9}{10}$ $\dfrac{5}{12}$ $\dfrac{19}{20}$

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

$\dfrac{5}{8}$ $\dfrac{1}{12}$ $\dfrac{1}{10}$ $\dfrac{1}{18}$

SIMPLIFYING IMPROPER FRACTIONS

- Sometimes when you add or subtract fractions you will get an answer that is an improper fraction.

- To reduce an improper fraction, divide the numerator by the denominator.

- Your quotient becomes your whole number, your remainder becomes your numerator and your denominator stays the same.

$$\frac{5}{6} \overset{\times 2}{\underset{\times 2}{=}} \frac{10}{12}$$

$$+ \frac{3}{4} \overset{\times 3}{\underset{\times 3}{=}} \frac{9}{12}$$

$$\frac{19}{12}$$

10 12ths **plus**

9 12ths **equals**

19 12ths $= 1\frac{7}{12}$

$$\begin{array}{r} 1 \\ 12{\overline{)19}} \\ 12 \\ \hline 7 \end{array}$$

$$\frac{28}{5} = \text{what mixed number?}$$

$$\begin{array}{r} 5 \\ 5{\overline{)28}} \\ -25 \\ \hline 3 \end{array}$$

$$\frac{28}{5} = 5\frac{3}{5}$$

Adding and Subtracting Mixed Numbers:

Whole numbers & fractions...

- To add/subtract mixed numbers, you can add/subtract the numbers first by following the rules.

- Then you add/subtract the whole numbers

- Finally, we simplify if possible

- *Sometimes we may need to borrow or regroup

Improper fractions

- To add/subtract using improper fractions, change your mixed number to an improper fraction.

- Then add/subtract your fractions using the rules

- Finally, we simplify if possible

To make a MIXED NUMBER into an IMPROPER FRACTION...

To change a mixed number into an improper fraction:
1. Multiply the denominator by the whole number
2. Add the numerator to your product—this is your new numerator
3. Keep your denominator

$$2\frac{3}{4} = \frac{(4 \times 2) + 3}{4} = \frac{11}{4}$$

Then add.

$$4\frac{1}{3} = \frac{13}{3}$$

Multiply.

Adding or Subtracting Examples:

$$2\tfrac{1}{2} = 2\tfrac{2}{4} \leftarrow \left(\tfrac{1}{2} \text{ is changed to } \tfrac{2}{4}\right)$$

$$+3\tfrac{1}{4} = 3\tfrac{1}{4}$$

$$5\tfrac{3}{4}$$

$\uparrow$

(remember to add the whole numbers)

$$5\tfrac{1}{5} = 5\tfrac{2}{10} = 4\tfrac{12}{10}$$

$$-3\tfrac{1}{2} = 3\tfrac{5}{10} = 3\tfrac{5}{10}$$

$$1\tfrac{7}{10}$$

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

$$+5\tfrac{3}{4} = 5\tfrac{3}{4}$$

$$7\tfrac{5}{4}$$

And $\qquad \dfrac{5}{4} = 1\tfrac{1}{4}$

So $\qquad 7\tfrac{5}{4} = 7 + 1\tfrac{1}{4} = 8\tfrac{1}{4}$

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1. $3 - \tfrac{1}{4}$ $\qquad$ $3 = 2\tfrac{4}{4}$ "Borrow" a 1 from the 3 and change to $\tfrac{4}{4}$.

$$-\tfrac{1}{4} = -\tfrac{1}{4}$$

$$2\tfrac{3}{4}$$

2. $2\tfrac{1}{3} + 3\tfrac{1}{8}$ $\qquad$ $2\tfrac{1}{3} = 2\tfrac{8}{24}$

$$+3\tfrac{1}{8} = +3\tfrac{3}{24}$$

$$5\tfrac{11}{24}$$

The LCD of 3 and 8 is 24.

YOUR TURN:

Find the sum or difference. Write your answer in simplest form.

1. $2\frac{2}{9} + 4\frac{1}{6}$ 2. $10\frac{5}{6} + 5\frac{3}{4}$ 3. $11\frac{7}{8} - 9\frac{5}{6}$ 4. $18\frac{3}{5} - 14\frac{1}{2}$

_____   _____   _____   _____

ANSWERS:

Find the sum or difference. Write your answer in simplest form.

1. $2\frac{2}{9} + 4\frac{1}{6}$

2. $10\frac{5}{6} + 5\frac{3}{4}$

3. $11\frac{7}{8} - 9\frac{5}{6}$

4. $18\frac{3}{5} - 14\frac{1}{2}$

$6\frac{7}{18}$

$16\frac{7}{12}$

$2\frac{1}{24}$

$4\frac{1}{10}$