Lecture Notes

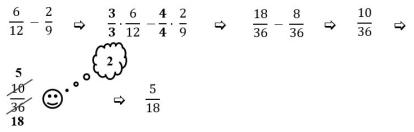
<u>Notes</u>

- Fractions that have the *different denominators* are called **unlike fractions**, because the denominators are *unalike*.
- When adding and subtracting fractions with *different denominators*, we first need to transform one, or both, denominators so that they match.
 - We must find the **Lowest Common Denominator** (**LCD**). The LCD represents the lowest number possible that both denominators divide into.
 - To add or subtract fractions, we need the *same unit fraction*.
 - We must make the fraction(s) bigger so that the denominators match.
 - We are "bumping up" the fraction(s), changing their size, to make their denominators become the same number.
 - \circ We multiply the denominator by some number that results in the LCD.
 - However, we must multiply **both** numerator and denominator by that *same number*.
 - Multiplying by that *same number* ensures we maintain the same *ratio* of the fraction.
 - A **ratio** shows the relative size of two values: **numerator** with respect to **denominator**.
- Adding and subtracting fractions with *different denominators* involves a 4-step process.
 - A fraction having unlike denominators is the typical problem you will get.
- If you understand how to *add* fractions, you will have no problem with how to *subtract* fractions.
 - The only difference between the two is the actual addition step, or subtraction step.
 - All other steps are the same for both types of problems.

Add and Subtract Fractions with Unlike Denominators

- **<u>Step 1</u>**: Find the LCD.
- <u>Step 2</u>: Find equivalent fraction(s).
 - Multiply denominator(s) by some number that results in the LCD.
 - To maintain the same *ratio*, multiply the numerator by that same number (n) as the denominator.
 - Ex: $\frac{n \cdot 2}{n \cdot 5}$
- <u>Step 3</u>: Add or subtract numerators. Keep denominators the same.
- <u>Step 4</u>: Reduce, if possible.
- <u>*Caution:*</u> You **cannot "reduce up front"** while in *addition or subtraction mode*. You must wait until the end to reduce.

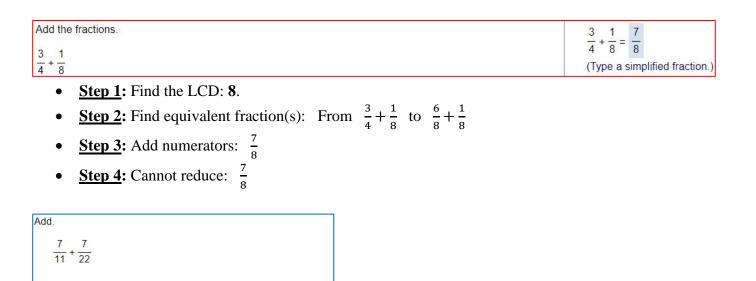
Example:



- <u>Step 1</u>: Find the LCD: 36.
- <u>Step 2</u>: Find equivalent fraction(s): From $\frac{6}{12} \frac{2}{9}$ to $\frac{18}{36} \frac{8}{36}$
- <u>Step 3</u>: Subtract numerators: $\frac{10}{36}$
- <u>Step 4</u>: Reduce: $\frac{5}{18}$

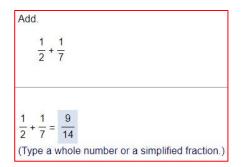
<u>Notes</u>

- In *Step 2* when we multiply the denominator(s) by some number that results in the LCD:
 - That *same* number is used up-and-down (numerator and denominator).
 - This is to maintain the same *ratio* of the fraction.
 - But a *different* number is used side-to-side (left fraction and right fraction).
 - This is because the denominators of the two fractions are themselves *different*.
 - If the denominators were the same, there would be no need for *Step 2* (or *Step 1*).



 $\frac{7}{11} + \frac{7}{22} = \frac{21}{22}$

(Simplify your answer. Type a whole number or a simplified fraction.)

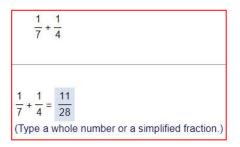


Add and simplify.

 $\frac{1}{8} + \frac{5}{6}$

 $\frac{1}{8} + \frac{5}{6} = \frac{23}{24}$ (Type a simplified fraction.)

- <u>Step 1</u>: Find the LCD: 24.
- <u>Step 2</u>: Find equivalent fraction(s): From $\frac{1}{8} + \frac{5}{6}$ to $\frac{3}{24} + \frac{20}{24}$
- <u>Step 3</u>: Add numerators: $\frac{23}{24}$
- <u>Step 4</u>: Cannot reduce: $\frac{23}{24}$



Subtract and simplify.	4 1 11
4 1	$\frac{1}{5} - \frac{1}{4} = \frac{1}{20}$
$\overline{5}$ $\overline{4}$	(Type a whole number or a simplified fraction.)

Subtract the following fractions. Simplify the answer.		
5	2	
12	9	
5 2	7	
$\frac{12}{12} - \frac{1}{9} =$		
(Simplify	your answer. Type a whole number or a fraction.)	

- <u>Step 1</u>: Find the LCD: 36.
- <u>Step 2</u>: Find equivalent fraction(s): From $\frac{5}{12} \frac{2}{9}$ to $\frac{15}{36} \frac{8}{36}$
- <u>Step 3</u>: Subtract numerators: $\frac{7}{36}$
- <u>Step 4</u>: Cannot reduce: $\frac{7}{36}$

Subtract and simplify. $\frac{4}{5} - \frac{7}{15}$	$\frac{4}{5} - \frac{7}{15} = \frac{1}{3}$ (Type a simplified fraction.)
• <u>Step 1</u> : Find the LCD: 15. • <u>Step 2</u> : Find equivalent fraction(s): From $\frac{4}{5} - \frac{7}{15}$ to $\frac{12}{15} - \frac{7}{15}$ • <u>Step 3</u> : Subtract numerators: $\frac{5}{15}$ • <u>Step 4</u> : Reduce: $\frac{1}{3}$	
Subtract and simplify. $\frac{7}{9} = \frac{1}{27}$	$\frac{7}{9} - \frac{1}{27} = \frac{20}{27}$ (Type a simplified fraction.)
Subtract and simplify. $\frac{3}{4} - \frac{5}{12}$	$\frac{3}{4} - \frac{5}{12} = \frac{1}{3}$ (Type a simplified fraction.)

MAT 050 Problems

<u>Note</u>

• The fractions are bigger in MAT 050, but the same 4-step process is used.

Add and simplify.	2 1 13
2 1	$\frac{1}{27} + \frac{1}{6} = \frac{1}{54}$
$\overline{27}^+\overline{6}$	(Type a whole number or a simplified fraction.)

Add and simplify.	1 3 77
1 3	$\frac{125}{125} + \frac{10}{10} = \frac{250}{250}$
125 + 10	(Type a whole number or a simplified fraction.)

Subtract and simplify.	7 1 16
7 1	15 9 45
15 - 9	(Type a whole number or a simplified fraction.)

Subtract and simplify.	13 21 2
13 21	15 25 75
15 25	(Type a whole number or a simplified fraction.)