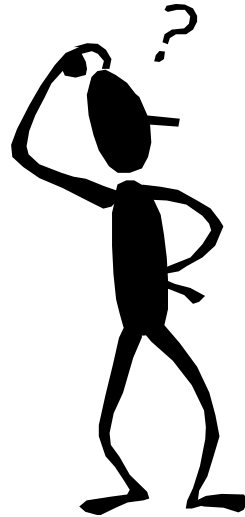


# ADDING AND SUBTRACTING FRACTIONS

# Addition

- To add two fractions, you must make sure they have a **Common Denominator**

$$\frac{3}{8} + \frac{5}{16}$$



What *is* a  
**Common  
Denominator?**

# Common Denominator

- A **common denominator** is a number with which both of the denominators share at least one factor that is not the number 1
  - For example, if the denominators are 4 and 7, then a common denominator is 28.
  - 28 shares the factors 1, 2 and 4 with the number 4, and the factors 1 and 7 with the number 7.

So let's go back to our simplification problem from before...

# Addition

- To add two fractions, you must make sure they have a **Common Denominator**
- What can you multiply each fraction by to give the smallest common denominator?

$$\frac{3}{8} + \frac{5}{16}$$

The smallest number that has both of these as factors is 16

Once you have a common denominator, add the numerators.

8 goes into 16 **two** times

$$\frac{3}{8} \times \frac{2}{2} = \frac{6}{16}$$

16 goes into 16 **one** time

$$\frac{5}{16} \times \frac{1}{1} = \frac{5}{16}$$

$$\frac{6}{16} + \frac{5}{16} = \frac{11}{16}$$

# Addition - *Let's Try It!*

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

$$\frac{4}{16} + \frac{2}{8} = \frac{1}{2}$$

$$\frac{6}{8} + \frac{2}{3} = \frac{17}{12}$$

$$= 1\frac{5}{12}$$

$$\frac{13}{16} + \frac{3}{4} = \frac{25}{16}$$

$$= 1\frac{9}{16}$$

# Example:

$$\frac{7}{9} + \frac{9}{27}$$

LCM: 27

$$=\frac{21}{27} + \frac{9}{27}$$

$$=\frac{30}{27}$$

$$=1\frac{3}{27}$$

$$=1\frac{1}{9}$$

LCM:

9; 18; 27  
27; 54; 81

## REMEMBER:

1. Change mixed numbers into improper fractions.
2. Find the LCM by counting in multiples.
3. Change the fraction/s into equivalent fractions.
4. Add/subtract the numerators.
5. Denominators stay the same.
6. Simplify answer:

- **Proper fraction** = make them the smallest they can be by dividing by the same number.
- **Improper fractions** = change into a mixed number and simplify fraction if possible.

# Example:

$$2\frac{2}{3} + \frac{1}{6}$$

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

LCM: 6

$$= \frac{16}{6} + \frac{1}{6}$$

$$= \frac{17}{6}$$

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

LCM:

3; 6; 9; 12  
6; 12; 18

## REMEMBER:

1. Change mixed numbers into improper fractions.
2. Find the LCM by counting in multiples.
3. Change the fraction/s into equivalent fractions.
4. Add/subtract the numerators.
5. Denominators stay the same.
6. Simplify answer:

- Proper fraction = make them the smallest they can be by dividing by the same number.
- Improper fractions = change into a mixed number and simplify fraction if possible.

# Let's practice

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

## REMEMBER:

1. Change mixed numbers into improper fractions.
2. Find the LCM by counting in multiples.
3. Change the fraction/s into equivalent fractions.
4. Add/subtract the numerators.
5. Denominators stay the same.
6. Simplify answer:
  - Proper fraction = make them the smallest they can be by dividing by the same number.
  - Improper fractions = change into a mixed number and simplify fraction if possible.



# Answer

$$= \frac{9}{2} + \frac{13}{6}$$

$$= \frac{27}{6} + \frac{13}{6}$$

$$= \frac{40}{6}$$

$$= 6\frac{4}{6}$$

$$= 6\frac{2}{3}$$

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

# Subtraction

- To subtract two fractions, they also must have a **Common Denominator**
- What can you multiply each fraction by to give the smallest common denominator?

$$\frac{3}{8} - \frac{5}{16}$$

8 goes into 16 **two** times

$$\frac{3}{8} \times \frac{2}{2} = \frac{6}{16}$$

16 goes into 16 **one** time

$$\frac{5}{16} \times \frac{1}{1} = \frac{5}{16}$$

The smallest number that has both of these as factors is 16

Once you have a common denominator, subtract the numerators.

$$\frac{6}{16} - \frac{5}{16} = \frac{1}{16}$$

# Subtraction - *Let's Try It!*

$$\frac{7}{8} - \frac{1}{2} = \frac{3}{8}$$

$$\frac{9}{16} - \frac{3}{8} = \frac{3}{16}$$

$$\frac{6}{8} - \frac{1}{2} = \frac{1}{4}$$

$$\frac{5}{4} - \frac{7}{16} = \frac{13}{16}$$

# Example:

$$\frac{11}{12} - \frac{1}{6}$$

LCM: 12

$$= \frac{11}{12} - \frac{2}{12}$$

$$= \frac{9}{12}$$

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

LCM:

6; 12; 18  
12; 24; 36

## REMEMBER:

1. Change mixed numbers into improper fractions.
2. Find the LCM by counting in multiples.
3. Change the fraction/s into equivalent fractions.
4. Add/subtract the numerators.
5. Denominators stay the same.
6. Simplify answer:

- Proper fraction = make them the smallest they can be by dividing by the same number.
- Improper fractions = change into a mixed number and simplify fraction if possible.

# Example:

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

$$= \frac{27}{5} - \frac{3}{2}$$

LCM: 10

$$= \frac{54}{10} - \frac{15}{10}$$

$$= \frac{39}{10}$$

$$= 3\frac{9}{10}$$

LCM:

2; 4; 6; 8;

10

5; 10; 15

## REMEMBER:

1. Change mixed numbers into improper fractions.
2. Find the LCM by counting in multiples.
3. Change the fraction/s into equivalent fractions.
4. Add/subtract the numerators.
5. Denominators stay the same.
6. Simplify answer:

- Proper fraction = make them the smallest they can be by dividing by the same number.
- Improper fractions = change into a mixed number and simplify fraction if possible.

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

# Answer

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

$$= \frac{65}{8} - \frac{7}{2}$$

$$= \frac{65}{8} - \frac{28}{8}$$

$$= \frac{37}{8}$$

$$= 4\frac{5}{8}$$

$$3\frac{1}{8} + 7\frac{2}{8} - 3\frac{1}{8}$$



# Answer

$$3\frac{1}{8} + 7\frac{2}{8} - 3\frac{1}{8}$$

$$= \frac{25}{8} + \frac{58}{8} - \frac{25}{8}$$

$$= \frac{83}{8} - \frac{25}{8}$$

$$= \frac{58}{8}$$

$$= 7\frac{2}{8}$$

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

$$6 - \left(\frac{1}{2} + \frac{5}{6}\right)$$

# Answer

$$6 - \left(\frac{1}{2} + \frac{5}{6}\right)$$

$$= \frac{6}{1} - \left(\frac{3}{6} + \frac{5}{6}\right)$$

$$= \frac{6}{1} - \frac{8}{6}$$

$$= \frac{36}{6} - \frac{8}{6}$$

$$= \frac{28}{6}$$

$$= 4\frac{4}{6}$$

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

# Review

- A fraction has a numerator and a denominator
- The denominator can never be 0
- You can multiply, divide, add and subtract fractions
- A common factor is a number that both denominators are evenly divisible by
- A common denominator is a number that both denominators share a factor with

- Ex. 6.4 pg. 83

## Exercise 6.4

1. a)  $\frac{3}{4}$   
b)  $\frac{3}{8}$   
c)  $\frac{189}{100} = 1\frac{89}{100}$   
d) 1  
e)  $\frac{3}{250}$   
f)  $\frac{71}{42} = 1\frac{29}{42}$   
g)  $\frac{11}{56}$   
h)  $\frac{19}{15} = 1\frac{4}{15}$

2. Each mixed number must first be written as an improper fraction before adding or subtracting.

$$\text{a) } \frac{97}{21} = 4\frac{13}{21}$$

$$\text{b) } \frac{37}{14} = 2\frac{9}{14}$$

$$\text{c) } \frac{283}{72} = 3\frac{67}{72}$$

$$\text{d) } \frac{31}{12} = 2\frac{7}{12}$$

- Solve problems with fractions
- Ex. 6.5 pg. 84



## Exercise 6.5

1. Ann got  $\frac{13}{25}$  answers correct and Vuyo  $\frac{1}{2}$ . We need to compare these two fractions.

$$\frac{13}{25} = \frac{26}{50} > \frac{1}{2} = \frac{25}{50}$$

Ann got a better score than Vuyo.

2. a) We need to add the fractions.

$$\frac{1}{3} + \frac{2}{5} + \frac{1}{9} = \frac{15}{45} + \frac{18}{45} + \frac{5}{45} = \frac{38}{45}$$

Sissi has spent 38 of the 45 parts of her money.

- b) We need to subtract the answer in 2a. from the whole.  $1 - \frac{38}{45} = \frac{45}{45} - \frac{38}{45} = \frac{7}{45}$

Sissi has 7 out of the 45 parts of her money left over after the purchases.

3.

Again we need to compare the two fractions

$$\frac{4}{5} = \frac{44}{55} < \frac{9}{11} = \frac{45}{55}$$

His father has gone the furthest.

4.

$$\frac{1}{12} + 1\frac{1}{3} = \frac{1}{12} + \frac{4}{3} = \frac{1}{12} + \frac{16}{12} = \frac{17}{12} = 1\frac{5}{12}$$

The total in pounds is 1 pound and  $\frac{5}{12}$  of a pound.

