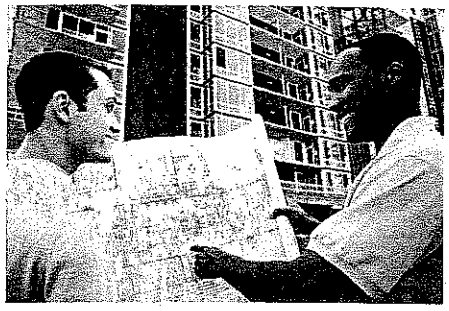
ADDING AND SUBTRACTING FRACTIONS

LESSON 1.3

Add and subtract fractions with like and unlike denominators.



Carpenters, chefs, engineers, surveyors and architects add and subtract fractions often as a part of their work. It is important to remember that two fractions must have a common denominator before you can find their sum or difference. Common denominators can be found by using the least common multiple of the two denominators. The **least common multiple** (LCM) is the smallest non-zero multiple that is common to two or more numbers.

EXAMPLE 1

Find the least common multiple of:
a. 8 and 12 **b. 4 and 5**

SOLUTIONS

a. One method for finding the least common multiple is to list out the multiples of each number until the same number appears on each list.

8, 16, (24) 32, 40 ...
12, (24) 36, 48, 60, 72 ...
The LCM is 24.

b. Another method to find the LCM is to choose the largest number, in this case 5, and look at its multiples.

5, 10, 15, 20, 25, 30, 35 ...

Find the smallest multiple that 4 divides into evenly.

5 – NO
10 – NO
15 – NO
20 – YES ($20 \div 4 = 5$)
The LCM is 20.

When the least common multiple of two denominators is found, it is called the **least common denominator** (LCD). Based on the answer in **Example 1,** the LCD of $\frac{1}{8}$ and $\frac{5}{12}$ is 24 because the least common multiple of 8 and 12 is 24.

ADDING AND SUBTRACTING FRACTIONS

1. If denominators are not equal, rewrite the fractions as equivalent fractions with common denominators using the least common denominator (LCD).
2. Add or subtract the numerators.
3. Write the sum or difference over the common denominator.
4. Write the fraction in simplest form. If the sum or difference is an improper fraction it should be changed to a mixed number.

EXAMPLE 2

Find the value of $\frac{1}{10}+\frac{7}{10}$.

SOLUTION

These fractions already have a common denominator. Add the numerators.

$$\frac{1+7}{10}=\frac{8}{10}$$

Write in simplest form.

$$\frac{8}{10}\overset{\div 2}{=}\frac{4}{5}$$

$$\frac{1}{10}+\frac{7}{10}=\frac{4}{5}$$

EXAMPLE 3

On Monday, the New Orleans International Airport reported $\frac{3}{8}$ inch of rain. On Tuesday it rained $\frac{11}{16}$ inch. What was the total rainfall for these two days?

SOLUTION

The least common multiple of 8 and 16 is 16. Write $\frac{3}{8}$ as an equivalent fraction with a denominator of 16.

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

Write the sum over the LCD.

$$\frac{6}{16}+\frac{11}{16}=\frac{17}{16}$$

Change from an improper fraction to a mixed number.

$$\frac{17}{16}=1\frac{1}{16}$$

It rained a total of $1\frac{1}{16}$ inches in New Orleans on Monday and Tuesday.

EXAMPLE 4

Find the value of $\frac{2}{3}-\frac{1}{4}$.

SOLUTION

The least common multiple of 3 and 4 is 12. Write each fraction as equivalent fractions with a denominator of 12.

$$\frac{2}{3}\overset{\times 4}{=}\frac{8}{12} \qquad \frac{1}{4}\overset{\times 3}{=}\frac{3}{12}$$

Write the difference over the LCD.

$$\frac{8}{12}-\frac{3}{12}=\frac{5}{12}$$