

## Adding and Subtracting Fractions

### Part 1: Adding and Subtracting Fractions with the Same Denominator

PROCEDURE: To add fractions with the same denominator, add the numerators and put the sum over the original denominator. To subtract fractions with the same denominator, subtract the numerators and put the difference over the original denominator.

SAMPLE PROBLEM A:

$$\frac{3}{5} + \frac{1}{5} = ?$$

Add the numerators, and put the sum over the original denominator:

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

SAMPLE PROBLEM B:

$$\frac{8}{11} - \frac{3}{11} = ?$$

Subtract the numerators and put the difference over the original denominator:

$$\frac{8}{11} - \frac{3}{11} = \frac{8-3}{11} = \frac{5}{11}$$

### Practice What You've Learned!

1. Add and subtract to complete the following equations. Reduce your answers to lowest terms.

a.  $\frac{9}{17} - \frac{6}{17} =$  \_\_\_\_\_

b.  $\frac{5}{24} + \frac{4}{24} =$  \_\_\_\_\_

c.  $\frac{5}{4} + \frac{3}{4} =$  \_\_\_\_\_

d.  $\frac{16}{5} - \frac{2}{5} =$  \_\_\_\_\_

### Part 2: Adding and Subtracting Fractions with Different Denominators

Sometimes you have to add or subtract fractions that have different denominators. To do this, you first need to rewrite your fractions so that they DO have the same denominator. Figuring out the **least common denominator (LCD)** of your fractions is the first step.

PROCEDURE: To find the least common denominator of two fractions, find the least common multiple of the denominators. In other words, look at the multiples of the numbers, and find out which they have in common. The common multiple with the lowest value is your LCD.

SAMPLE PROBLEM: What is the LCD of  $\frac{3}{4}$  and  $\frac{2}{3}$ ?

Step 1: List the multiples of 4.

$$(4 \times 1) = 4, (4 \times 2) = 8, (4 \times 3) = 12, (4 \times 4) = 16, \text{ etc.}$$

Step 2: List the multiples of 3.

$$(3 \times 1) = 3, (3 \times 2) = 6, (3 \times 3) = 9, (3 \times 4) = 12, \text{ etc.}$$

The least common denominator of  $\frac{3}{4}$  and  $\frac{2}{3}$  is 12.

### Adding and Subtracting Fractions, continued

#### Lower Away!

2. Find the least common denominators of the following fractions:

a.  $\frac{3}{5}$  and  $\frac{5}{4}$  \_\_\_\_\_

b.  $\frac{7}{8}$  and  $\frac{4}{3}$  \_\_\_\_\_

#### Part 3: Putting the LCD to Work

Now that you know how to find the LCD, you are all set to add and subtract fractions with different denominators. Follow the steps below to see how to use the LCD to add and subtract fractions with different denominators.

PROCEDURE: To add or subtract fractions with different denominators, first find the LCD of the two fractions. Then determine the factor that each denominator is of that LCD. Multiply both the numerator and the denominator by those factors so that the fractions have the same denominator. Then add or subtract the numerators.

SAMPLE PROBLEM:  $\frac{1}{2} + \frac{2}{5} = ?$

Step 1: Find the LCD.

$$(2 \times 1) = 2, (2 \times 2) = 4, (2 \times 3) = 6, (2 \times 4) = 8, (2 \times 5) = 10, \text{ etc.}$$

$$(5 \times 1) = 5, (5 \times 2) = 10, \text{ etc.}$$

The LCD is 10.

Step 2: Determine the factor that each denominator is of the LCD.

Because  $2 \times 5 = 10$ , 5 is the factor of 2.  
Because  $5 \times 2 = 10$ , 2 is the factor of 5.

Step 3: Multiply the factors of the LCD by the fractions.

$$\frac{1}{2} = \frac{1 \times 5}{2 \times 5} = \frac{5}{10} \quad \frac{2}{5} = \frac{2 \times 2}{5 \times 2} = \frac{4}{10}$$

Step 4: Add the fractions.

$$\frac{5}{10} + \frac{4}{10} = \frac{9}{10}$$

#### Use Your Skills!

3. Add and subtract. Don't forget to reduce your answers to lowest terms.

a.  $\frac{2}{9} + \frac{1}{6} =$  \_\_\_\_\_

b.  $\frac{14}{15} - \frac{5}{6} =$  \_\_\_\_\_

c.  $\frac{12}{25} + \frac{2}{5} =$  \_\_\_\_\_

d.  $\frac{1}{2} - \frac{3}{11} =$  \_\_\_\_\_

