

# Tips for Teachers

## Chapter 3 - Fractional Notation and Mixed Numerals

### Sections 3.2 and 3.3 - Addition and Subtraction

#### When Denominators Are Different

Students often say that finding the least common denominator and then writing the fractions with that denominator are the hardest parts of adding and subtracting using fractional notation. There are two keys to helping your students through these difficulties. First, be sure they understand how to find the least common multiple of a set of numbers. This concept can be reinforced as you teach addition and subtraction if, instead of simply stating what the LCD is, you show how to find the LCD for the fractions in each example you do in class. Then emphasize the idea of multiplying by 1 to write the fractions with the least common denominator, carefully explaining how to choose the form of 1 to use for each fraction.

#### Finding the LCD

Suppose, for example, that you are adding  $\frac{3}{8}$  and  $\frac{1}{6}$ . Begin by demonstrating how to find the LCM of 8 and 6 by writing the prime factorization of each number and then using each factor the greatest number of times that is occurs in any one factorization.

#### Writing the Fractions with the LCD

Once you have found the LCD, 24, show the students how to determine the form of 1 to use in expressing each fraction with the LCD. That is, take them through a thought process like the following:

For  $\frac{3}{8}$ , ask “8 times what number equals 24?” Since  $8 \times 3 = 24$ , we multiply  $\frac{3}{8}$  by 1 in the form  $\frac{3}{3}$ . For  $\frac{1}{6}$ , ask “6 times what number equals 24?” Since  $6 \times 4 = 24$ , we multiply  $\frac{1}{6}$  by 1 in the form  $\frac{4}{4}$ .





#### Outlining the Steps to Follow

It will also help to outline the following steps for adding or subtracting with fractional notation and to recite each one as you perform it. Encourage your students to recite these steps also as they do their homework.

To add (or subtract) when denominators are different:

- a) Find the least common multiple of the denominators. That number is the least common denominator.
- b) Multiply by 1, using an appropriate notation,  $\frac{n}{n}$ , to express each number in terms of the LCD.
- c) Add (or subtract) the numerators, keeping the same denominator.
- d) Simplify, if possible.

### Supplement Key Further Instruction and Practice for Your Students

Video	Audio cassette	MathMax CD-ROM	InterAct Math Online Exercises	Printed Test Bank/ Instructor's Resource Guide	
				Exercises	Chapter Review
Tape 5	5A & 5B	Sections 3.2 & 3.3		p. 623	p. 697

## Section 3.5 - Addition and Subtraction: Mixed Numerals

When adding or subtracting mixed numerals, students often find it challenging to deal with the fractional parts of the numerals. In methodically going through *each* step in the process in class, you will demystify the process for your students and give them confidence that they too can follow these steps. Students should be admonished to include *all* of the steps when they do their homework, since skipping steps can lead to mistakes.

### Addition

It is often necessary to to rewrite the fractional part of a sum as a mixed numeral in order to express the final sum correctly. Show your students all of the steps below when you teach this topic.

Add:  $8\frac{3}{4} + 5\frac{5}{6}$ .

The LCD is 12.

$$\begin{array}{r} 8 \boxed{\frac{3}{4} \cdot \frac{3}{3}} = 8 \frac{9}{12} \\ + 5 \boxed{\frac{5}{6} \cdot \frac{2}{2}} = +5 \frac{10}{12} \\ \hline 13 \frac{19}{12} = 13 + \frac{19}{12} \\ = 13 + 1 \frac{7}{12} \\ = 14 \frac{7}{12} \end{array}$$

To find a mixed numeral for  $\frac{19}{12}$  we divide:

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

### Division

In subtraction, it is often necessary to borrow in order to be able to subtract the fractional parts of mixed numerals. As with addition, it is important to be methodical and thorough as you do examples in class, describing each step as it is done.

Subtract:  $34\frac{1}{3} - 12\frac{5}{8}$ .




The LCD is 24.

$$\begin{array}{r} 34 \boxed{\frac{1}{3} \cdot \frac{8}{8}} = 34 \frac{8}{24} = 33 \frac{32}{24} \\ - 12 \boxed{\frac{5}{8} \cdot \frac{3}{3}} = -12 \frac{15}{24} = -12 \frac{15}{24} \\ \hline 21 \frac{17}{24} \end{array}$$

(Since  $\frac{8}{24}$  is smaller than  $\frac{15}{24}$ , we cannot subtract until we borrow:

$$34\frac{8}{24} = 33 + 1 + \frac{8}{24} = 33 + \frac{24}{24} + \frac{8}{24} = 33 + \frac{32}{24} = 33\frac{32}{24}.)$$

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 Further Instruction and Practice for Your Students

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			Exercises	Chapter Review
Tape 6	6A		p. 625	p. 697