

Fractions: Booklet 3 - Mixed Numbers and Improper Fractions

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The cover mandala and many delightful illustrations are by Karen Marie Christa Minns. Other illustrations are by Suki Glenn and ClickArt by T/Maker.

To all of the mathematicians, from antiquity to the present, who discovered the principles of mathematics goes our heartfelt appreciation for your dedication.

Patterns in Arithmetic: Fractions - Booklet 3

Parent/Teacher Guide

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Mixed Numbers to Improper Fractions

- Purpose** The purpose of this lesson is to introduce the concept of mixed numbers and improper fractions and how to change a mixed number into an improper fraction using a manipulative. The student uses the familiar fraction piece that is used to show the whole and places it with one other smaller fraction piece. The whole is then traded for the same smaller fractional pieces and the total counted up and written as an improper fraction. This simple procedure is then recorded, analyzed, and constructed into an algorithm for calculating the improper fraction from the mixed number.
- Note** While it seems much faster to just tell the student how to change a mixed number into an improper fraction,* doing so has two negative consequences. First, it prevents her from developing the skill of seeing patterns and formalizing them into mathematical procedures. This is what mathematicians do. It is where the fun is. Second, even for a student who does not easily create procedures from patterns, constructing a procedure with a teacher allows her to understand why a particular procedure works. If the procedure is simply memorized, it is likely to be filed in the brain with all of the other memorized procedures she will learn for fractions, and there are many of them. Accurate retrieval is then based solely on the skill of memory and no mathematical skill other than the multiplication tables. Many students get memorized procedures mixed up time and time again. In the long run, it is actually faster to have them construct understanding so they can reconstruct the procedure whenever needed.
- Prerequisites** Division - Booklet 1, Fractions - Booklet 1, and Fractions - Booklet 2
- Materials** Mixed Numbers to Improper Fractions - Worksheets 1 - 9, pages 3 - 11
Prism Fractions Circles (plus a paper set), or Prism Fractions Squares
Pattern blocks
- Warm Up** Make wholes with the fraction pieces. Discuss the pattern that to make one whole, the numerator and the denominator are equal. And, if you have more than one whole, the numerator will be a multiple of the denominator, for example, $\frac{2}{2}$, $\frac{4}{2}$, $\frac{6}{2}$.
- Lesson Part 1** Mixed Numbers to Improper Fractions - Worksheet 1, page 3, is an instructional page for both the student and the teacher. Have her read it aloud. Do this page together. Then do the top row of problems on Mixed Numbers to Improper Fractions - Worksheet 2, page 4, together. On the second row, have her work on the problems with you watching. If she is secure, have her finish the worksheet alone and go on to Mixed Numbers to Improper Fractions - Worksheet 3, page 5. Check answers to be sure the work is done correctly.
- Part 2** Mixed Numbers to Improper Fractions - Worksheet 4, page 6, switches the manipulative to pattern blocks and uses the changing whole. This requires her to reconstruct her understanding of the relationship between parts and wholes on every problem.
- *Multiply the denominator by the whole number and add the numerator. Place this number in the numerator and keep the denominator the same.