Chapter 7
Notes for Instructors

Content

The focus of this chapter is the Real Number System. Up to this point in the course the need for richer number systems has been obvious because we desire to have closure under the basic operations of arithmetic. For example, in moving from the Whole Number System to the Integers, we gain closure under subtraction. It may not be so obvious why we need to move from the Rational Number System to the Real Number System. Consequently, I think it is important to prove that the $\sqrt{2}$ is irrational. Beyond that, I did not have much time to spend on Chapter 7. Consequently, I spent very little time on the last two sections of this chapter; it was unfortunate, but necessary.

Manipulatives

We have the base ten blocks which can be used to represent decimals. Note that it is important that you do not call the small cube the unit when working with decimals. The unit will have to be the long, the flat, or the large block, depending on the magnitude of the numbers you wish to represent. For example, if I needed to represent 134.5, then my unit would be the long, and I would represent this with one large block, three flats, four longs (units) and five small cubes. On the other hand, if I wanted to represent 23.56, then my unit would be the flat, and I would represent this with two large block, three flats (units), five longs, and six small cubes.

You can also use money to represent decimals. I haven't seen any problems with this approach, but there does appear to be some discussion about this technique among educators. I'm not sure what their objections are, but you should be aware that a certain faction of educators is somewhat leery of this approach.

The place value cards that we used to represent whole number arithmetic can be easily adjusted to represent decimal addition and subtraction.

Notes and Suggestions:

Notes on Section 7.1: *Decimals*

- I believe that it is important to prove that the $\sqrt{2}$ is irrational. This proof will provide students with a wealth of irrational numbers. In order to understand this proof, students will need to be reminded about the Fundamental Theorem of Arithmetic. You will also need to familiarize them with the following idea based on the FTA: If a and p are integers, p is prime, and p is a factor of a^2, then p is a factor of a. You should also convince students that this is not true if we remove the restriction that p is prime.

- I wanted my students to be able to do problems similar to those in Examples 7.3, 7.4, 7.5, and 7.6 on pages 419–421 of the textbook.

Notes on Section 7.2: *Computations with Decimals*

- When working with terminating decimals, students should see the connection between fraction arithmetic and decimal arithmetic.
- In theory, these students should see scientific notation and significant digits in a science class, so I tried not to spend too much time on this section.

Notes on Sections 7.3 and 7.4: *Ratio and Proportion* and *Percents*

- I spent very little time on these sections. I did try to ensure that they could do basic calculations with percents similar to those in problems 1–11 of section 7.4. Any extra time you have to devote to these sections would certainly be worthwhile.

Worksheets

I have included two worksheets with this documentation.