Section 4.4: Clock Arithmetic

Materials needed:

- Scissors
- 2 paper plates (I'll supply these)

Describe the set of numerals in 12-hour clock arithmetic.

Use the 12-hour clock plates to compute the sums:

$5 +_{12} 3$ $8 +_{12} 9$

Use the 12-hour clock plates to compute the products:

$5 *_{12} 3$ $8 *_{12} 9$

Describe an algorithm that computes the sums and products without the plates.

Clock arithmetic is similar to counting in other bases because:

Clock arithmetic is similar to counting in imaginary units because:

Clock arithmetic is similar to trigonometry in this way:

Properties of our numeration system include

- Closure for both addition and multiplication
- Addition and multiplication are both commutative
- Addition and multiplication are both associative
- 0 is the additive identity element and 1 is the multiplicative identity element

Discuss whether or not these properties hold for 12-hour clock arithmetic.

Compute the following 12-hour clock differences using the plates then determine an algorithm to do the computations:

$5 -_{12} 3$

$8 -_{12} 9$

Look up the definition of clock subtraction in your text. How does this definition help you calculate these differences?

Explain how your calculations above are examples of *Theorem: Clock Subtraction as Clock Addition*.

In our number system *a* and - *a* are known as *additive* inverses. Explain why.

Name the additive inverse of *a* in 12-hour clock arithmetic.

Which of the numeration properties hold for 12-hour clock arithmetic?

12-Clock division: Use a multiplication chart similar to the one on page 289 to perform the following quotients:

$6 /_{12} 5$ $8 /_{12} 9$

How does 10-hour clock arithmetic perform like 12-hour clock arithmetic?

Explain how postage bar codes on relate to 10-hour clock arithmetic.