Name _____ Date _____

LESSON 1.2 — Math and History Application

For use with the lesson "Apply Order of Operations"

History Few details of Muhammad ibn Musa al-Khwarizmi's life are known. He was born around 790 A.D. in the town of Khwarizm (now Khiva), in the Khorasan province of Persia (now in Uzbekistan) and died around 840 A.D. His family moved to a place near Baghdad soon after he was born. He studied at the House of Wisdom in Baghdad and wrote on several subjects including mathematics, astronomy, cartography, and geography. One of his mathematics books, titled *Al-Jebr W'al-Muqabala*, gave us the word *algebra* from *al-jebr*.

The word *al-jebr* originally meant to move a negative term to the other side of an equation. The word *al-muqabala* meant to balance an equation. In time however, the term *al-jebr*, or algebra, came to include all operations involved in modern algebra.

The purpose of the book, in al-Khwarizmi's own words, was to teach:

> what is easiest and most useful in arithmetic, such as men constantly require in cases of inheritance, legacies, partition, lawsuits, and trade, and in all their dealings with one another, or where the measuring of the lands, the digging of canals, geometrical computations, and other objects of various sorts and kinds are concerned.

The book was intended to be highly practical and algebra was introduced to solve real-life problems that were part of everyday life in the Arab empire at that time. How modern algebra is taught and the use of algorithms can be traced to al-Khwarizmi's work.

Math In *Al-Jebr W'al-Muqabala*, al-Khwarizmi did not use any symbols, not even numerals, and he expressed everything in words. This book was used as an algebra text for hundreds of years. He used a systematic and logical approach to solving linear and quadratic equations which is still used today.

1. *Explain* why al-Khwarizmi may have written an algebra book without using any symbols. If your algebra book was written without using symbols, estimate how many pages would be needed.

2. The steps taken to solve an expression such as $\dfrac{3 \cdot 8 - 4}{2} = 10$ may have been written in al-Khwarizmi's *Al-Jebr W'al-Muqabala* as follows.

   > I multiplied three and eight and got twenty-four, then subtracted four and got twenty; finally I divided twenty by two and got ten.

   Write two algebraic expressions and evaluate. Next, write the steps taken to evaluate the expression in words without using symbols.