

## Xmania Numeration System Needed

Xmaina – Space travelers have just returned from the planet of Xmania, a civilization far, far away. Prior to this recent voyage, this civilization has had no contact with our civilizations on Earth. The space travelers spoke to the people of Xmania about their numeration system. They learned that Xmania had a numeration system that works like this: 0 (a fist), A (one finger), B (two fingers), etc. A young man was asked his age and he flashed both hands twice and then six fingers and said “Z.” The space travelers report that anything more than Z is called *many*.

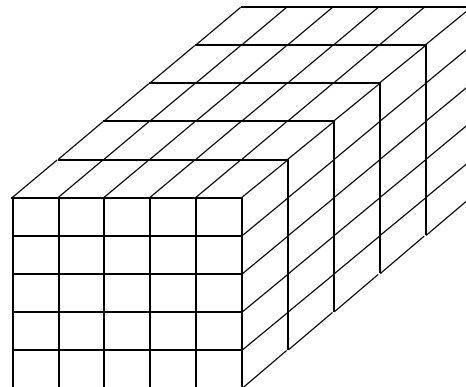
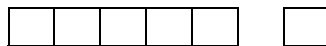
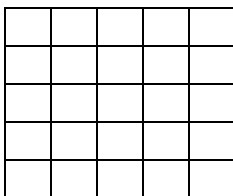
Prominent mathematicians of Xmania said, “The people of

Xmania were very dissatisfied with our own numeration system.” In fact, the Xmanians were so dissatisfied they gave all their mathematicians generous grants to work on designing a different numeration system. “Xmania’s mathematicians worked on this problem for several years until one day a certain mathematician announced the successful design of a new system.” The new system uses only the symbols 0, A, B, C, and D. In this system you can represent any number, no matter how large and you can add, subtract, multiply, and divide.

The space travelers found out that the mathematician that designed this system died

before she was able to publish a full description of the number system. She did leave some objects on her desk that she was going to use to explain this system. (See diagrams below) The people of Xmania are seeking the help of other civilizations to recreate this numeration system.

In your groups, your task is to come up with a possible numeration system for Xmania that fits the description. That is, it is based only on the symbols 0, A, B, C, and D; it can represent any number; and you can operate in it. You should use the objects to help you develop and explain your system.





**Develop a numeration system based only on the symbols O, A, B, C, and D. Be able to answer the following questions about the system.**

- Begin counting in your system... How do you write 8, 60, and 241 (“our” numbers)?
- What does each symbol represent? Explain the rules for “making” the numerals in your system.
- How do the objects left behind by the mathematician help to explain the system?
- What are some advantages/disadvantages of your system when compared with the original Xmania system? When compared with “our” system?
- How do you add, subtract, multiply, and divide with numerals in the system?