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Basics of Ancient Number Systems

From simple tally marks on a stick to complex written number systems that could be used to perform many types of calculations, people in the ancient world developed and used a wide variety of number systems. In this lesson, learn how ancient number systems were developed and used.

The Earliest Number Systems

For many thousands of years, people have counted things using their fingers and toes. At least 25,000 years ago, people also began making **tally marks**, marks on a stick or stone tablet to record numbers.

Tally marks are still used today by many people, maybe even you! You probably have used tally marks to keep up with the score of a game or count votes. Most tally mark systems have some way to represent multiples, usually of five or ten, by placing a slash or other marker through the earlier marks. This makes it easy to see how many marks you have. This simple number system was sufficient for many thousands of years and is still used in many situations, but it is difficult to record large numbers or perform complex mathematical operations using only tally marks.

Babylonian Number System

Approximately 5,000 years ago, one of the first written number systems arose in Babylon, which used a base of 60. Number systems with a base of 60 are called **sexagesimal**. For numbers less than 60, the Babylonians used a base-10 system. All of the Babylonian numbers could be written by combining just two symbols, as compared to the ten different symbols we use to represent numbers today.

The Babylonian system came from earlier Sumerian and Akkadian number systems, which were also sexagesimal. The Babylonians improved on earlier systems, however, by developing a positional system, in which the same symbol could be used to represent different orders of magnitude, depending on where it was located in the number. This was a major achievement that had not been done before. Our number system today is positional, as well. The same symbol, for example, 1, can be used to represent 1, 10, or 100 depending on where it is located.

You might be surprised to learn that even though it was developed thousands of years ago, we still use the Babylonian base-60 number system in some ways today. For example, there are 60 seconds in a minute and 360 degrees (or 6 times 60) in a circle.

Roman Number System

The Roman number system was in used in ancient Rome and in most of Europe for many years after the end of the Roman empire. In some situations, Roman numerals are still used today throughout the world.

The **Roman number system** was based on seven symbols that could be arranged to represent any positive number. The Roman number system did not include zero or negative numbers, and most historians believe that it derived from a primitive system of tally marks. The seven roman numeral symbols had the following values:

I - is one

V - is five

X - is ten

L - is fifty

C - is one hundred

D - five hundred, and

M - one thousand

The Roman number system was not positional like the Babylonian system, so the value of each symbol was simply added together to get the total value. For example, the Roman number MMDLXXII represents the number 1000 + 1000 + 500 + 50 + 10 + 10 + 1 + 1, which is 2,572 using modern notation.

Mayan Number System

A very different type of number system was developed in the Americas by the Mayan civilization. The **Mayan number system** was a base-20 number system that included the number zero. The numerals were made up of only three shapes: a shell shape to represent zero, a dot to represent one, and a bar to represent five. The Mayan system was positional like the Babylonian system, meaning that these simple shapes were arranged in a specific order to record a number.

Hindu-Arabic Number System

Sometime between the first and fourth centuries CE, Indian mathematicians developed a new positional number system that used ten different symbols to represent numbers. This new system also used decimals to represent numbers less than one. In the ninth century, this system of numbers began to be used by mathematicians in the Middle East. This is why it later came to be called the **Hindu-Arabic number system**.

If a number system based on ten symbols sounds familiar to you, that's because it is! The Hindu-Arabic number system spread to Europe by the Middle Ages and is now the most commonly used number system throughout the world. Although the ten symbols look different in different parts of the world, the Hindu-Arabic number system operates according to the same rules throughout most of the world.

Lesson Summary

The earliest number systems were simple **tally marks**, probably first made on sticks and later on stone tablets or pottery. The **Babylonian number system** was the first known positional number system, and it was **sexagesimal**, meaning it used a base of sixty. The **Roman number system** was based on seven symbols that could be arranged to represent any positive number. It evolved from simple tally marks, and although it was not positional like the Babylonian system, it was very successful and widely used throughout Europe for hundreds of years. It is still used in some instances today.

The **Mayan number system** was developed by the Mayan civilization in Central America, and it used dots and bars to represent numbers using a positional system. The Mayan number system also had a zero, which many ancient number systems did not. Finally, the **Hindu-Arabic number system** used ten different symbols to represent numbers. It was developed by Indian mathematicians and eventually spread to the Middle East and Europe. Now, it is used throughout the world.