

# Lesson 5: Maya Number System

The Maya had a number system unlike the one students are accustomed to using today. Introduce students to the Maya number system and challenge them to solve math equations using these numbers.

This lesson complements the **Mayan Mysteries'** Math puzzle as well as the **MayaNumbers** companion app. To learn more about the game and app, visit [www.dig-itgames.com](http://www.dig-itgames.com).

## *Objectives:*

- Identify the Maya number system as a place-value system
- Identify the symbols used in the Maya number system
- Read and identify the value of Maya numerals

*Materials:* The *Maya Number System* student [activity sheet](#).




*Time Required:* 30 minutes

## *Directions:*

1. Introduce students to the structure of the Maya number system. The Maya number system is a vertical place-value system. It is a base-20 system (a vigesimal system) made up of three symbols: a dot represents 1, a line represents 5, and a shell represents 0. The symbols are repeated to represent larger numbers. The place values were multiples of 20, so each place value was 20 times greater than the one that came before it. The place values were: 1s, 20s ( $20 \times 1$ ), 400s ( $20 \times 20$ ), 8,000s ( $20 \times 400$ ), and so on. The numbers 1 through 4 were written using a row of dots. The number 5 was written using one horizontal line. Numbers 6 through 19 were written using a combination of lines and dots, or a combination of 5s and 1s. For example:
  - 6 was written using one line with a dot above it ( $5+1$ )
  - 10 was written as two stacked lines ( $5+5$ )
  - 19 was written using three stacked lines with a row of four dots above them ( $5+5+5+1+1+1+1$ )
2. (See the Maya Numeral Chart on the student worksheet as a

reference.) For numbers greater than 19, the symbols were arranged in place values based on 20s, with the greatest value on top. The shell, representing zero, was used as a placeholder for numbers greater than 19. Many believe that the Maya were the first to use a symbol for zero and consider this to be one of their greatest achievements. Review these examples with students to explain the process of writing Maya numbers:

- 30 was written using a dot in the 20s place and two lines in the 1s place:  $(1 \times 20) + (5 + 5)$
- 80 was written using four dots in the 20s place with a shell beneath it representing zero ones:  $((1 + 1 + 1 + 1) \times 20) + (0 \times 1)$
- 302 was written using three lines in the 20s place, above two dots in the 1s place:  $((5 + 5 + 5) \times 20) + (1 + 1)$
- 400 was written using a dot in the 400s place above two stacked shells:  $(1 \times 400) + (0 \times 20) + (0 \times 1)$
- 2,040 was written using a line in the 400s place, 2 dots in the 20s place, and a shell in the 1s:  $(5 \times 400) + (2 \times 20) + (0 \times 1)$

8,000					
400				•	—
20	•	• • • •	≡		• •
1	≡		• •		
Value of Number	<b>30</b>	<b>80</b>	<b>302</b>	<b>400</b>	<b>2,040</b>













3. Distribute the *Maya Number System* student activity sheet and review the instructions and examples with the students. Have students work independently or with partners to complete the exercises.
4. As a follow-up activity:
  - Have students work with a partner to identify similarities and

differences between the Maya Number System and our Hindu-Arabic Number System.








- Have students create their own Maya Number System math problems such as the ones included on the activity sheet.
- Host a class competition using the **MayaNumbers** app.
- Have students compare and contrast the Maya numeral system with the counting system used in the Maya calendar. Students can learn more about the calendar system in the **Mayan Mysteries** Calendar puzzle.

# Student Activity Sheet Answers:

Part One:

 +  = 
 x  = 
 +  = 
 -  = 

Part Two:

8,000	•			• •
400		• • •		•
20	• • •			
1	• •			• • •
Value of Number	<b>8,062</b>	<b>1,340</b>	<b>2,812</b>	<b>16,703</b>