Name: _____ Date: _____

The Story of Zero

Circle group

Zero seems so plain that it is hard to picture numbers without it. But for much of history, people counted with no zero at all. Its story took thousands of years.

Early number systems had a problem. They had no way to show an empty place. So 25 and 205 could look almost the same. More than two thousand years ago, scribes in Babylon began to use a special mark. It showed that a column was empty. Far away, the Maya of Central America made their own symbol for zero. It looked like a shell. They used it in their calendars.

The next step was bigger. In India, mathematicians began to treat zero as a number. Around the year 628, an Indian scholar named Brahmagupta wrote rules for adding, subtracting, and multiplying with zero. His rules showed that adding zero to a number leaves it the same.

Scholars in the Arab world studied the Indian system. They carried it west. In 1202, an Italian mathematician named Fibonacci wrote a book. It taught the digits and the zero to European merchants. At first, many people did not trust the odd new symbol. Over time, they saw that it made math much easier than Roman numerals did.

Today zero is the base of place value. It lets us write any number with only ten digits. It is also part of the binary code that computers use. Every message there is built from zeros and ones.

Questions

1. Why was it a problem to have no way to show an empty place?

_____

_____

2. Which two peoples made a symbol for zero?

_____

_____

3. What did Brahmagupta do around the year 628?

_____

_____

4. What did Fibonacci's book do in 1202?

_____

_____

5. How was zero in India different from zero in Babylon?

_____

_____

6. Why did Europeans come to like the new number system more than Roman numerals?

_____

_____

Words to know

scribes: people whose job was to write and keep records
merchants: people who buy and sell goods

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Story of Zero

Triangle group

Zero seems so ordinary that it is hard to imagine numbers without it. Yet for much of history, people counted with no zero at all. Its story took thousands of years.

Early number systems had a problem. Without a way to show an empty place, the numbers 25 and 205 could look almost the same. More than two thousand years ago, scribes in Babylon began using a special mark to show that a column was empty. Far away, the Maya of Central America also invented a symbol for zero, drawn like a shell, and used it in their calendars.

The next step was bigger. In India, mathematicians began to treat zero as a number in its own right. Around the year 628, an Indian scholar named Brahmagupta wrote down rules for adding, subtracting, and multiplying with zero. His rules showed, for example, that adding zero to a number leaves it unchanged.

Scholars in the Arab world studied the Indian system and carried it west. In 1202, an Italian mathematician named Fibonacci wrote a book that explained the digits and the zero to European merchants. At first, many people distrusted the strange new symbol. Over time, they saw that it made arithmetic much easier than Roman numerals did.

Today zero is the foundation of place value, which lets us write any number with only ten digits. It is also part of the binary code that computers use, where every message is built from zeros and ones.

Questions

1. Why was it a problem to have no way to show an empty place in a number?

_____

_____

2. Which two peoples in the passage invented a symbol for zero?

_____

_____

3. What did Brahmagupta do around the year 628?

_____

_____

4. What did Fibonacci's book do in 1202?

_____

_____

5. How is zero in India different from zero in Babylon?

_____

_____

6. Why did Europeans come to prefer the new number system over Roman numerals?

_____

_____

Words to know

scribes: people whose job was to write and keep records
merchants: people who buy and sell goods
distrusted: did not feel sure about or believe in
foundation: the base that something else is built on

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Story of Zero

Square group

Zero seems so ordinary and familiar that it is difficult to imagine numbers without it. Yet throughout much of human history, people counted and calculated with no zero whatsoever, and its remarkable story unfolded gradually over many thousands of years and across several continents.

Early number systems suffered from a serious weakness. With no means of indicating an empty place, the numbers 25 and 205 could look nearly identical. More than two thousand years ago, scribes in Babylon began to use a special mark to show that a column was empty. Far away, the Maya of Central America independently invented a symbol for zero, drawn in the shape of a shell, which they used in their elaborate calendars.

The next advance was far more significant. In India, mathematicians began to treat zero as a genuine number in its own right. Around the year 628, an Indian scholar named Brahmagupta recorded rules for adding, subtracting, and multiplying with zero, and his rules demonstrated, for example, that adding zero to any number leaves that number unchanged.

Scholars in the Arab world studied the Indian system and carried it westward. In 1202, an Italian mathematician named Fibonacci wrote a book that explained the digits and the zero to European merchants. Initially, many people distrusted the unfamiliar symbol, but over time they recognized that it made arithmetic far easier than Roman numerals ever had.

Today zero is the foundation of place value, which allows us to write any number, no matter how enormous, using only ten digits. It also forms part of the binary code that computers rely upon, in which every message is constructed from zeros and ones.

Questions

1. Why was it a serious weakness to have no means of indicating an empty place?

_____

_____

2. Which two peoples invented a symbol for zero in the passage?

_____

_____

3. What did Brahmagupta record around the year 628?

_____

_____

4. What did Fibonacci's book accomplish in 1202?

_____

_____

5. How did the Indian understanding of zero differ from the Babylonian one?

_____

_____

6. Why did Europeans eventually prefer the new number system to Roman numerals?

_____

_____

Words to know

scribes: people whose job was to write and keep records
merchants: people who buy and sell goods
distrusted: did not feel sure about or believe in
foundation: the base that something else is built on

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Story of Zero

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Story of Zero

Easier · 239 words · Flesch-Kincaid grade 5.4

1. The numbers 25 and 205 could look almost the same.
2. The Babylonians and the Maya.
3. He wrote rules for adding, subtracting, and multiplying with zero.
4. It taught the digits and zero to European merchants.
5. In India it was a number of its own, not only a mark for an empty place.
6. It made math much easier.

Triangle: The Story of Zero

This passage · 241 words · Flesch-Kincaid grade 8.2

1. The numbers 25 and 205 could look almost the same.
2. The Babylonians and the Maya.
3. He wrote down rules for adding, subtracting, and multiplying with zero.
4. It explained the digits and zero to European merchants.
5. In India it was treated as a number in its own right, not only a placeholder.
6. It made arithmetic much easier.

Square: The Story of Zero

Harder · 271 words · Flesch-Kincaid grade 12.6

1. The numbers 25 and 205 could look nearly identical.
2. The Babylonians and the Maya.
3. Rules for adding, subtracting, and multiplying with zero.
4. It explained the digits and the zero to European merchants.
5. In India zero was treated as a genuine number, not only a mark for an empty place.
6. They recognized that it made arithmetic far easier.