TITLE

THE STORY OF ZERO

GRADE LEVEL: ELEMENTARY (K-3)

DISCIPLINE: Math, social science

TOPIC: The history of how zero developed, and its operations in mathematics.

STANDARDS: CCSS.MATH.CONTENT.K.CC.A.3 | CCSS.MATH.CONTENT.K.CC.C.o | CCSS.MATH.CONTENT.K.OA.A.1 | CCSS.MATH.CONTENT.1.OA.A.1 | CCSS.MATH.CONTENT.2.NBT.A.1 | CCSS.MATH.CONTENT.2.NBT.A.I.A, CCSS.MATH.CONTENT.2.NBT.A.1.B | S.MATH.CONTENT.3.0A.D.9

OBJECTIVES:

- Understand and explain zero's value as a number.
- Have students use zero in mathematical operations appropriate for their grade level.
- Know the story of zero and the unique contributions of those advancing the idea of zero as a numerical value, especially of Indian mathematicians.

ESSENTIAL QUESTIONS:

- What is zero? How does zero show up in real lite?
- How does zero work in mathematical operations such as addition and subtraction, and how does it work as a placeholder?
- Where did the idea of "zero" come from? How did the idea change over time?
- Why is it important to honor the creators of important mathematical concepts, especially those who are underrepresented in history!

MATERIALS NEEDED:

- Computer/projector to display video
- Printouts of homework worksheet

CLASSROOM HOURS NEEDED: 1 hour

FINAL ASSESSMENT TYPE: Worksheet

KIT INCLUDES:

- *Background Reading for Educator*
- *Glossary of Terms*
- *PowerPoint Slides*
- *Diversity Our Narrative Origins of Zero Video*
- *Zero by Kathryn Otoshi video*
- *Zero Is The Leaves On The Tree by Betsy Franco video*
- *Worksheet*

CREDIT AUTHOR AND CONTACT: *Ariana Kretz* *akretz@diversifyournarrative.com*

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DAY 1, INTRODUCTION (5 MINUTES)	Bring students to a circular formation, ideally on the floor. Introduce the concept of today's lesson plan as learning about zero. Ask students the following questions: - Where have you heard of zero before? - Have you ever seen zero in real life? - What's your definition of zero? Give students an example of how zero has come up in your own life.
INTRODUCTION ACTIVITY (15 MINUTES)	• Next, have students play the "Zero game," a Montessori method activity. For this, you'll need a set of cards for your students with numbers on them and include the number zero on a few of the cards. You'll also need boxes of different objects. The objects can be pencils, pebbles, shells, or anything you have handy. Make sure to separate the objects into boxes based on what they are. • Have each student pick a card and ask them not to show it to anyone else. After all students have a card, ask them to pick out the number of objects from the circle that is written on their card • When students are done collecting the items, have them go back to their circle. Go around the circle, and have students guess the numbers their peers had based on the number of objects they have. • One person should have zero objects. Take a chance to tie the idea of nothing and the number zero together.
VIDEO: 15 MINUTES	• Next, have students go back to their seats and watch Diversify Our Narrative's "Origins of Zero" video. • Throughout the video, there will be instances where you'll be asked to pause and discuss concepts with your students. Make sure to do so and help guide the conversation.
VIDEO: 15 DEBRIEF	If necessary/there is time, reinforce concepts from the video using the following discussion questions: - Where was zero first thought of as a placeholder? - Where was zero first thought of as a number? - Who were the two mathematicians who thought of zero as a number?

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VIDEO DEBRIEF CONT.	• What about South Asian culture helped these mathematicians invent zero? Why is it important to know this story about zero? If there is time, you can also include these more complex questions: - Did anything surprise you about the video? - What was one thing you learned that was new? - What was your favorite part of the video? - Wilbyou use ideas from the video in your daily life? How?
DAY 2, MINI LECTURE:	After finishing the video debrief, you can move on to teaching about the mathematical rules for zero. Use this slideshow to assist in teaching students about mathematical concepts of zero or use the slideshow as a workbook students can follow. If using as a slideshow, ask students to use a piece of paper to do the problems along with you. The slideshow is broken up by grade level, since K-3 students should be at different levels of understanding about zero. We suggest that you stop at the appropriate grade level but review concepts from previous grade levels. For K-1 grade levels, we suggest also reading aloud one of the following books. This can take the place of the mini lecture if you feel your students will be more responsive to it. If you do the read aloud, do not use the worksheet. (Additional 7 minutes) - *Zero by Kathryn Otoshi video* - *Zero Is The Leaves On The Tree by Betsy Franco video*
TAKE HOME ASSIGNMENT:	To reintorce concepts from the mini lecture, assign this *worksheet*. The worksheet is also separated by grade level. Make sure students know that they only have to complete the problems leading up to their grade level (i.e. A kindergarten student would only complete kindergarten level problems, whereas a third grade level student would complete problems from K-3 grade.), but they can try the harder levels if they want.

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