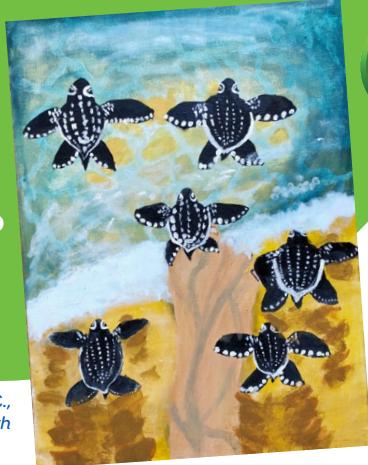


Create Books that Add, Subtract, Multiply, and Divide



Kedaton C.,
Save Leatherbacks with Math



Math As a Visible Language

Introduction

People use math every day, all day! Add the number of plates needed to set the table. Subtract the two eggs used in a recipe. Multiply the price of a smoothie times the three purchased. Divide the number of markers among the family members who are coloring together. Turn everyday situations into math stories and create homemade books that feature math operations: addition, subtraction, multiplication, or division—whatever is age appropriate for each child.

LEARNING OBJECTIVES

Children will:

- observe how math is everywhere and discuss how math operations (addition, subtraction, multiplication and division) are relevant in real life;
- imagine an adventure that uses math symbols as characters and provide a setting and plot for the story, with a beginning, middle, and end; and
- create a handmade book that demonstrates knowledge of age-appropriate math operations and blends that math content into the storyline.

Vocabulary

math symbols	problem-finding	publish
characters	problem-solving	author
plot	math operations	illustrator
setting	main ideas	
adventure	surprise	

Essential Questions

- What are some ways people use math operations every day? What examples pertain to addition, subtraction, multiplication, and division?
- What symbols are used in those math operations? What if those symbols became imaginary characters who had math adventures?
- Why is setting and plot important in a story? How are well-crafted stories framed with a beginning, middle, and end, and how are those sections used to organize what happens?
- What role does illustration serve in shaping a story and communicating the main ideas?

Guiding Questions

- Which math symbols will the young author and illustrator use as story characters?
- What adventures could the math symbol characters go on and what experiences might surprise readers?
- How would the math operations be important parts of the story as the characters are involved in problem finding and problem solving?
- Why do adventure stories need to be organized with a clear beginning, middle, and end? Where would surprises in the plot or setting occur?
- How many pages will the book have, and what images and words will go on each page?

Supplies

- Paper (scrap paper, newspaper, or drawing paper)
- Crayola® Colored Pencils
- Crayola® Crayons
- Crayola® Markers

Prepare

This lesson will take some time to complete. Set up a work station that enables the young author/illustrator to return to work on this book over several days.

Five Math Processes
(adapted from the National Council of Teachers of Mathematics)

1. PROBLEM SOLVING
How will mathematics be used to solve problems?

2. REPRESENTATION
What representations and models can be created to organize, record, and communicate mathematical ideas?

3. COMMUNICATION
How will mathematical thinking be communicated clearly using symbols and through spoken, written, and visual languages to express ideas precisely?

4. REASONING & PROOF
How will various types of reasoning and methods of proof be used to develop and evaluate mathematical arguments and fundamental ideas?

5. CONNECTIONS
What connections can be made that recognize mathematical ideas, see how they interconnect and build on one another, and apply to subjects other than mathematics?

Look closely at the art on this page and other art around you and relate the images to the math processes.

REPRESENTATION: Which math operational symbols will be the story characters?

COMMUNICATION: How will mathematical operations be communicated throughout the story? Which aspects will be realistic and which will be imaginary?

CONNECTIONS: How will the young author/illustrator connect the ideas in the book with real-life situations that pertain to the math operations?



- Review age-appropriate math operations with the young author/illustrator that could include addition, subtraction, multiplication, and/or division.
- Have children sketch one or more symbols that are used in the selected math operations that add details to the sketch that suggest personal characteristics.
- Ask children to imagine that the math symbols were characters who go on an adventure and encounter math problems to solve. Where would they go? Would the story setting be real or imaginary? What problems might they experience? How could math help them solve those problems?
- Have children organize the ideas into a story with a beginning, middle, and end and to be sure to include at least one surprise in the story.
- Discuss how publishers produce books. Have children take on the role of a math book publisher by deciding what format will be used for the book (traditional pages, accordion folded pages, mini-pocket book, digital book on slides, or other ideas), how many pages would be needed, and how many illustrations and words should go on each page.
- Have the young author/illustrator map out the plan, sketch draft pages, and then prepare the book over a series of work sessions that can extend over a week or so.



- Have the young author/illustrator present the book and explain the math operations, artistic decisions, and publishing process.
- Plan ways to present the book to a broader audience using photos, video recordings, or other technology for remote sharing.
- Help the young author/illustrator prepare answers to questions and listen to comments with a continuous improvement attitude. How could others' ideas help revise and improve the story?



- Have children respond to feedback from others and discuss additional math story possibilities.
- Ask the young author/illustrator what challenges publishers, authors, and illustrators might face when completing books.



- Review the steps of this project, which likely progressed over several days. Have children connect math operations to everyday events.
- Connect the storytelling aspects of this lesson to other language arts studies and look for history or science connections that could pertain to the homemade book.



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For Younger Children

- Focus on the math operations that children are learning such as addition and subtraction. Begin with numbers up to five, then 10, then 20, and so on. Multiplication and division are usually introduced in third grade and require more abstract thinking than addition and subtraction.
- Young children's oral storytelling and illustration skills are more advanced than their ability to write down their ideas. Put one or a few words on each page, or serve as a scribe to write the story that the young child dictates.
- Math stories can be dramatized to strengthen learning.

For Older Children

- Use this opportunity to reinforce basic math facts and practice math operations in playful, dramatic ways that boost the interest and engagement levels.
- Math stories can become quite sophisticated and take many twists and turns. Challenge the author/illustrator to develop a math mystery or thriller with math operations as the heroes.



Child Reflections

- How did the math operations theme influence story-making decisions?
- Describe how art was a springboard to understanding the math operation.
- Did sharing the story and sketches lead to any changes? If so, what changed? Why?
- If this was the first story in a series, what would the next one be?

Adult Reflections

- How was this lesson adapted to address the range of children's skills?
- What unexpected information and insights were learned during the project?
- Which objectives, essential questions, and guiding questions were most helpful?
- How was technology used for sharing children's work?

Standards and Skill Development

Educational standards outline what children should know and be able to do. These recommendations guide how children move through a progression of skills and understandings. Standards-based projects evolve as children contribute their ideas.

This lesson addresses the following educational standards:

LANGUAGE ARTS

- Analyze how and why individuals, events, or ideas develop and interact over the course of a story.
- Delineate and evaluate the argument and specific claims in written text, including the reasoning as well as the relevance and sufficiency of the evidence.
- Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
- Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach.
- Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

MATHEMATICS

- Solve problems involving math operations. Identify and explain patterns in arithmetic.
- Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from.
- Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g. claps), verbal explanations, expressions, equations, or by acting out situations.
- Explain why addition and subtraction strategies work.
- Understand the properties of addition, subtraction, multiplication and/or division, including whole numbers, place value, and/or fractions.

- Understand the properties of multiplication and the relationship between multiplication and division.

- Represent and solve problems involving multiplication and division.

VISUAL ARTS

- Combine ideas to generate an innovative idea for art making.
- Apply knowledge of available resources, tools, and technologies to investigate personal ideas through the art-making process.
- Select, organize, and design images and words to make visually clear and compelling presentations.
- Revise artwork in progress on the basis of insights gained through discussion.
- Convey meaning through the presentation of artistic work.
- Describe what an image represents.
- Synthesize and relate knowledge and personal experiences to make art.

SCIENCE

- Ask questions and define problems.
- Develop and use models.
- Use mathematical and computational thinking to explore science concepts.
- Obtain, evaluate, and communicate science information.