



Math Solutions: *Discussion Guide*

Overview

Math reasoning is essential for solving problems that arise in everyday life. Help your students to discover valuable logic, reasoning and organizational strategies behind the math solutions to real-world problems.

Use this discussion guide and related videos in your classroom to extend your students' understanding of the power of mathematics and to give them practice with proven approaches to problem-solving.

Student Glossaries

Explain that every field has its specialized vocabulary, and math is no exception. Understanding math terms gives students an advantage for solving real-world problems. Have students use dictionaries and math books to create flash cards defining each new math term, including those listed below:

deduction	statistics
equation	survey
graph	table
logic	unknown
pictograph	value

Classroom Activities

1. Show “Collecting Information and Using Statistics” video clip from *Mathematical Eye: Statistics*.

- **Pre-Video Activity:** Before showing the video clip, give students hypothetical problems, such as the following: “Imagine that you own a music store. How would you know which CDs to stock and how many?” OR “Imagine you are in charge of the school cafeteria. How would you decide how much food to buy?” Discuss the importance of collecting information and how numbers are essential for that process.
- **Vocabulary:** Have students make flashcards with definitions of *statistics*, *survey*, and *pictograph*. Encourage them to continue adding flashcards as they encounter the terms listed above.

- **Discussion:** After watching the video clip, ask students: What types of math problems and solutions does the video show (e.g., creating bus schedules, tracking animal migration, determining top 40 songs)? Why is collecting information necessary for the problems presented in the video? What is the value of statistics in other areas of life?
- **Survey:** Assign groups of students to design and conduct a survey to use for solving a problem. For example, students might determine the type of juice to stock in a school vending machine. Have students visualize their survey results with a pictograph. Ask students: How did numbers obtained from the survey help you to solve the problem?

2. Show “Using Logical Deduction” from *Mathematical Eye: Logic and Problem Solving*. (Access to *unitedstreaming* is required.)

- **Discussion:** Discuss how to solve problems by using logical deduction. Review how logical deduction was applied in the problems shown in the video:
 - a) How can logic solve the ping pong problem? How can a table help to organize the information for solving the problem? (Have students replicate the ping pong problem and draw logical deductions.)
 - b) How does “if ... then” logic help to solve the box problem? How can you use “if ... then” logic in other situations? (Show students how to diagram an “if ... then” relationship.)
 - c) How did the table help to organize information for solving the “Dracula duck” problem?
 - d) How can tables and graphs help you to solve a logic problem?
- **Problem Solving:** Give students the following logic problems to solve, and help them to organize and visualize the information they will use to come to a solution.
 - a) You must take a leopard, deer, and melon across a river in a boat, one at a time. If left together, the leopard will eat the deer and the deer will eat the melon, but the leopard won’t eat the melon. How can you transport all three safely to the other side of the river. (*Discuss the logic of the leopard and deer—and deer and melon—never ending up together. Diagram each boat trip. SOLUTION: Trip #1 across with deer, trip #2 back alone, trip #3 across with melon, trip #4 back with deer, trip #5 across with leopard, trip #6 back alone, trip #7 across with deer*)
 - b) Tyrone has three sisters, ages 6, 8, and 10, named Dara, Deidre, and Danika. The sister who’s 8 isn’t Danika, and Deidre isn’t 10. Dara isn’t the oldest or youngest. What is each sister’s age? (*Ask students how they can organize the information in a table to help solve the problem. For example, they might create a 3-column table with each sister’s name atop a column and the numbers 6, 8, and 10 below. SOLUTION: By logically eliminating the numbers that don’t apply, they can come to the solution that Danika is 10, Deidre is 6, and Dara is 8.*)

3. Show the video clip “Solving Problems in the Real World” from *Mathematical Eye: Working Things Out*. (Access to *unitedstreaming* is required.)

- **Pre-Video Discussion:** Discuss what practical problems mathematics can help solve—both at work and at play. Have students brainstorm to list problems they encounter in everyday life that can be solved with math. Examples include these:
 - Comparison shopping—How can you find the best value?
 - Finding locations—How can you determine how far someplace is, how far you can travel in a day, or where something is located on a map?
 - Figuring time—How can you decide on transportation, how much time to allow for a task, or how to schedule an activity?
 - Calculating money—How can you decide how much you can afford or what will be a total cost?
- **Post-Video Discussion:** Ask students how the materials supervisor calculated the number of bricks, as well as how the students determined the best value for beans. Question students about what they observed about using math to solve practical problems.
- **Problem Solving:** Direct students to use mathematical reasoning in the following real-life situations:
 - Comparison shop for the best value (size and brand) in a certain product, such as popcorn or frozen pizza. (*Guide students to divide price by weight to determine price per ounce.*)
 - Calculate the number of bricks or blocks a construction worker would need to replace a specific wall in the school. (*Guide students to measure a fraction of the wall and multiply.*)

4. Show students “Solving a Problem: Money Combinations” from *Solving Practical Problems*. (Access to *unitedstreaming* is required.)

- **Pre-Video Activity:** Tell students that the video clip will help them solve story problems that they might find in school or everyday life. Review the techniques of making a table and outline these steps for solving a story problem: a) understand the situation, b) determine the unknown, c) gather information, d) create an equation, e) solve the equation and label the answer, and f) check the answer.
- **Discussion:** Discuss how the video showed the above steps applied to a money problem. Ask: How did a table help to solve the problem? How was an equation used? What was the unknown?
- **Problem Solving:** Review these concepts by solving more story problems.

- **Writing:** Ask students to write a summary of what they learned about math solutions. In addition, assign them to write story problems of their own that apply the concepts they learned.

Academic Standards

This discussion guide addresses the following national standards:

National Council of Teachers of Mathematics

<http://standards.nctm.org/>

- Problem Solving:
 - Build new mathematical knowledge through problem solving
 - Solve problems that arise in mathematics and in other contexts
 - Apply and adapt a variety of appropriate strategies to solve problems
 - Monitor and reflect on the process of mathematical problem solving
- Number and operations
- Algebra
- Probability and Data Analysis
- Reasoning and Proof

Mid-continent Research for Education and Learning (McREL)

<http://www.mcrel.org/compendium/browse.asp>

- **Mathematics**
 - Uses a variety of strategies in the problem-solving process
 - Understands and applies basic and advanced properties of the concepts of numbers
 - Uses basic and advanced procedures while performing the processes of computation
 - Understands and applies basic concepts of statistics and data analysis
 - Understands and applies basic and advanced properties of functions and algebra
 - Understands the general nature and uses of mathematics