

TEACHER'S GUIDE

MATH SERIES 2

PROBLEM SOLVING, Part 2:

21 Minutes

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FOR USE IN: Mathematics

LEVEL: Grades 7-9

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EDUCATIONAL OBJECTIVES:

To help the students understand:

The five steps to take in solving a problem, one of which is to select a strategy.

The six common strategies used to solve a problem.

Why different strategies are better suited to different problems.

BACKGROUND INFORMATION:

No one can foresee the kinds of problems they will have to solve in their life or in their job. But this video will introduce you to an orderly process to follow, which will help you solve many problems. Not every problem is solved on the first attempt. If that happens, reexamine the problem for overlooked information, or try another strategy. We will explore the remaining four of six commonly used strategies in Part 2. It may take a combination of strategies to solve one problem. The key to more quickly solving a problem, is to first, clearly understand the problem, and then to relate the nature of the problem to the strategy most likely to solve it. Search your memory for strategies that have solved similar problems. Look at a problem in different ways to increase the chance of finding that analogy with a solved past problem.

CONTENT OF THE VIDEO:

The uncle of our young lady on camera has promised a ride on his boat if she can solve six problems. Two were solved in Part 1.

There is a review of what was learned in Part 1:

There are 5 important steps to follow in solving a problem:

1. Read and re-read the problem

2. Identify important information
3. Choose a strategy from among 6 choices we will learn later, which is best suited for solving the problem.
4. Solve the problem using the selected strategy
5. Check the answer to be sure it's correct.

There are six commonly used strategies to choose from. Two were explained in Problem Solving: Part 1: Guess and Check, and Simpler Related Problem. The remaining 4, which are to be explained in Part 2 are: Discovering Patterns, Drawing Pictures and Diagrams, Making Lists and Charts, and Working Backwards,

1. **Discovering Patterns Strategy** A problem may contain a pattern, which in this problem involves a set of numbers.

What is the pattern in the following sequence of numbers: 3, 7, 11, 15?

The pattern is that 4 is added to each number to produce the next in the sequence.

What is the pattern in this sequence of numbers: 1 2 4 8? The pattern here is that each number in the sequence is double the amount of the preceding one.

2. **Drawing Pictures and Diagrams Strategy** Visualizing a problem may suggest a solution. The problem posed is that a square garden, with 4 sides of equal length, is enclosed by a fence supported by 16 evenly spaced poles. How many poles are there on each side. A snap judgement answer might be 4, but by drawing a picture to help visualize the problem, a different answer presents itself. There are 5 posts on each side because the 4 corner posts are counted twice.

3. **Making Lists and Charts Strategy** Problems, which provide disorganized and partial information, may be solved by organizing the data into lists or charts. Here's the problem. John, Fran and Carlos have 3 ways to get around town: bike, walk or bus and 3 favorite destinations: shopping, beach and park. Work out who goes where and how using the following clues: the person who walks doesn't go to the beach; John goes by bike & doesn't go shopping; one person goes by bus to the park, and Fran doesn't like to walk

A grid chart is created with the three names across the top, and the three means of transportation given down the left side. Using logic, entered in the grid squares are the match ups of name, mode of transportation, and destination.

4. Working Backwards Strategy This strategy is particularly useful when one knows the end result of a series of transactions, and wants to find the value at the beginning of those transactions.

The problem: Dana is saving for a trip to Mexico. She already has some money in her savings account. In June she deposits \$300, in July she withdraws \$150, in August she deposits \$400 then checks the balance, which means the remaining amount of money left, and it's \$1,000. How much money did she have to start with? Working the calculations backwards, we arrive at \$450 as the starting amount. We check that answer by then doing the calculations going forward, from \$450 to \$1,000.

Having solved all the problems, Uncle Mat rewards his niece with a ride in his boat, which turns out to be far less glamorous than imagined.

AFTER SHOWING THE VIDEO:

Discuss why the four strategies explained in Part 1 were appropriate for solving the problems posed: **Discovering Patterns Strategy** for the number patterns given; **Drawing Pictures and Diagrams Strategy** for calculating the number of posts; **Making Lists and Charts Strategy** for who travels how to where; and **Working Backwards Strategy** for finding Dana's beginning bank balance. Do the students know of any analogous problems for which these four strategies might be useful?

These are suggested exercises, which involve all 6 of the strategies explained in both Parts 1 & 2:

1. Five students were in the cafeteria line today. Bernie was first in line. Joel was two places behind Edith. Lester was ahead of Pierre, who was fifth? Who was second in line?
2. Carl is 4 years older than Chris. Five years ago, Carl was twice as old as Chris.
How old is Carl now?
3. A student wants to give 25 cents to each of several charities but finds that she is 5 cents short, If she gives 20 cents to each, she will have 15 cents left. How much money does she have to start with?
4. Ernestine is 3 times as old as her sister Lucy. In 5 years, Ernestine will be twice as old as Lucy. How old are Ernestine and Lucy now?

5. The 400 voters in the town of Euclid voted on two issues. There were 225 in favor of the first issue and 355 in favor of the second. If 40 persons voted against both issues, how many voted in favor of both issues?
6. If $2 * 4 = 12$, $3 * 5 = 16$, and $1 * 2 = 6$, what is $2 * 3$?
7. How many boxes 3" by 4" by 5" will fit in a carton whose dimensions are 9" by 15" by 10"?
8. A group of Americans and Canadians were on a bus tour of Niagara Falls. There were 8 boys, 5 American children, 9 men, 6 Canadian boys, 10 Americans, 3 American males, and 15 Canadian females. How many persons were on the bus tour?
9. On what day of the week must the year start so that July 4 will fall on a Monday?

Math Series 1, consists of 10 videos:

- ALGEBRA: A Piece of Cake Part 1**
ALGEBRA: A Piece of Cake Part 2
SLOPES: That's a Bit Steep!
PERCENTAGES: That Make Sense
LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 1
LINEAR EQUATIONS and Their Graphs: Let's Get It Straight Part 2
INTEGER OPERATIONS: Into the Negative Zone Part 1 Adding and Subtracting
INTEGER OPERATIONS: Into the Negative Zone Part 2 Multiplying and Dividing
FACTORING IS FANTASTIC Part 1: Common Factors
FACTORING IS FANTASTIC Part 2: Quadratic Trinomials

Math Series 2, consists of 12 videos:

- PROBABILITY, Parts 1 & 2**
RATIOS
TRIGONOMETRY, Parts 1 & 2
STATISTICS Parts 1 & 2
PROBLEM SOLVING Parts 1 & 2
GEOMETRY Parts 1, 2, & 3

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