

MATHEMATICAL PROBLEM SOLVING

(AN INQUIRY-BASED APPROACH)

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In this workshop, you will learn how to teach the five analysis questions that must be asked to solve algebraic reasoning problems. The correct answers to these questions are guaranteed to lead students to the relation (equation or inequality) they must solve in order to find the answer to the problem.

I. Introduction

A. *Three Types of Problems*

1. “Fun”
2. “Strategic”
3. “Structured”

B. *Problem-Solving Approaches*

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.

C. *So What About “Textbook” Problem-Solving?*

II. Solving Textbook Story Problems using only One Variable

A. *Five Key Analysis Questions*

1. How many “things” are there in the problem?

(These might be considered the “main characters” in the story. These are the “things” which have value.)

WRITE THEM DOWN

2. What are the “is-sentences” in the problem?

(These are the relationships between the things, and there must be the same number of “is-sentences” as there are “things”.)

WRITE THEM DOWN

3. Which is-sentence will be used for the “open sentence”?

(Generally, this is an arbitrary selection, but usually the best choice is the most complicated is-sentence, or the one, which includes the most “things”)

SAVE IT

4. How will we represent the “things”?

(This is the point at which we were usually taught to “let something be x ”. Better choices come from noticing which things “depend” on other things for their value.)

REPRESENT THEM

5. What is the “open sentence” we will use to solve the problem?

(This is where we translate the “saved” is-sentence, using our representations for the things.)

TRANSLATE AND SOLVE

III. Solving Textbook Story Problems using More than One Variable

A. *Four Key Analysis Questions*

- 1. How many “things” are there in the problem?**

(These might be considered the “main characters” in the story. These are the “things” which have value.)

WRITE THEM DOWN

- 2. What are the “is-sentences” in the problem?**

(These are the relationships between the things, and there must be the same number of “is-sentences” as there are “things”.)

WRITE THEM DOWN

- 3. How will we represent the “things”?**

(This is the point at which we were usually taught to “let something be x ”. Now we can just use a different variable for each thing.)

REPRESENT THEM

- 4. What are the “open sentences” we will use to solve the problem?**

(This is where we translate all of the is-sentences, using our representations for the things, therefore creating a “system”.)

TRANSLATE AND SOLVE

B. *Try the examples again*

IV. So.....Is there a place for a “Structured Approach”?