WORD PROBLEMS AND THE FRIENDLY LETTER

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Introduction

The process of solving word problems has been accepted as a prominent issue for many mathematics teachers as they prepare to teach this very important problem-solving skill. In this article, this writer demonstrates an approach that teachers could use to help them to develop their own methods which are more concrete than simply asking their students to read the problem and to find the solution. In recent years, more emphasis has been placed on bridging areas of subject matter such as English and mathematics; therefore, solving word problems can be an ideal way of accomplishing this task. This plan for the solution of word problems includes both reading techniques and English skills within the scope of mathematics. The importance of this procedure is not that this is the only efficient method which can be used to solve word problems, but rather, that through research, through trial and error, and through creativity, various strategies for instruction can be developed to enhance the field of mathematical education. The content of this article is written for Algebra I classes; however, with minor variations, a similar procedure could be used with any level of mathematics students.

The Process

When solving word problems, several steps should be followed to obtain the desired outcome. These steps can be paralleled with the parts of the friendly letter. With the students having more concrete steps to execute, the solutions of the word problems should become more apparent.

The first step, which is to read the problem, can be compared to the writer's organization of thoughts when preparing to write a letter. While the need for physically writing the information is not essential, the student must read the problem carefully. This reading, of course, entails more than merely scanning the words. The student must ask several important questions about the problem in order to determine what information is needed.

1. Do I understand the meaning of each word and/or the meaning of each phrase?

2. Do I know which words and/or which phrases are not necessary in finding the solution?

3. Am I aware of the phrases which tell me whether to add, to subtract, to multiply, or to divide?

4. Can I find either the word or the phrase that will indicate the placement of the equals sign?

5. Can I think of a shortened word statement which would be in the form of an equation?

These questions should encourage the student to think about the most important details given in the problem. With all of these questions answered, the student will have a better perspective as to the procedure for finding the solution.

Now the student should be able to write the heading, or the first part of the solution. Just as the heading is the first written part of the friendly letter, the heading also is the first written part of a word problem. To decide what quantity or what quantities need to be found, the student must represent one unknown quantity in terms of the first unknown. After this representation is completed, the student can continue to the next step.

The second part of a friendly letter is the salutation, or the part that tells the reader to whom the letter is being written. With a word problem, the next written part is the equation, or the directions used to find the solution. When writing the equation, the student will need to find two quantities that are equivalent. A knowledge of finding both the subject and the predicate of the sentence is essential in writing the equation of the word problem. In most instances, the key word in finding the equivalent parts of the word problem is an intransitive verb, which will signify the equals sign. Then by using the information for the heading and by using both the subject and the predicate, the student can find the equation by visualizing, SUBJECT EQUALS PREDICATE.

The body of a letter is the writer's words which give information that the reader should know. The body of the solution of a word problem is the series of steps necessary to solve the equation. The student would need to use knowledge of algebra to complete the solution.

The complimentary close of a friendly letter can be compared with the writing of the solution to the word problem. When completing a friendly letter, a person will use the complimentary closing to indicate that the letter is finished. When completing the solution of a word problem, the student needs to find the values of the unknown quantities which were stated in the heading.

The final part of a friendly letter is the signature, which indicates that the writer has completed what s/he wanted to say. The final part in the solution of a word problem is the checking of the results to determine if the correct values for the unknown quantities have been found. Just as a friendly letter can be signed informally with either the writer's first name or nickname, a problem can be checked informally without explicitly writing the details as to why the solution is correct; however, since a friendly letter can be signed formally by using the writer's legal signature, the problem also can be checked formally by denoting the information which determines the solution to be correct. In most cases, the informal check is sufficient in ascertaining the validity of the solution.

After relating the parts of a friendly letter to the steps in the solution, the student now has the tools to use in making more astute decisions as to the precise meaning of the word problem. The steps can be followed directly so that the student will have a chain of facts to help in proceeding with a plan of attack. With practice, the student should gain much confidence and should be able to solve more involved problems.

Conclusion

The comparison of the parts of a friendly letter and of the solution to a word problem is listed below in the order that each would be accomplished.

FRIENDLY LETTER		WORD PROBLEM
Compile thoughts	←−−−−−−→	Read problem
Heading	←−−−−−−→	Heading
Salutation	←−−−−−−→	Equation
Body	←−−−−−−→	Body
Complimentary close	←−−−−−−→	Solution
Signature	←−−−−−−→	Check

The following is an example of a solution using this method for solving word problems.

EXAMPLE: The capacities of two trucks are 3 tons and 4 tons, respectively. If the larger truck makes 3 more trips than the smaller, its total haul is 20 more tons than that of the smaller truck. How many trips does each truck make?

NOTE: (Tons hauled by larger truck EQUALS tons hauled by smaller truck + 20 tons.)

HEADING:
$$x = \text{trips by smaller truck}$$
$$x + 3 = \text{trips by larger truck}$$

EQUATION:
$$4(x + 3) = 3x + 20$$

BODY:
$$4x + 12 = 3x + 20$$

SOLUTION:
$$x = 8$$
$$x + 3 = 11$$

CHECK (informal):   Will the tons hauled by the larger truck EQUAL the tons hauled by the smaller truck plus 20 tons?

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Margaret Jo Gray has matched a six-step problem-solving algorithm to six steps in letter writing. You may want to give her plan a try or you may have a different approach which works for you. Our readers would like to see your words on how you have solved the problem of how to solve word problems.

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CIRCULAR REASONING

Insert 0,1,2,...,9 in the ten small circles to that each large circle has the same total. At least six different totals are possible (See p. 28 for answers.)