



Using Schema-Based Instruction to Solve Math Word Problems Lesson 1: One-Step Math Word Problems

Objective: To teach students the skills to distinguish between three different word problem types using the schema strategy and solve one-step math word problems using the schema strategy.

Setting and Materials:

Settings: Resource Classroom (Special education classroom: 45 minute middle school math class)

Materials:

- Strategy diagram worksheets
- Practice problems
- Worksheets with story situations
- Note sheets with strategy rules for identifying the total and the operation to use when solving word problems

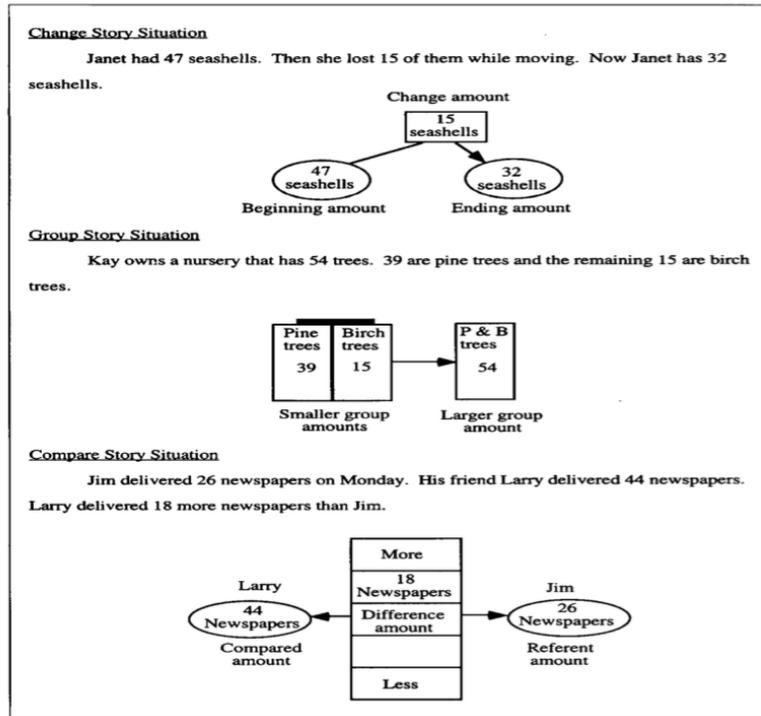
Content Taught

Teach the skills needed to solve one-step math word problems including the following operations (a) addition, (b) subtraction, (c) multiplication, and (d) division, as well as, how to distinguish between three different word problem types.

Teaching Procedures

1. Introduce the lesson
2. Provide direct instruction to explain the rules:
 - a) To assist students with memorizing the rules, use a self-instructional sheet with written rules to help them identify the total and operation.
 - b) Until students can memorize the rules independently, let them use a notes sheet as a scaffold while completing problems during guided practice.
 - c) Explain the three features of each problem type (change, group, and compare) in story situations that do not contain any unknown information.

Example:



3. Model the strategy
 - a) Give students schemata diagrams to follow along with you.
 - b) Model for the students how to solve the problem using the schemata diagrams.

4. Guided Practice
 - a) Provide students schemata diagrams to allow students to map features of the story situation into the diagrams.
 - b) Help students solve the problem using the correct story mapping procedures
 - c) Make sure each student applies the strategy steps.
 - d) Once students demonstrate knowledge of problem schemata, begin to give them word problems instead of story problems.
 - e) For the word problems, teach students to identify the missing element in the problem with a question mark.
 - f) Teach students to find the key words in the text that tell them the operation. Example: In a change problem, understanding whether the problem ended up with more or less than the beginning amount was important. Students were taught that when the problem ended up with more, the ending amount represented the total. However, if the problem ended up with less, the beginning amount was the total. In a group problem, the larger group object always represented the total because

the smaller groups combined to form the larger group. In the compare problem, the quantity represented by the higher value was deemed to be the total. It was critical for students to determine whether the referent or the compared object represented the higher value in the problem by examining the comparison or difference statement (e.g., Larry delivered 18 more newspapers than Jim).

- g) Next, teach student a rule based on the part-whole concept for determining the correct operation by examining the part of the situation that was unknown and whether or not it represented the total amount. For example: “when the total is not known, we add to find the total; when the total is known, we subtract to find the other amount.”

5. Independent Practice

- a) Give the students problems for one type of problem for independent practice with a diagram sheet.
- b) Next, give the students problems for another type of problem to solve and do not give them a diagram sheet, encourage them to draw their own.
- c) After students, do well on those problems give them a worksheet with all problem types.

Evaluation

After giving feedback on independent practice, give student a 10-item word problem test immediately following instruction.

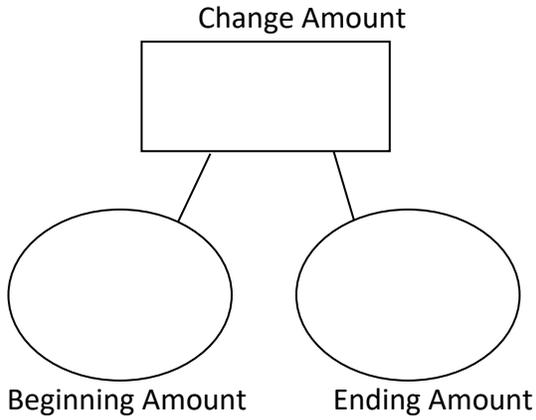
Lesson Plan Based on:

Jitendra, A. K., Hoff, K., & Beck, M. M. (1999). Teaching middle school students with learning disabilities to solve word problems using a schema-based approach. *Remedial and Special Education, 20*, 50-64.

Worksheet with diagrams

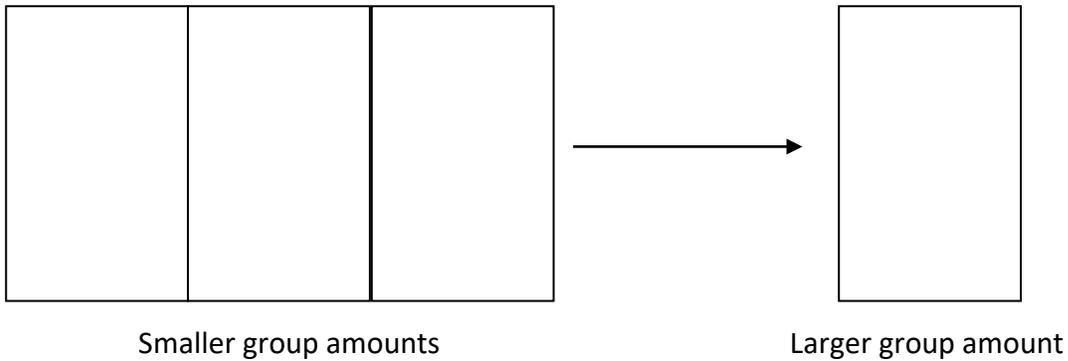
Change Story Situation

Jake cleaned out his closet and donated 12 pairs of shoes to Goodwill. He now has 14 pairs of shoes. How many pairs of shoes did he have before he cleaned out his closet?



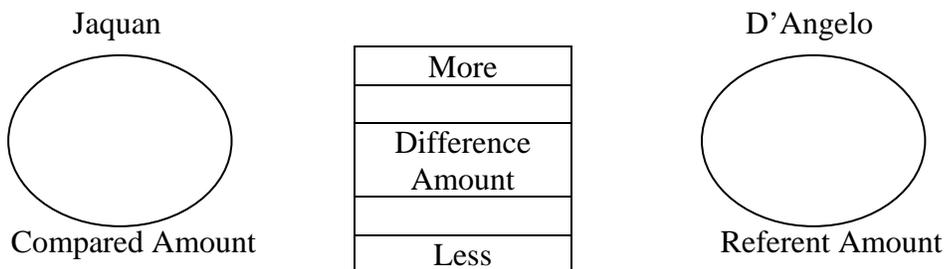
Group Story Situation

Shauna bought three types of fruit at the grocery story. She bought a total of 18 fruits. She bought 5 bananas and 9 apples. How many mangos did she buy?



Compare Story Problem

D'Angelo owns a car mechanic shop. He worked on 21 cars on Monday. His friend Jaquan owns another mechanic shop. He worked on 17 cars on Monday. How many more cars did D'Angelo work on?



Worksheet of problems without diagrams

Change Story Problems

1. Henry's class made "Earth Day" posters in the morning. Then they made 14 more posters in the afternoon. Now they have 42 "Earth Day" posters. How many posters did Henry's class make in the morning?

2. Jenny's science class constructed 12 model rockets during first period. Second period made 16 rockets. Third period made rockets too. At the end of third period, they had 43 rockets. How many rockets did the third period class make?

3. Simone bought 36 thank you cards for all of her friends. She gave away 13 at school. How many cards does she have left to mail out?

4. There were 41 people at Lori's party. 13 people left the party before eating cake. 13 more people left the party after eating cake. How many people are still at the party?

Group Story Problems

1. In Mr. Test's class, there are 19 students. 13 students are girls. How many boys are in the class?

2. Kari owns a nursery that has 54 trees. 36 are pine trees. How many are birch trees?

3. Steven has a car lot that has 100 cars on it. He has three types of cars. He has 33 Jeeps and 27 Camaros. How many mustangs does he have?

4. Dariel went to the grocery store to buy soda for a party. He bought 32 cans of orange soda, 24 cans of sprite, 16 cans of grape soda, and 32 cans of Coca-Cola. How many total cans of soda did he buy?

Compare Story Problems

1. Jim delivered 29 newspapers on Monday. His friend Larry delivered 51 papers. How many more papers did Larry deliver than Jim?

2. Joseph weighs 125lbs and his friend Cody is 16 lbs. lighter than Joseph. How much does Cody weigh?

3. Catherine rode her bike 23 more miles than Dave did in the past two weeks. Dave rode his bike 13 miles last week and 21 miles this week. How many miles did Catherine ride during the past two weeks?

4. Debbie checked out 33 books at the library during the last month. She checked out 7 more books than Tosha did. How many books did Tosha check out?

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