What Is Problem Solving?
Teacher Notes

Purpose:
Participants will begin to formulate a definition of problem solving.

Overview:
Participants will each read one of four sets of definitions on problem solving. After reading and highlighting key points, they will share what they read with the other members of their group. Then each group will create a product on chart paper that represents their definition of problem solving.

Materials:
- Highlighters
- Chart paper
- Markers
- Yard sticks or meter sticks

Transparencies/Handouts:
- Transparencies
- Definition Sets A, B, C, and D (one copy of each set per table of four and extra copies if needed)

Procedure:

Steps	Questions/Math Notes
1. Distribute the four sets of definitions of problem solving among the participants at each table. If there are more than four participants at a table, provide extra copies of one or more of the sets of definitions as needed, and two people may read the same set.	Many teachers view problem solving as something extra: the word problems at the end of the problem set or the challenge problems used as warm-ups or for extra-credit. Some approach problem solving by simply teaching a list of strategies such as "guess and check" and "work backwards." This activity is designed to give teachers an opportunity to review some of the literature on problem solving and to begin to develop a definition based on the research in effective teaching of mathematics. A first-year teacher who participated in the pilot session for this institute said that this activity "…helped me to clearly understand what problem solving is. I started to connect …[that] what I thought was problem solving may not necessarily be problem solving."

	An experienced teacher said that this "…analysis of the problem-solving process helps us teachers by (1) showing us what we are already doing well and, (2) giving ideas to refine and add to our present strategies."
Display Transparency 1B-1 and ask participants to take time to read silently one of the four sets of definitions of problem solving. Use the transparency to explain the process that will be used to share the content of the sets of definitions.	
Allow participants 10-15 minutes to silently read and highlight key points in the set of definitions.	
After the 10-15 minutes have elapsed, participants will share with the other members what they learned from their reading.	
After the sharing of readings is completed, use Transparency *What is Problem Solving* to guide participants in creating a beginning definition of problem solving. Groups will respond to the prompts "Problem Solving Is…" and "Problem Solving Is Not…." Groups create lists on chart paper, which will be posted on the wall during the break and will be displayed for the duration of the institute. Each group will briefly present its two lists.	Problem solving is engaging in a task for which the solution method is not known in advance. Problem solving is the goal of mathematics. Problem solving is a means of learning mathematics. Problem solving is a challenging and complex process, requiring the use of higher order thinking skills that lead to deeper understanding of meaningful mathematical concepts. Problem solving is not practicing a skill. Problem solving is not a set of prescribed steps. Problem solving is not Friday or any other particular day set aside for problem solving. Problem solving is not a set of word problems that use the same algorithm.
Allow one or more members of each group to briefly explain the group's two lists.	
In a whole-group discussion, list on a transparency the important points and common threads from all the groups' lists of *"What Problem Solving Is"* and *"What Problem Solving Is Not."* Discuss similarities and differences and important points in definitions. See questions in column to the right.	*What similarities do you see in the definitions of problem solving?* *Are there differences in the definitions?* *What important points emerged from the descriptions of what problem solving is not?* *Has your view of problem solving changed? If so, how?*

	What questions does this activity create for you? Are there new questions you have about problem solving?

Readings for this activity, following in Definition Sets A – D, are taken from these sources:

Baroody, Arthur J. *Problem Solving, Reasoning and Communicating (K-8): Helping Children Think Mathematically.* NY: Macmillan Publishing Company, 1993.

Burns, Marilyn. *About Teaching Mathematics, A K-8 Resource.* Sausalito, CA: Marilyn Burns Education Association, 1992.

Charles, Randall and Frank Lester. *Teaching Problem Solving: What Why & How*. Palo Alto, CA: Dale Seymour Publications, 1982.

Herr, Ted and Ken Johnson. *Problem Solving Strategies: Crossing the River with Dogs and Other Mathematical Adventures*. Emeryville, CA: Key Curriculum Press, 1994.

Hyde, Arthur A. and Pamela R. Hyde. *Mathwise: Teaching Mathematical Thinking and Problem Solving.* Portsmouth, NH: Heinemann, 1991.

Lenchner, George. *Creative Problem Solving in School Mathematics.* Boston, MA: Houghton Mifflin Company, 1983.

National Council of Teachers of Mathematics. *Principles and Standards for School Mathematics.* Reston, VA: National Council of Teachers of Mathematics, 2000.