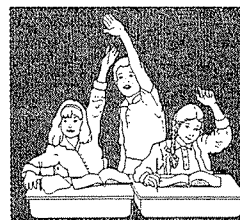


Problem-Solving Practices

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Problem solving provides a context for applying concepts and skills as well as stimulating discourse. For problem solving to be effective, one needs to prepare adequately as well as facilitate the discourse when solutions are shared.

Smith, Hughes, Engle, and Stein (2009)

have identified five practices to increase the likelihood of getting the most mathematics out of each high-level task that students work on:

1. anticipating students' responses to challenging mathematical tasks;

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2. monitoring students' work on and engagement with the tasks;
3. selecting particular students to present their mathematical work;
4. sequencing in a specific order the student responses that will be displayed; and
5. connecting different students' responses and connecting the responses to key mathematical ideas.

First, select a challenging problem and then solve the problem in as many ways as you can. Think about how students might solve the problem correctly and identify incorrect solutions. Solving the problem helps determine questions to ask students while they are working or when they are presenting their solutions.

When introducing the problem to students, be sure they understand what is being asked and provide three to five minutes for them to work independently before working with a

partner or in groups. Circulate while students work and note the solutions that students generate. Ask questions about their solutions. Decide which solutions you will ask to be presented to the class and in which order they will be presented to get at the mathematics you want to highlight.

The sequence of solutions can help students make connections between solutions and see the same mathematical idea expressed in more than one way. At the end of the presentations, provide time for students to make notes about the solutions.

These five practices provide a model for planning and implementing problem solving that is mathematically rich and student centered.

References

Smith, M.S., E.K. Hughes, R.A. Engle, M.K. Stein. "Orchestrating Productive Mathematical Discussions." *Mathematics Teaching in the Middle School* 14 (May 2009): pp. 549-556. 