

Alternative Problem Solving Method

1. **Select an appropriate problem.** The problem should match the current unit of instruction and help students see the connection between what they are learning & the application to the real world.
2. **Assign students to small groups.** Ideally the groups should consist of 3 students.
3. **Distribute the problem and an alternative write-up guide.** Explain the three sections of the write-up guide and what is expected in each section.
4. **Have students count off in their small group.** Each student should write his/her assigned number on the top of the write-up guide. This number will be used for the rotation process.
5. **Students create data sheet.** Each student creates an individual data sheet to record their own thinking/work as they attempt to solve the problem. The student will use this as a guide for completing their write up. This data sheet is similar to the data sheet used in the poster method; it is a place to capture a student's initial thinking about a problem.
6. **Let students attempt to solve the problem independently.** Students should have about 5 minutes to work on the problem and record on their individual data sheet.
7. **Students record their independent work.** At the end of the 5 minutes, ask students to write in complete sentences in the “**Independent Work**” section of the write-up guide. Students who didn't record anything on data sheets can write their thoughts or any questions they may have. Students must write something.
8. **Explain the “hint” process.** A hint can be a clarification, a strategy, or even a formula. During the group work time, if students think they have an insight into the information necessary to solve the problem, they are able to write that information/hint on the board (i.e. a student may write “there are 36 inches in a yard”). At this point the teacher asks all of the groups to stop working, to look at the hint and have the student read/explain it. The teacher should not react positively or negatively about the hint. Allow students to determine the usefulness/quality of the hint.
9. **Begin group work.** Students work in their small groups for about 10 minutes, recording the group's work on the individual data sheet.
10. **Record initial group work.** At the end of the 10 minutes students record what they did to solve the problem with a few sentences in the “**Cooperative Work**” section of the write-up guide.
11. **Do the first rotation.** Call out one of the student numbers and have that person from each group stand and choose another group taking their data sheet and write-up with them. The rotation can occur in a specific movement or randomly.
12. **Continue group work with new members.** Students should work for another 10 minutes to continue solving the problem. To begin, the new member shares any information/work accomplished from the first work session as the other members share their information. All students record the new information on their individual data sheet and continue to solve the problem together.

- 13. Recording on write-up guide.** At the end of the 10 minutes students record what they did with their second group to solve the problem in the “Cooperative Work” section of the write-up guide.
- 14. Second rotation.** The teacher states another number and that student from each of the groups moves to a new group. (The rotation can occur in a specific movement or randomly.)
- 15. Begin work with new group.** Students add any new information from former groups to their own data sheets and continue working for another 10 minutes to solve the problem.
- 16. Recording on the write-up guide.** As in #13 above students write a few more sentences on their write-up guide.
- 17. Students complete the “Answer and Verification” section.** As students think they have solved the problem they can begin their work on the final section of the write-up guide. Students use the hints that were recorded and any of the work they did in the varied groups to develop their final solution and proof.
- 18. Create the final product independently.** For homework, students use their data sheets and write-up guides to decide on their own solutions. Each student writes a summary on a new piece of paper that contains a paragraph for each section of the write-up guide. (Teachers may choose to have students complete this the next day in class during the first few times it is introduced or to allow those students needing more time and assistance with the writing process.)
- 19. Process the solution.** After students have completed their possible solutions (the next day or the 3rd day) have several students present their proposed solution and verifications. Then have a class discussion regarding the actual correct solution and the mathematics supporting that solution.
- 20. Assess the completed student work.** Involve students in self-assessment of their work. Teachers should use a rubric to assess the student work providing feedback in specific, observable, and measurable terms.

Alternative Problem-Solving Write-up Guide

- 1. Title of Problem**
- 2. Independent Work** (Record what you did to try to solve the problem by yourself.)
- 3. Cooperative Work** (Record what you did to try to solve the problem with others.)
- 4. Answer and Verification** (Write your answer and explain how you know your answer is correct mathematically.)