

Finding Solutions

Many projects ask students to generate a solution to a problem. As life and work become more complex in the 21st century, problem-solving skills will be critical for success. Problem-solving skills are composed of identifying and describing problems, using heuristics (thinking tools and routines), coping with complexity, reasoning, argumentation (in upper grades), and decision making.

In many ways problem solving is the ultimate thinking skill because it encompasses all other kinds of thinking: critical thinking, creativity, and decision making. Students are asked to solve important problems in these Unit Plans in *Designing Effective Projects: Float that Boat, Go-Go Gadget, Creative Kids Go Pro, Plugging into the Sun, The Earth Moves Under My Feet, Biomes: Action for a Healthy Planet, and Designer Genes*. The opportunities for teaching problem solving extend far beyond units designed for that purpose. Any student-centered activity can serve as a forum for teaching and assessing a specific problem-solving skill.

Students in Mr. Burton's physics class solve a problem involving motion in *Phabulous Physics*, one of the Unit Plans in *Designing Effective Projects*. They prepare brochures illustrating a real-world problem related to motion that answers the Unit Question, *How do the laws of motion describe everyday events?* They illustrate the problem, show how to solve the problem using physics principles, and use a spreadsheet to graphically show some aspect of the solution.

Mr. Burton knows from previous units that his students are often frustrated and confused when they are presented with projects that do not have clear solutions. Many of them feel that science is a topic with right answers that they just have to memorize, and the transition to more authentic work with physics has been a challenge for them. Therefore, in this unit he is going to focus on helping students cope with complexity in addition to the academic content. He presents them with a rubric from *Assessing Projects* that he modified to suit this project and provides them with some explicit instruction on strategies to help them deal with all the tasks they need to complete as part of the project.

As students are working on the project, he takes anecdotal notes specifically about how well students are doing with the complexity. Periodically, he asks them to write in their learning logs about how what they are doing compares with the rubric they received at the beginning of the unit. When he notices that particular students are having trouble, he meets with them individually or in small groups, giving them strategies they can use to minimize their frustration levels. During these conferences, he is careful not to provide students with answers to their questions, just with strategies they can use to form their own questions and find their own answers.