

The Whiteboards

Rapid advances in technology require individuals in science, technology, engineering and mathematics (STEM) fields careers to skillfully apply their problem-solving knowledge to novel situations. But what does it mean to be a good problem solver? Problem solving has been described as “knowing what to do when you don’t know what to do.” A good problem solver is someone who can approach any problem in a systematic way: dissecting and analyzing it, and formulating a coherent and viable strategy for developing a solution. Good problem solvers are patient and methodical, carefully considering all options before moving forward toward a solution. They break complex problems down into smaller, more manageable steps, making reasoned decisions on how to approach each step. Good problem solvers manage the problem solving process by planning, monitoring, and evaluating their progress and strategies, and adjusting their approaches when necessary. ¹

The *Whiteboards* were developed with the help of industry partners to help you improve your problem solving ability by walking you through a four-step process consisting of problem analysis, independent research, brainstorming, and solution testing.



The Problem Solving Cycle

Step I. Problem Analysis

The first step in problem solving is to clearly define the problem. Exactly what is the problem you are trying to solve and what is the desired outcome? To do this, you must first identify and list the criteria against which your solution will be measured. You must identify what you know about the problem (i.e., what is given), what you need to learn to solve the problem and any assumptions you need to make if information is missing. Once you have clearly defined the problem, you are ready to move forward and seek out the knowledge and skills needed to solve the problem.

Clearly define the problem:			
What are the criteria for a successful solution?	What do we know about the problem?	What do we need to learn? Be specific.	Are there any assumptions we must make?

Step II. Independent Research

Independent Research involves developing a plan to acquire the knowledge you identified in Step 1 as necessary to solve the problem. Divide up the learning with your team members, set deadlines and develop an action plan for how you and your team will acquire the knowledge and skills needed to solve the problem.

Divide up the learning: Who will do what?	How much time do we have to complete the research?	What is our action plan for acquiring the knowledge we need?

Step III. Brainstorming

Brainstorming involves sharing what you've learned through your independent research with your team in order to generate possible solutions. This requires carefully listening to and considering the input of your teammates—it is important to exchange ideas without criticism or judgment. Through this process, you will be able to identify a solution that represents the collective knowledge of the group.

Solution ideas	Pros	Cons	Ranking

STEP IV. Testing Your Idea

Testing your idea requires developing a detailed plan to validate your solution based on the criteria you defined in the Problem Analysis phase. A good test plan is one that someone of reasonable intelligence can follow and replicate your results. In cases where it is unrealistic to test your solution, you should provide conclusive evidence describing how your solution addresses each of the stated criteria.

List the criteria for a successful solution identified in your Problem Analysis.	How does your solution address each of the criteria listed?	If applicable, how would you validate your solution?

Notes: