

**12-Step Quantitative Problem Solving Method**

*Last updated 1/10/2009 by Dr. Traum*

1. Write the goals that are being solved for.
2. Write what is known about the problem from the problem statement.
3. Sketch the problem in a diagram or schematic.
4. Select a sign convention.
5. Define the closed system, control volume, or region of interest in the diagram.
6. List all engineering assumptions and idealizations.
7. Write out complete equations for the applicable phenomenological laws and relationships that will be applied to the region of interest.
8. Write out the complete equations for all constitutive relationships governing the region of interest.
9. Apply engineering assumptions and information known about the problem to simplify the equations for phenomenological laws and constitutive relationships.
10. Solve the resulting equations to achieve the goals.
11. Apply engineering intuition to the solution to assure the result “makes sense”. Check the units of the solution – are they the same as the goals’ units?
12. Repeat Steps 1 – 11 if the answer in Step 10 seems unsatisfactory per the analysis in Step 11.